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A CASE STUDY OF SOFTWOOD LUMBER AND
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Bruce Peter Glass

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THE TRANSITION FROM A COMMODITY TO A DIFFERENTIATED PRODUCT: A CASE STUDY OF SOFTWOOD LUMBER AND MICHIGAN MILLWORK MANUFACTURERS.

By

Bruce P. Glass

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ABSTRACT

THE TRANSITION FROM A COMMODITY TO A DIFFERENTIATED PRODUCT: A CASE STUDY OF SOFTWOOD LUMBER AND MICHIGAN MILLWORK MANUFACTURERS.

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The problem this dissertation addressed concerns commodity price fluctuation. It considered a method by which a firm might minimize the adverse impacts of commodity price fluctuation. Conversion of a commodity to a differentiated product was the approach adopted. The commodity examined was softwood lumber for manufacturing millwork.

A three-part process was examined by which this conversion might be implemented. The first part consisted of analyzing competitive forces affecting firms in a commodity-based industry. The second part involved determining who makes specific decisions in each of four stages forming the purchase process. Levels of preferred product characteristics are determined in the third part.

Two structured questionnaires were used to gather data from respondents in lower Michigan millwork manufacturing companies (40% and 43% response rates respectively). Structural and background information was obtained from primary respondents. Primary respondents were asked to identify secondary respondents, from whom data concerning

lumber purchasing practices and product characteristics were obtained.

Intense rivalry existed among millwork manufacturers employing 20 or more persons. The principal competitive forces were substitution at the raw material and finished product levels, and the threat of entry to millwork manufacturing resulting from low entry barriers.

Purchase decisions were made mainly by customers (or their agents) outside, or individuals within, millwork companies. Within companies these decisions tended to be made mainly by company executives, but in certain stages of the purchase process, specialists were prominent contributors also.

Conjoint analysis was used to examine preferred price and product characteristics among secondary respondents. The preferred bundle consisted of softwood lumber purchased at least price from a vendor who extended credit to customers, offered cumulative discounts and customer-satisfaction guarantees, and was willing to enter supply contracts. Physical attributes were: shop grade lumber; boards of specified dimensions (14 feet long, 14 inches wide, and one inch thick); and waterproof paper packaging.

Along with several method modifications, managerial implications were discussed. Future research possibilities were identified also.

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PREFACE

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CHAPTER I. INTRODUCTION

Problem statement

This dissertation is concerned with how a commodity producer might minimize adverse effects of commodity price fluctuation. In other words, it deals with how benefits associated with stable commodity prices might be realized by commodity processors, and perhaps commodity producers and the ultimate consumers of the final product(s) as well.

Commodity price fluctuation originates in the dynamic structure of commodity markets (Kirpalani, 1985). Ready switching between different products in the same commodity group implies that demand for commodities tends to be elastic. Supply is relatively inelastic, at least in the short run. This disparity in demand and supply elasticities leads to price fluctuations as markets clear.

Price indices for a variety of different commodities are displayed in Table 1. For any two year interval over the 1978-86 period, the maximum price fluctuation for the commodities displayed ranged between 21% and 126%.

At the international level price fluctuation can lead to problems, especially acute for the less developed countries. These countries are most dependent upon

Table 1 : World commodity price indices[1] for selected commodities, 1978-86.

Commodity[2]	Year				
	1978	1980	1982	1984	1986
Metals					
Aluminum	74.6	100.0	55.9	70.5	64.8
Copper	62.5	100.0	67.8	63.0	62.7
Tin	76.7	100.0	76.5	72.9	38.7
Zinc	82.7	100.0	105.0	131.1	106.3
Energy					
Coal	98.5	100.0	120.6	100.0	84.6
Petroleum	44.3	100.0	116.8	99.3	n.a.
Food					
Bananas	76.4	100.0	99.9	98.5	105.4
Beef	77.5	100.0	86.6	82.4	75.9
Butter	72.3	100.0	86.2	62.0	76.1
Palm oil	103.0	100.0	76.3	125.0	44.1
Rice	80.4	100.0	73.9	76.6	69.1
Soybeans	90.6	100.0	82.5	95.2	70.4
Sugar	46.5	100.0	66.3	72.4	69.8
Tea	98.3	100.0	86.7	155.2	86.6
Raw materials					
Cotton	70.8	100.0	73.8	83.8	64.8
Jute	126.9	100.0	90.3	181.7	103.9
Newsprint	81.2	100.0	113.4	116.0	116.8
Plywood	69.2	100.0	85.6	82.9	100.1
Pulp	62.2	100.0	87.7	88.9	87.5
Rubber	68.0	100.0	77.6	67.5	56.1
Sawnwood	55.0	100.0	81.7	83.0	72.0
Sisal	62.1	100.0	77.8	76.3	67.3
Wool	79.0	100.0	77.3	75.8	77.8

Key
n.a. = not available.

Notes
1 : Base year is 1980.
2 : Refer to source for information concerning pricing points.

Source: Anonymous, 1987a.

commodity exports as the major source of the foreign exchange earnings needed to pay for imports (Table 2).

What is a commodity?

Groupings of similar products are often referred to as commodities. They are typically raw materials or minimally processed products. Products within a commodity group have more in common with each other than with products outside the group. Two conditions must be satisfied before a grouping of products is regarded as a commodity (Lancaster, 1966, 1979):

1. The products possess common characteristics not shared with or easily distinguishable from products outside the group.
2. To the extent that products possess similar and dissimilar characteristics setting them apart as a group, products within the group are viewed as equivalent in use.

The above two conditions help impart commodities with their most often observed feature, i.e., price. Commodity consumers are very price sensitive, provided they perceive no substantive differences between products in the same commodity group, and transaction costs are sufficiently low so as not to create switching disincentives.

What is competitive strategy?

Sustained competitive advantage is the ultimate goal of competitive strategy for the firm (Porter, 1980).

Table 2 : Share of primary commodities[1] in value of merchandise exports by economic groups, 1966-1984.

Economic grouping	Year				
	1966	1970	1975	1980	1984
			(%)		
Developed market economy countries	28.5	22.1	19.7	19.1	17.1
Less developed countries					
All	53.9	48.3	25.4	18.6	20.9
Excluding major petroleum exports	71.2	65.6	52.2	40.2	32.7
Socialist countries					
East Europe	25.2	21.5	17.7	13.0	9.8
Asia	36.7	40.2	35.4	24.2	20.1
World	31.5	27.0	21.1	18.5	17.4

Note
1 : Sum of agricultural primary commodities and mineral commodities defined as Standard International Trade Classification sections 0, 1, 2 (less groups 233, 244, 266, and 267), and 4 (division 68, item 522.56 only).

Source: Anonymous, 1987b.

Subsidiary strategic objectives include seeking, seizing, and maintaining this competitive advantage - processes which imply that competitive strategy is dynamic. Competitive strategy for a firm is defined therefore as a dynamic process involving selection and coordination of the means by which the firm seeks, seizes and maintains competitive advantage[1].

Porter (1980) has identified two extremes of competitive strategy. At one extreme a cost leadership strategy commits the firm to produce its product at least cost within an industry. Insofar as market price reflects production costs, a firm in a cost leadership position can afford to sell its output at the lowest price in the industry and still remain in business, even in the face of commodity price fluctuation. Although the firm's principal objective is to reduce its costs relative to its competitors, quality, service, substitute commodities, and final products cannot be ignored.

The cost leadership strategy emphasizes the commodity features of a firm's product and sales methods. Such emphasis is typically placed on intrinsic product characteristics[2], with consumers viewed as being alike, and

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1 This definition is very similar to one proposed by Chandler (1962), i.e., "...the determination of the basic long-term goals and objectives of an enterprise, and the adoption of courses of action and the allocation of resources necessary for the carrying out of these goals" (p. 13).

2 Termed attributes in the marketing literature.

with the product market regarded as being static. The firm appeals to consumers on the bases of price and quantity, often with minimal regard to either consumer expectations or how its product could be made to appear unique or attractive to consumers. Usually the firm's objectives are related to maximizing production and/or sales of product.

A product differentiation strategy is the other extreme. Here the firm not only actively seeks to distinguish its product from those of other firms, but also seeks to enhance its product's appearance to consumers by differentiating its product into a single-product product group. In so doing the firm aims to attract (or create) consumers who are less price sensitive in their purchasing behavior than might otherwise be the case. The firm thereby insulates itself from commodity price fluctuation.

The product differentiation strategy does not allow the firm to ignore costs. Instead it requires strict justification of costs incurred over and above the least cost alternative. This strategy requires the firm to recognize the existence of differences in consumer needs and wants, that product markets are dynamic (perhaps even malleable), and that the firm must appeal to consumers on the basis of desired product characteristics.

Statement of objective and contribution

The objective of this dissertation is to investigate how a firm can use competitive strategy to help avoid the

adverse impacts of commodity price fluctuation. Specifically, the process of transforming a commodity into a differentiated product is examined[3]. Softwood lumber for use in millwork manufacturing is used as a vehicle to study this process[4].

The contribution of this dissertation is practical. It presents and examines a three part method which a firm can use to achieve the transition from a commodity to a differentiated product. The perspective adopted is that of a potential softwood lumber vendor.

Research assumptions

The assumptions underlying this dissertation are:

1. At present, lumber vendors use a commodity approach in selling softwood lumber to millwork manufacturers.
2. Millwork manufacturers view softwood lumber as a collection of specific characteristics partially guiding vendor choice.
3. A vendor can treat softwood lumber as a bundle of product characteristics, each of which can be manipulated to the benefit of the millwork manufacturer.

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3 A discussion of theoretical considerations underlying the process of transforming a commodity to a differentiated product is provided in Appendix I.

4 A discussion of why the softwood lumber and millwork manufacture were selected is provided in Appendix II.

Organization

In Chapter II, the methods used for data collection and analysis are described. Results of the analysis of these data are presented in Chapter III. Chapter IV contains an interpretation of the results contained in Chapter III, along with future research possibilities and conclusions.

CHAPTER II - RESEARCH METHOD

The research method used is broken down into several sections. First, the results of an exploratory pilot study are reported. Second, the target population of millwork manufacturers is defined. Questionnaire design and pretesting is the subject of the third section, followed by a description of the data collection method. The final section is concerned with how the data obtained were analyzed.

The pilot study

Before questionnaire development, a pilot study was conducted to examine structures and purchasing practices in the Michigan millwork (SIC 2431) and wood kitchen cabinet (SIC 2434) industries. Using the information gained from the pilot study, a pretested structured questionnaire consisting of close-ended questions was used to telephone interview buyers of lumber and other wood products. Buyers from twelve, randomly selected companies in each industry formed the sample population in the pilot study (N=39 in SIC 2431, N=23 in SIC 2434). An 80% response rate was obtained for each industry.

This pilot study differs from typical pilot studies. It does not seek to test a questionnaire to see if information about specific hypotheses is obtained. Rather, the pilot study provided guidance for subsequent questionnaire construction. In particular, it provided insights into characteristics potentially useful in differentiating softwood lumber.

The principal findings of the pilot study were:

1. Millwork companies employed more people and purchased more softwood lumber on their most recent purchase occasion than wood kitchen cabinet companies (Table A.III.1, Appendix III). In addition, the softwood lumber purchased by millwork companies on that occasion was longer and narrower than for wood kitchen cabinet companies. No other statistically significant differences were detected.

2. Millwork and wood kitchen cabinet companies appeared to be more similar than they were different (Table A.III.1, Appendix III). In light of this similarity (particularly output similarity), the rigid SIC taxonomy was considered unlikely to provide the most useful basis for deriving a target population listing.

3. Virtually all companies in both industries maintained one or more regular vendors (Table A.III.2, Appendix III). They preferred these regular vendors for reasons of price, availability (including the

vendor providing an inventory service, and thereby reduce the need for the companies to maintain inventory themselves), service (especially timely delivery), and the type of product offered by each vendor. Other reasons included user satisfaction, trial, and the type of relationship with the vendor (e.g., personal interaction and length of relationship).

4. Half or more of the companies in both industries purchased outside their regular circle of vendors from time to time (Table A.III.2, Appendix III). The main reason for this concerned the type of wood input desired (e.g., 'oddball', 'special'), although product availability and price were also mentioned.

Several hypotheses emerged from the pilot study also:

1. Companies in both industries have developed wood purchasing practices which may be partly explained in terms of reducing wood supply uncertainty, thereby promoting supply security. Examples of such practices included purchasing directly from primary processors, cultivating long and often personal relationships with vendors, and maintaining a circle of both regular and irregular vendors.

2. In purchasing wood inputs, the following were particularly important to companies in both industries:

   a. Price.

   b. Supply security.

   c. Assurance of purchase satisfaction.

d. Dimensional assortment.

e. Lumber dimensions.

Target population

The target population was defined as woodworking companies located in the lower peninsula of Michigan, and listed in a directory of Michigan wood products manufacturers (Burcham *et al.*, 1986). One selection criterion was that companies manufactured one or more of the millwork products corresponding to the SIC millwork definition as a "principal" product (cf. Burcham *et al.*, 1986). In addition to utilizing softwood lumber, companies were required to consume a minimum annual lumber volume of 3.0 million board feet to focus attention on large millwork manufacturers.

Omissions detected in the population list forced the above criteria to be extended. Two additional selection criteria were adopted:

1. Companies for which no annual lumber consumption was listed in the directory but which otherwise satisfied the above criteria[1]; and

2. Companies not listed in the target population list but whose operations, in the opinion of one of several

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1 One of the directory's compilers indicated that some large companies were reluctant to disclose their annual wood consumption for competitive reasons (Burcham, pers. comm.).

people knowledgeable about the wood industry, were likely to conform to the original set of criteria. A total of 45 companies satisfied these criteria.

Various sources of bias (having unknown effects) were associated with the target population specification. They included: exclusion of companies meeting the above criteria but not identified; exclusion of companies manufacturing millwork as a 'secondary' rather than as a 'principal' product; and inaccuracies in the companies' reported annual lumber consumptions.

The questionnaire

The questionnaire used to collect primary data was divided into two parts (see Appendices IV & V). The first part was administered to the 'primary respondent', i.e., the contact person listed in the directory from which the target population was derived. Part 2 was administered to 'secondary respondents', i.e., persons within the firm chosen on account of their role(s) in the softwood lumber purchase process. The primary and secondary respondents were sometimes the same person, i.e., when the primary respondent was also a participant in the softwood lumber purchase process.

Each part of the questionnaire consisted of several sections. The first section of Part 1 was designed to obtain descriptive information about the company. This section also contained some screening questions since doubts

about the accuracy of the target population listing emerged during pretesting. Most of these questions were close-ended, having precoded responses. Section II consisted of questions concerning structural characteristics of the company itself and the millwork industry as viewed by the respondent. Both close- and open-ended questions were asked. Close- and open-ended questions also made up the third section in Part 1, which inquired into millwork sales practices. The last section of Part 1 aimed at identifying contributors to various decisions in the softwood lumber purchasing process. The answers to these questions were precoded.

Sections I, II, III, and IV of Part 2 were administered to the secondary respondents as defined by the primary respondent's replies to Section IV of Part 1. Obtaining personal information about secondary respondents was the purpose of Section I, a collection of predominantly close-ended questions with precoded responses. In Section II, close-ended questions with precoded responses were used in asking respondents to assign values relative to the then current market prices for variants of ten softwood lumber characteristics, i.e., those identified in the pilot study and from an examination of relevant literature (not reported here). Section III consisted of a set of tradeoff tables. Respondents were asked to rank their most preferred combinations for different levels of 10 product characteristics (and price) in considering purchasing

softwood lumber. The final section of Part 2 asked both close- and open-ended questions concerning softwood lumber purchasing practices.

The first three sections of Part 1 and Sections I and IV of Part 2 were devoted to gathering data which could be used to examine the structure and practices of the millwork manufacturing industry. Some descriptive data were collected in these sections also. The descriptive data gathered were considered potentially useful for interpreting the results of the industry analysis[2].

Determining secondary respondents (Section IV of Part 1) was based on the models of buying behavior discussed in Appendix I. Primary respondents were asked to specify who contributed to various decision tasks at each of four stages of the buying process. Secondary respondents within each company then were selected based on primary respondents' replies to specific questions within each stage. Specifically, these secondary respondents were:

1. From the precipitation stage, those persons who decided to initiate a supply reevaluation when prompted by price, source, or materials changes (arising for

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2 For example, enquiring into the personal characteristics of the softwood lumber purchasing personnel (Section I of Part 2) can give an indication of the importance of this input purchasing function within the company (education, income, experience, etc. of persons involved in the buying process). This is especially the case when different persons specialize in different buying tasks.

unspecified reasons), i.e., changes in price, available supply sources, and softwood lumber species;

2. From the product specification stage, those persons who finally decided the type of softwood lumber to use;

3. From the vendor selection stage, those persons who finally decided which vendor(s) got the order(s); and

4. From the commitment stage, those persons who finally decided to change vendors.

The questions in Section II of Part 2 served to prepare the respondents for the tradeoff tables appearing in the third section. These questions were important for two other reasons. They asked respondents to put explicit (relative) values on certain specified variants of product characteristics, and also provided an informal check on the consistency of the conjoint analysis results.

The tradeoff tables were used to examine specific levels of various product characteristics with a view to determining their potential as dimensions along which product differentiation efforts could be directed. The characteristics selected as possible dimensions for differentiating softwood lumber are summarized in Table 3[3].

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3 A detailed description of the levels of each characteristic is provided in Appendix V.

Table 3 : Levels of softwood lumber product characteristics[1].

Softwood lumber product characteristic	Level of product characteristic	
Grade (A.L.S. specifications)	a.	D Select or better
	b.	Shop
	c.	Reconstituted lumber, i.e., fingerjointed or edge-glued
Type of discount scheme	a.	None
	b.	Cumulative
	c.	Noncumulative
Type of packaging	a.	None
	b.	Waterproof paper
	c.	Shrink plastic film
Product guarantee	a.	None
	b.	Customer satisfaction
	c.	Brand
Credit supplied by lumber vendor	a.	No
	b.	Yes
Contract assurance of supply	a.	None
	b.	Supply assured
Dimensional assortment of purchase unit	a.	Random lengths, widths, and thicknesses
	b.	Random lengths and widths, specified thickness
	c.	Specified length, width and thickness
Width	a.	4"
	b.	8"
	c.	14"
Length	a.	8′
	b.	14′
	c.	20′
Thickness	a.	1"
	b.	2"
	c.	4"

1 : Three levels of price per board foot were also used, i.e., $0.95, $1.00, $1.05.

Questionnaire pretesting

The pilot study provided information for questionnaire construction. The questionnaire which was subsequently constructed was pretested prior to interviewing primary respondents in this study.

The objectives of pretesting the questionnaire were (1), to determine the most appropriate question structure and order; and (2), to determine the approximate number of tradeoff tables which a respondent could handle at one time without impairing response reliability. In an effort to avoid subsequent response contamination (since a complete enumeration of a fairly small population was planned), hardwood rather than softwood millwork manufacturers were interviewed during questionnaire pretesting[4]. This approach assumed differences between hardwood and softwood millwork manufacturers to have a negligible effect on questionnaire modifications arising from pretesting.

Four hardwood millwork manufacturers in the lower peninsula of Michigan were randomly selected for pretesting purposes. They conformed to the same target population as proposed for softwood millwork manufacturers. These hardwood millwork manufacturers were contacted using the approach outlined below.

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4 This procedure was adopted so that respondents would be interviewed only once, and therefore not confound their answers with any answers they may have given during pretesting.

After pretesting, the questionnaire was modified according to defects discovered and suggestions made by both primary and secondary respondents. The number of tables offered was drastically reduced from 55 to 21 (i.e., from interactions of all possible paired combinations of characteristics, and price, to interactions of arbitrarily selected combinations). Also, the first two tables presented in an individual questionnaire involved price-length and price-dimensional assortment tradeoffs so respondents would be lead into the series of tradeoff tables using examples with which they were already likely to be familiar. The order of the remaining 19 tables was randomized. Completion of these 21 tradeoff tables was estimated to take respondents about 30 minutes.

Data collection method

Primary respondents were initially contacted using a cover letter (Appendix VI) which outlined the study objectives, how the data gathered were to be used, and likely participant commitment. This initial contact letter was followed up 10 to 14 days later by telephone to confirm whether or not the company was willing to participate in the study, to answer any questions which the company may have had concerning the study, and to allay any doubts which any recalcitrant companies may have had. In addition, companies were offered a copy of the study's findings to either induce or cement their participation, depending on circumstances.

During the telephone call following up the initial contact letter, nine respondents provided information indicating that their company was ineligible in terms of the target population criteria (e.g., they did not manufacture any of the products defined as millwork). Therefore the original target population of 45 was reduced to 36.

Primary respondents were interviewed in person. After determining who the secondary respondent(s) ought to be, Part 2 of the questionnaire was distributed to them via the primary respondent. Part 2 was to be completed at the secondary respondents' convenience with the completed questionnaires being returned by postage-paid mail. If the Part 2 responses were not received within 10 to 14 days after the primary respondent interview, then a follow-up telephone call was made to try to elicit the response. Ten to 14 days later another telephone call was made to respondents who still had not returned Part 2 of the questionnaire, and a final letter 10 to 14 days later.

Responses were checked immediately after either interviewing or receipt in the mail. Any inconsistencies, discrepancies, and necessary points of clarification were noted. At the earliest convenient time after this examination, the appropriate respondents were recontacted (by telephone or in person) to ascertain the meaning of the responses in question. Responses were altered to reflect respondents' explanatory comments.

Data analysis

Replies to open-ended questions were summarized in line with the nature of the responses received. During response coding, respondents' replies were categorized at their simplest level before being successively incorporated into a hierarchical response coding system. This method captured all the elements embodied in an individual reply. These elements were then available for aggregation to the level desired in subsequent analyses.

A personal computer version of the Statistical Package for the Social Sciences (SPSS/PC+) (Norusis, 1986) was the program selected for statistical analysis. Means and response frequencies were calculated for both sets of questionnaire data and various other data subsets of interest.

Data analysis for the tradeoff tables (Section III of Part 2) was more complex than for the remainder of the questionnaire. No distinctions were made between respondents with respect to their different roles in the industrial buying process or their companies.

The specific algorithm used to conduct the conjoint analysis[5] was MONANOVA (Kruskal, 1965). This algorithm was designed to determine the part-worths of characteristics in

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5 A discussion of why conjoint analysis was chosen over other techniques is given in Appendix VII.

an additive[6] utility model using a local optimization technique.

A specialized experimental design to minimize the number of tradeoff tables covering main effects and all interactions between product characteristics (e.g., fractionalized factorials) was not used. Instead, third and higher order interactions were ignored in favor of main effects and second order interactions for specific combinations of product characteristics. The specific tradeoffs examined were chosen using *a priori* knowledge about (softwood lumber) buying behavior.

Other limitations concerning application of conjoint analysis have been discussed by Green *et al.* (1978). The main limitation applicable here concerns the number of tradeoff tables presented to respondents. This number depends on how many product characteristics are being examined. Too many tradeoff tables can result in respondents using patternized responses to rank combinations of the paired product characteristics, as well as create respondent fatigue. Randomizing the order in which tradeoff tables were presented to respondents was an attempt to overcome the former problem.

There were two limitations about which little could be done. One concerned the lack of realism in presenting pairs of characteristics rather than complete profiles of

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6 An additive utility model means that overall utility is equal to the sum of the part-worths.

characteristics to respondents. The other limitation was that only the part-worths of the specified levels of the chosen characteristics were evaluated, and not intermediate or other levels. Note too that these part-worths are only comparable between levels for a product characteristic; they are not comparable between product characteristics.

CHAPTER III - RESULTS

In the presentation of results, the following approach has been adopted. The number of participants and response rates for each part of the questionnaire are discussed at the outset, followed by a description of questionnaire respondents and company practices. The three parts of the process of converting a commodity to a differentiated product complete the chapter.

Only results relevant to converting a commodity product to a differentiated product are reported here. With a few noted exceptions, results are based only on data for large[1] millwork manufacturers. In some instances confidentiality required that certain results were either not reported or reported in less detail than was available from the questionnaire.

Questionnaire response rates

Respondents from 18 millwork manufacturing companies participated in Part 1, a response rate of 40%. No information was available concerning the companies that declined to participate.

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1 'Large' means millwork manufacturing companies which employ 20 or more persons.

Of the 40 persons eligible to participate in Part 2 of this study, responses were received from 17 persons - a response rate of 43%. No information was available concerning the respondents who declined to participate.

In terms of large companies, eight participated in Part 1. Eight of 25 (32%) eligible secondary respondents from four large companies participated in Part 2.

Description of respondents and company practices

Company size as measured by number of employees is shown in Table 4. Half of all primary respondents interviewed worked for companies employing fewer than ten persons, and one third employed 100 or more persons. Three quarters of the large companies employed 100 or more persons.

Company presidents constituted 38% of primary respondents, with company owners making up a further 25% (Table A.VIII.1, Appendix VIII). The remaining primary respondents were equally represented.

Primary respondents had held their reported positions for about six years on average. Their responsibilities covered the entire company in six cases, four of which operated plants at more than one location, and two at 20 or more locations.

Seven companies were incorporated; 11 were privately owned and operated by a sole proprietor. Most of the companies had been established for ten or more years - seven

Table 4 : Size of participating millwork manufacturing companies by number of employees.

Employee number range	Frequency	
	(#)	(%)[1]
Less than 10	9	50.0
10 - 19	1	5.6
20 - 49	2	11.1
50 - 99	0	0.0
100 - 499	3	16.7
500 or more	3	16.7
TOTAL	18	100.1

Note
1 : Total does not add to 100% because of rounding errors.

were first established before 1967. Only one company was new, having been established within the last ten years.

Custom millwork was manufactured by all companies. Half of all, and five of eight large, companies manufactured stock millwork also.

Door frames and entrances were produced most often, and stairwork was produced least often (Table 5). All eight companies produced more than one type of millwork product, and five produced four or more. Five of eight companies produced nonmillwork products, usually wood kitchen cabinets.

Analysis of competitive forces

These results are presented for each competitive force individually. To avoid repetition where certain findings relate to two or more competitive forces, results are presented only once.

1. Potential entry

Half of the eight primary respondents viewed their companies' customers as potential entrants to the millwork manufacturing industry (Table 6). Three of these four respondents regarded their companies' customers as making an explicit decision to either make or buy the needed millwork products. Only one respondent thought that customers might perceive millwork manufacturing profitability to be sufficiently attractive to induce entry. None of these four

Table 5 : Types of millwork products manufactured.

Product type	Frequency	
	(#)	(%)
Door frames and entrances	6	75.0
Doors - interior and exterior	5	62.5
Mouldings	4	50.0
Sash and windows	4	50.0
Blinds and shutters	4	50.0
Stairwork	3	37.5
Other products (not millwork)	5	62.5

Table 6 : Entry status of current customers as perceived by millwork manufacturers.

Offered reason	Present customers regarded as:	
	Potential entrants (#)	Not potential entrants (#)
Explicit make/buy decision	3	0
Expertise and equipment	0	3
Perceived profitability	1	2
Other	1	1
ALL PRIMARY RESPONDENTS[1]	4	4

Note
1 : Totals do not add because of multiple responses to individual questions.

respondents appeared to view specialized expertise and equipment as an effective entry barrier.

The other four primary respondents did not regard their customers as potential entrants to the millwork manufacturing industry - for almost opposite reasons. Specialized expertise and equipment required for millwork manufacturing was viewed by three of four respondents as discouraging entry. Two respondents thought that potential customer entrants would be unlikely to perceive millwork manufacturing profitability to be high enough to induce entry.

Three of eight secondary respondents viewed their softwood lumber vendors as potential entrants to the millwork manufacturing industry, mainly because they thought their vendors might perceive millwork manufacturing as improving the lumber utilization of their existing operations (two respondents). Another three secondary respondents did not regard any of their softwood lumber vendors as potential entrants to millwork manufacturing[2]. Two of these three respondents said their vendors did not, and were unlikely to, define their businesses so as to encompass millwork manufacture. Neither industry profitability nor entry barriers were mentioned as inhibiting (or encouraging) vendor expansion into millwork manufacturing.

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2 Two 'Don't know' responses were received.

Several questions were asked to try to ascertain whether the fixed cost structure facing prospective entrants to millwork manufacturing might constitute an effective barrier. With one exception, total annual fixed costs exceeded $600,000 per year (Table 7). Equipment and other (especially salaries) costs were the largest contributors to these costs (Table 8).

Six primary respondents indicated their companies actively attempted to make their millwork products appear unique compared to those of their principal rivals. All six regarded their companies' attempts at product differentiation as successful. The reasons offered as criteria for defining differentiation success included: establishing a market niche for their companies' products (67%), and sales growth (33%).

Half of the primary respondents indicated that their company had previously switched between different customers or customer types. Switching was prompted for three reasons: to avoid customer or job types which persistently presented problems, to follow perceived market changes (each two of four respondents), and for operational reasons (i.e., centralizing operations, increasing order volumes - one respondent)[3].

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3 One 'Don't know' response was received, leaving three respondents who had not previously switched between customers or customer types.

Table 7 : Annual fixed costs of millwork manufacturing companies.

Fixed cost range	Frequency (#)
Less than $600,000	1
$600,001 to $1,000,000	3
More than $1,000,000	2
ALL PRIMARY RESPONDENTS	8[1]

Note
1 : Includes two 'Don't know' responses.

Table 8 : Type of annual fixed costs faced by millwork manufacturing companies.

Fixed cost	Frequency (# of respondents) :			
	Property tax cost	Equipment cost	Insurance cost	Other[1] fixed cost
Less than $50,000	2	1	2	1
$50,001 to $100,000	1	2	2	1
More than $100,000	2	2	1	3
ALL PRIMARY RESPONDENTS	8[2]	8[2]	8[2]	8[2]

Notes
1 : Mainly salaries.
2 : Includes three 'Don't know' responses.

Three of these four respondents gave replies which indicated their companies undertook switching deliberately. They selected which (types of) customers they wished to serve for what specific reasons, and then proceeded to act accordingly. Only one respondent said switching was the result of passively following changes in (types of) customers.

Seven of eight secondary respondents reported switching between softwood lumber vendors. Reasons for switching concerned lumber quality[4] (i.e., wood characteristics) and price (three respondents each), efforts to attain increased supply security (two respondents), customer service[5], and vendor malpractice (one respondent each).

Various drawbacks were encountered during this switching process. The principal drawbacks were establishing credit lines with the 'new' vendor, and conducting yield tests on the lumber supplied by the 'new' vendor (both two respondents). Increased freight costs and difficulties encountered if a switch back to the original

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4 In general, quality refers to one or more of the following subsets associated with both softwood lumber inputs and the millwork products manufactured: wood characteristics, finishing characteristics, workmanship and manufacturing standard, and input and output yield. For further details, refer to Appendix X.

5 In general, customer service refers to one or more of the following customer service subsets provided by softwood lumber vendors or millwork manufacturers to their customers: design expertise, delivery, customer orientation, inventory, and order placement. For further details, refer to Appendix X.

vendor was required were also mentioned (one respondent each)[6].

The process millwork manufacturers adopted in switching between softwood lumber vendors is of particular interest to prospective vendors. Eight distinct stages were identified from respondents' replies to a question asking how they or their companies went about switching between vendors (Table 9).

2. Substitutes

Table 10 summarizes replies from primary respondents to questions asking about the impacts on production and sales of wood millwork of certain substitute raw materials (reconstituted wood products[7], plastics, and metals). Either two or four of eight respondents said their companies had experienced (minor rather than substantial) substitution away from solid wood depending on the substitute raw material. Again, depending on the substitute raw material, either two or three respondents said no impacts had occurred on millwork sales or production. One respondent reported substitution in favor of solid wood away from plastics.

The reaction of millwork manufacturers to perceived materials substitution is illustrated in Table 11. A

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6 Two 'Don't know' responses were received.

7 Reconstituted wood products include products made from wood fibers, chips, and solid wood components, e.g., medium density fiberboard, particle and wafer board, plywood, and fingerjointed and edge-glued lumber.

Table 9 : Stages identified in switching between softwood lumber vendors.

Stage	Frequency (#)
Meet with previous supplier	1
Identify alternate vendors	2
Set specifications and obtain quote	1
Place trial order(s)	2
Confirm specifications	1
Conduct yield test	3
Discuss results of yield testing	1
On-going periodic yield testing	1
ALL SECONDARY RESPONDENTS[1]	8[2]

Notes
1 : Total does not add because of multiple responses to individual questions.
2 : Includes 2 'Don't know' responses.

Table 10 : Perceived impacts on sales and production of solid-wood millwork by substitute raw materials.

Pattern of substitution	Substitution with respect to:		
	Reconsti-tuted wood products (#)	Plastics (#)	Metal (#)
Substitution from solid wood	4	2	4
No substitution	2	3	2
Substitution to solid wood	0	1	0
ALL PRIMARY RESPONDENTS	8[1]	8[1]	8[2]

Notes
1 : Includes two 'Don't know' responses.
2 : Includes single 'Don't know' and 'Unclear response' responses.

Table 11 : Reaction to the use of substitute raw materials for millwork manufacture.

Manufacturer response	Substitute materials:		
	Reconstituted wood products	Plastics	Metal
	(#)	(#)	(#)
None	5	6	5
Develop substitute manufacturing capability	2	1	2
Increase solid wood manufacturing capability	0	0	1
Other	0	1	1
ALL PRIMARY RESPONDENTS	8[1]	8	8

Note
1 : Includes a single 'Don't know' response.

majority of respondents reported their companies took no steps to either offset or take advantage of substitute raw materials in millwork products. The remaining responses were near opposites. Some companies (two or less) increased their manufacturing capabilities for the substitute raw materials, while one company increased its solid wood manufacturing capability.

When asked about future substitution patterns, primary respondents generally anticipated either little or no further substitution away from solid wood (75%). One of these foresaw the increased use of both solid wood and solid wood substitute materials, but did not anticipate substitution in favor of any particular raw material type. The remaining two respondents predicted further substitution away from solid wood (price-driven) in favor of reconstituted wood (i.e., fingerjointed lumber). No respondents anticipated substitution in favor of solid wood.

3. Intensity of rivalry

Company structure was similar with respect to purchasing and sales functions. Five companies had a separate and distinct purchasing department employing up to 20 persons. Fewer than five softwood lumber buyers were employed by seven of eight companies, with the remaining company employing from five to ten.

With respect to equipment, all eight companies operated one or more face-planers and moulders (Tables A.VIII.2,

A.VIII.3, and A.VIII.4, Appendix VIII). Fewer companies operated remanufacturing mill, fingerjointing, and edge-gluing machinery - only four, three, and three companies respectively. With the possible exception of moulders, most of the woodworking machines operated by respondents' companies were capable of handling large dimension lumber, i.e., boards nine inches or more wide, 16 feet or more long, and two inches or more thick.

Wholesale distributors, and sawmills and planing mills were the only two sources from which secondary respondents purchased softwood lumber for millwork manufacture (Table 12). Respondents indicated their companies purchased softwood lumber from less than five wholesale distributor sources, but they spread their purchases among larger numbers of sawmills and planing mills. Possible reasons underlying this purchasing pattern were not examined.

Reasons offered by respondents why their companies did or did not purchase equal value and volume shares from their vendors are displayed in Table 13. The reasons most frequently offered for not purchasing equal shares concerned the type and availability of the desired material (i.e., wide boards), quality (i.e., wood characteristics and yield), and vendor service. Only two respondents said their companies purchased about equal amounts by volume and value from each of their supply sources. Price differences were mentioned rarely.

Table 12 : Softwood lumber purchased for millwork manufacture by vendor type, proportion of purchases, and number of sources.

Range	Vendor type:	
	Sawmills and planing mills	Wholesale distributors
	(#)	(#)
Proportion of purchases:		
None - 0%	1	1
1% to 25%	0	3
26% to 75%	0	0
76% to 100%	4	1
ALL SECONDARY RESPONDENTS[1]	5	5
Number of sources:		
None	1	1
Less than 5	1	4
5 or more	3	0
ALL SECONDARY RESPONDENTS[1]	5	5

Note
1 : Excludes three 'Missing data' responses.

Table 13 : Reasons for purchasing equal or unequal volume and value shares of softwood lumber from vendors.

Offered reason	Volume share[1]:		Value share[1]:	
	Equal (#)	Unequal (#)	Equal (#)	Unequal (#)
Material	1	3	0	2
Quality	0	3	0	2
Service	0	2	0	2
Price	0	1	0	1
Location	0	1	0	1
Other	0	1	1	1
ALL SECONDARY RESPONDENTS[1]	1[2]	6[2]	2[2,3]	5[2]

Notes
1 : Totals may not add because of multiple responses to individual questions.
2 : Excludes a single 'Don't know' response for volume and value share (each).
3 : Includes a single 'Unclear response' response.

All eight secondary respondents indicated that their companies maintained vendors from whom they regularly[8] purchased softwood lumber for millwork manufacture (Table 14). Six respondents said their companies maintained lumber vendors with whom they dealt on both regular and irregular bases also. These respondents observed that not limiting the number of regular lumber vendors serving their companies, and maintaining both regular and irregular vendors were both deliberate actions undertaken as part of their companies' sourcing strategy (each four of five respondents).

All six respondents whose companies maintained irregular vendors said that these vendors sometimes became regular vendors. Offering a favorable price, lumber of the desired quality (i.e., yield and wood characteristics), and appropriate service (i.e., timely and reliable delivery and customer orientation) were the the principal means by which irregular lumber vendors became regular vendors (each two of three respondents).

In general, relationships between millwork manufacturer and their regular softwood lumber vendors were firmly established. The oldest relationships usually exceeded 5 years (75%), while the shortest relationship was usually less than 5 years (63%)[9].

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8 As used here regular means conformity to a pattern.

9 Both response frequencies include single 'Don't know' responses.

Table 14 : Reasons for developing certain types of relationships with softwood lumber vendors.

Offered reason	Type of vendor relationship:				
	Limit regular vendors:		Both regular and irregular vendors[1]:		Conversion to regular vendor status:
	Why (#)	Why not (#)	Why (#)	Why not (#)	(#)
Sourcing strategy	2	4	4	0	0
Quality	1	0	1	0	4
Service	1	0	0	0	4
Flexibility	2	0	0	0	0
Location	0	1	0	0	0
Price	0	2	0	0	4
ALL SECONDARY RESPONDENTS[2]	3	5	5[3]	1[4]	6[2,4]

Notes
1 : Excludes two responses based on instructions to skip questions.
2 : Totals may not add because of multiple responses to individual questions.
3 : Includes single 'Don't know' and 'Other' responses.
4 : Includes a single 'Other' response.

Quality (i.e., wood characteristics, manufacturing standard, and yield), service (i.e., reliable and timely delivery and customer orientation), and material (i.e., type and availability) were the most important determinants of repeat purchasing among millwork manufacturers dealing with regular vendors (Table 15). A sourcing strategy aimed at ensuring supply security (including continually seeking new and improved supply sources) was the major reason offered by respondents whose companies also dealt with irregular vendors. Price was among the least important determinants for both vendor types.

Few respondents said they did not face any problems in dealing with either their regular or irregular vendors (Table A.VIII.5, Appendix VIII). Reported problems were quite widely dispersed within each vendor group with the possible exception of service (i.e., reliable and timely delivery).

The same five companies having a purchasing department also had a sales department, as did one other company. Ten or fewer salespersons were employed by four companies, while three companies employed more than ten[10]. Three of these six companies employed 20 or fewer persons in sales and two of the remaining three employed more than 20 persons[11].

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10 One 'Don't know' response was received.

11 One 'Don't know' response was received.

Table 15 : Reasons for repeat purchasing of softwood lumber by type of vendor relationship.

Offered reason	Repeat purchases from:	
	Regular vendors (#)	Irregular vendors (#)
Quality	6	3
Service	5	3
Material	3	0
Sourcing strategy	1	5
Price	1	2
Source location	1	0
Flexibility	1	0
ALL SECONDARY RESPONDENTS[1]	8	5[2]

Note
1 : Totals do not add because of multiple responses to individual questions.
2 : Excludes a single 'Unclear response' response, and two responses based on instructions to skip questions.

The distribution of millwork sales by customer type is shown in Table 16. Half or more of the participating companies sold up to 60% of their millwork output to the general public, builders and contractors, independent wholesale distributors, and independent retail distributors. Four companies made the bulk of their millwork sales (i.e., 61% to 100%) to either builders and contractors or independent wholesale distributors (each two companies). No company appeared to focus on selling millwork to the general public. These patterns are supported also by the numbers of customers to whom the millwork manufacturers sold output.

Use of price and price-related variables, such as quantity discounts, as the principal means of selling millwork products was acknowledged by only two of eight respondents (Table 17). One of these companies engaged in head-to-head price rivalry. The remaining six respondents said their companies did not emphasize these sorts of variables in selling their millwork products, either by adoption of an appropriate sales strategy or through the use of pricing methods which diminish the accent on price *per se* (e.g., sealed bidding).

Nearly all of the respondents interviewed indicated their companies maintained a softwood lumber inventory on hand for manufacturing. Five companies reportedly maintained a millwork inventory on hand for sales, and five carried both types of inventories.

Table 16 : Sales of millwork by customer type, proportion of sales, and number of customers.

Ranges	Millwork sales to:			
	General public	Builders and contractors	Independent wholesale distributors	Independent retail outlets
	(#)	(#)	(#)	(#)
Proportion of millwork sales:				
None - 0%	4	2	1	3
1% to 10%	4	0	3	2
11% to 25%	0	3	1	1
25% to 60%	0	1	0	1
61% or more	0	2	2	0
ALL PRIMARY RESPONDENTS	8	8	8[1]	8[1]
Number of customers:				
None	4	2	1	3
Less than 5	n.a.	0	2	1
5 to 25	n.a.	2	1	2
26 or more	n.a.	2	3	1
ALL PRIMARY RESPONDENTS	n.a.	8[2]	8[1]	8[1]

Key
n.a. = not applicable.

Notes
1 : Includes a single 'Don't know' response.
2 : Includes two 'Don't know' responses.

Table 17 : Reasons for using or not using price-related variables as the principal means of selling millwork.

Offered reason	Price-related variables: (#)	Other variables: (#)
Pricing method	1	2
Strategic choice	0	3
Other	0	2
ALL PRIMARY RESPONDENTS	2[1]	6[2,3]

Notes
1 : Includes a single 'Don't know' response.
2 : Includes a single 'Unclear response' response.
3 : Total does not add because of multiple responses to individual questions.

Minimum and mean monthly softwood lumber inventory volumes carried by participating companies are similarly distributed (Table A.VIII.6, Appendix VIII), with five of seven companies maintaining these inventory volumes above 50 mbf. For finished millwork, four of five companies maintained minimum and mean monthly inventories in excess of $50,000[12].

None of the participating companies owned[13] forestland or sawmills from which they obtained softwood lumber for millwork manufacture. Two companies owned wholesale distribution outlets, and two acted as intermediate processing agents for wholesale distributors who supplied manufacturing and product specifications[14].

Four primary respondents said price fluctuation had not created softwood lumber procurement problems for their companies. However, only one respondent offered a possible explanation; it concerned the frequency with which their vendors made adjustments reflecting price shifts[15] (thus

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12 Distributions similar to those summarized in Table A.VIII.6 (Appendix VIII) were obtained for companies carrying both softwood lumber and finished millwork inventories.

13 Here ownership means a majority shareholding in the operations being discussed.

14 The proportion of millwork sales made through company wholesale and retail outlets and the numbers of retail outlets owned by these companies are not reported to preserve confidentiality.

15 Two 'Don't know' and one 'Missing data' responses were received.

insulating the company from price fluctuation). Three of the remaining four respondents reported that price fluctuation occasionally interfered with reliable and timely lumber delivery (particularly in a rising market because vendors tended to delay meeting orders). The fourth respondent observed that supply security was sometimes difficult to achieve because of price fluctuation.

Respondents' companies used various means to offset the adverse effects of price fluctuation. These included deliberately cultivating customer loyalty among their lumber vendors (two respondents), increasing the lumber inventory carried, and specifying the pricing point at the scheduled rather than the actual delivery time (each one respondent).

4. Bargaining power - Millwork manufacturers vis-a-vis buyers

Respondents were asked to describe how they thought their customers viewed the importance of their companies' millwork products. Six respondents said they regarded their millwork products as being of 'moderate' or higher importance to their customers (Table 18). Only one primary respondent regarded her companies' products as 'essential' to her companies' customers, while none regarded them as being 'unimportant'. The cost of millwork as a component of a particular job was the main reason upon which respondents based their importance rankings overall (50%), but various other reasons also featured prominently.

Table 18 : Reasons underlying perceived customer importance of millwork by importance ranking.

Offered reason	Importance ranking[1]:				
	Essential (#)	Very (#)	Moderate (#)	Little (#)	Total (#)
Millwork as a cost component	0	2	1	1	4
Source-related	1	0	1	1	3
Service-related	1	1	1	0	3
Customer-related	0	2	0	0	2
Quality-related	0	1	1	0	2
Product-related	0	1	0	1	2
ALL PRIMARY RESPONDENTS[2]	1	2	3[3]	2	8[3]

Notes
1 : No respondents assigned an 'unimportant' ranking, and one respondent acknowledged not having considered the importance of his company's millwork product to the company's customers.
2 : Totals do not add because of multiple responses to individual questions.
3 : Includes a single 'Unclear response' response.

Only two of eight primary respondents indicated their companies shared the millwork inventory function with their customers (Table A.VIII.7, Appendix VIII). Information feedback was part of this sharing process in one instance.

Four primary respondents said their companies actively tried to manipulate the customer types to whom they sold their millwork products. They and did so for specific strategic reasons - usually by identifying specific markets for its millwork products (75%) or defining the customer types to be served (Table A.VIII.8, Appendix VIII)[16]. Respondents from three companies said they did not try to influence the customer type(s) to whom they sold millwork; they thought the nature of the millwork business was such as to preclude this type of activity (e.g., custom, opportunist, obtaining referrals based on company reputation).

5. Bargaining power - Millwork manufacturers vis-a-vis vendors

The price millwork manufacturers paid for softwood lumber most often resulted from negotiation with the vendor according to secondary respondents (five of eight respondents). A further two respondents indicated the price paid was determined by the vendor, in one case because of insufficient purchasing power. A single respondent used a

16 One 'Don't know' response was received.

price publication to decide whether or not to purchase lumber at a vendor's asking price.

Average monthly variable costs ranged between $50,000 and $100,000 for three of seven companies[17]. Two primary respondents reported average monthly variable costs in the $100,000 to $500,000 range, and for one company these costs exceeded $500,000. The average monthly cost of softwood lumber for millwork manufacturing was less than $40,000 for three of eight companies, and exceeded $250,000 for two companies.

Various sources of bargaining leverage were identified. The physical and dollar volume of lumber purchased was used for bargaining purposes by three of five respondents. Also used were the manufacturer's credit rating[18], and market information[19].

The most commonly used sources of market information were vendor price lists, verbal price quotes, advertisements, and other softwood lumber buyers within the same company (Table A.VIII.9, Appendix VIII). None of the secondary respondents indicated they had any problems obtaining market information.

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17 One 'Don't know' response was received.

18 All five respondents who knew their company's credit rating used it as a bargaining tool.

19 Use of market information for bargaining was somewhat sporadic. Only one of six secondary respondents always used market information for bargaining, three used it half or more of the time, and two with a frequency of 20% to 49%.

All secondary respondents indicated the softwood lumber they purchased was checked by company personnel for conformity to either specified or expected characteristics (Table A.VIII.10, Appendix VIII). Internal checking was complemented by checks conducted outside the purchasing company in five instances.

Only one company shared the softwood lumber inventory function with its vendors (Table A.VIII.7, Appendix VIII). Both formal (e.g., contract) and informal (e.g., priority for company orders) methods were used.

Possible improvements to induce millwork manufacturers to increase softwood lumber purchases are summarized in Table 19. With the possible exception of price, these improvements generally were consistent with the findings presented in Tables 12 and 13. Price was mentioned because respondents recognized the relatively powerful position of softwood lumber vendors. Vendors tended to delay order delivery in a rising market, and pass on freight costs (but not necessarily discounts and cost reductions) to millwork manufacturers.

When asked whether their softwood lumber vendors emphasized price and price-related variables in selling softwood lumber instead of other lumber and vendor service characteristics, two of eight secondary respondents indicated this was indeed the case. However, only one of these two respondents actually considered price to have a

Table 19 : Suggested improvements for increasing softwood lumber purchases by type of vendor relationship.

Type of improvement	Regular vendors (#)	Irregular vendors (#)
Price	3	4
Quality	3	3
Service	3	1
Flexibility	1	0
Other	1[1]	1[2]
ALL SECONDARY RESPONDENTS[3]	8	5[4]

Notes
1 : Supply assurance during rising market conditions.
2 : Sourcing - location.
3 : Totals do not add because of multiple responses to individual questions.
4 : Excludes a single 'Missing data' response, and two responses based on instructions to skip questions.

larger impact on selling softwood lumber than any product characteristics[20].

Four of eight secondary respondents said at least some of their softwood lumber vendors actively attempted to make their lumber and associated services appear unique compared to rival vendors. The vendors apparently tried to differentiate themselves in terms of lumber quality (i.e., wood characteristics, manufacturing standard, and yield), services offered (particularly reliable and timely delivery), and flexibility with their customers, particularly with respect to arranging credit (each two respondents).

None of the four respondents whose vendors did not actively attempt to differentiate themselves from their rivals could provide reasons why. Two respondents viewed their softwood lumber vendors as dealing with standardized products sold to standardized processors.

Decision-making loci in the softwood lumber purchase process

Most specified decisions in each stage of the purchase process were made by individuals inside the millwork companies (Table 20). In only one company was a decision made by a within-company group, i.e., in the precipitation stage when a new price differential emerged.

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20 No reason was obtained for the response, but this respondent apparently viewed the softwood lumber market as being highly 'competitive' (i.e., in the traditional economic meaning of the term).

Table 20 : Location of decisionmakers by stage in the softwood lumber purchase process.

Decision-making stage and type of decision	Decision-making locus (#):		
	External	Internal	Total
Precipitation:			
New product	4	14	18
Product performance	4	12	16
Production change	3	12	15
Species change	3	12	15
New price differential	3	11	14
New supply source	4	9	13
Product specification:			
Conformity to technical specifications	3	13	16
Determining technical specifications	3	10	13
Final choice of softwood lumber	4	10	14

Table 20 (cont'd.).

Vendor selection:			
Identifying potential vendors	1	14	15
Negotiating purchase	1	12	13
Collecting vendor information	1	10	11
Choosing eligible vendors	1	10	11
Final choice of vendor	1	11	12
Vendor commitment:			
Technical monitoring	0	18	18
Vendor monitoring	0	16	16
Vendor change - commercial reasons	0	16	16
Vendor change - technical reasons	0	15	15
Final decision to change vendor	0	13	13

Persons outside the company made anywhere from 19% to 31% of the decisions specified in the precipitation and product specification stages. An external purchasing agent made (all specified) decisions in the vendor selection stage for one company. No outside person or group contributed to any decisions specified in the vendor commitment stage.

The customer or her agent (e.g., an architect or purchasing agent) were the main external decisionmakers in the precipitation and product specification stages (Table 21). Outside engineers made decisions concerning product performance and new products (precipitation stage) in only one instance.

Decisionmaking within millwork companies was quite highly concentrated (Tables 22, 23, 24, and 25). Company executives (owners, presidents, vice-presidents, and managers) were frequent contributors to decision tasks in all stages of the purchase process, especially final decisions in the product specification, vendor selection, and vendor commitment stages.

Beyond company executives, the influence of specialized contributors became apparent. Company engineers were especially prominent in making technical and product decisions in the precipitation, product specification, and vendor commitment stages (Tables 22, 24, and 25). Company purchasing agents often decided vendor selection issues (Table 24). They also made vendor and some technical decisions in the precipitation and commitment stages (Tables

Table 21 : External decision-making loci in the precipitation and product specification stages of the softwood lumber purchase process.

Decision-making stage and type of decision	Decision-making locus:				
	Customer (#)	Architect (#)	Engineer (#)	Purchasing agent (#)	Total (#)
Precipitation:					
Product performance	1	1	1	1	4
New product	1	1	1	1	4
New supply source	1	1	0	2	4
Species change	2	1	0	0	3
New price differential	1	1	0	1	3
Production change	1	1	0	1	3
Product specification:					
Conformity to technical specifications	2	1	0	0	3
Determining technical specifications	2	1	0	0	3
Final choice of softwood lumber	2	1	0	1	4

Table 22 : Internal decision-making loci in the precipitation stage of the softwood lumber purchase process.

Decision-making locus	Type of decision:					
	New price differential (#)	New supply source (#)	Production change (#)	Product performance (#)	New product (#)	Species change (#)
Purchasing agent	2	4	1	1	1	3
Owner	2	2	0	1	2	1
President	2	1	2	3	2	3
Engineer	0	0	1	3	3	3
Plant superintendent	1	1	3	2	1	1
Vice-president	1	1	2	1	2	1
Manager	1	0	2	1	2	0
Other administrative staff	1	0	1	0	1	0

Table 23 : Internal decision-making loci in the product specification stage of the softwood lumber purchase process.

Decision-making locus	Decision in 'Product specification' stage (#):		
	Determining technical specifications	Conformity to technical specifications	Final choice of softwood lumber
Engineer	3	4	3
Purchasing agent	2	3	2
Owner	1	1	2
President	1	1	1
Vice-president	1	2	1
Plant superintendent	2	2	1

Table 24 : Internal decision-making loci in the vendor selection stage of the softwood lumber purchase process.

Decision-making loci	Type of decision:				
	Identifying potential vendors (#)	Collection vendor information (#)	Choosing eligible vendors (#)	Negotiating purchase (#)	Final choice of vendor (#)
President	3	2	2	3	3
Purchasing agent	5	4	4	4	3
Owner	2	2	2	2	2
Manager	1	1	1	1	2
Engineer	1	0	0	1	1
Vice-president	1	1	1	1	0
Plant superintendent	1	0	0	0	0

Table 25 : Internal decision-making loci in the vendor commitment stage of the softwood lumber purchase process.

Decision-making locus	Type of decision:				
	Technical monitoring	Vendor monitoring	Vendor change:		Final decision to change vendor
			Commercial reasons	Technical reasons	
	(#)	(#)	(#)	(#)	(#)
President	1	1	2	2	4
Purchasing agent	4	6	5	2	3
Vice-president	2	2	3	2	2
Owner	1	1	1	1	2
Plant superintendent	3	1	2	3	1
Manager	2	2	1	1	1
Engineer	3	1	0	3	0
Plant foreperson	1	0	2	1	0
Other administrative staff	1	1	0	0	0
Finance controller	0	1	0	0	0

22 and 25). Plant superintendents instigated lumber purchasing decisions when changes in the production process occurred, and sometimes made technical decisions in the vendor commitment stage (Tables 22 and 25).

Some persons in the company made few or no decisions in any stage of the purchase process. These persons included the company financial controller(s), purchasing staff other than company purchasing agents, plant forepersons, and machine operators.

Differentiation of softwood lumber

1. Relative value of softwood lumber characteristics

Certain softwood lumber characteristics were selected to define a 'basic purchase unit'[21]. Respondents reported that no major softwood lumber characteristics had been overlooked in defining the basic purchase unit[22].

Respondents were asked how much more or less they would be prepared to pay (compared to the then current market price) for softwood lumber identical in all but one respect to the basic purchase unit (Table 26). Most respondents were willing to pay either the same or a lower price for both shop grade and fingerjointed lumber compared to the D

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21 Refer to Questionnaire Part 2, Appendix V, for a detailed description of these characteristics.

22 Two respondents said this and two more didn't respond ('Missing data'). Among the remaining four respondents, other characteristics included moisture content (i.e., kiln-dried or not), prime-painted lumber, mill location (backhaul possibilities), and species (one respondent each).

Table 26 : Willingness to pay for different levels of individual softwood lumber product characteristics relative to market prices.

Product characteristic	Willingness to pay relative to the price of the basic purchase unit:							
	50% + below	16% - 50% below	6% - 15% below	1% - 5% below	No difference	1% - 5% above	6% - 15% above	16% + above
	(#)	(#)	(#)	(#)	(#)	(#)	(#)	(#)
Type of lumber:								
Shop grade[1]	1	2	0	0	3	0	0	1
Fingerjointed[1]	1	2	0	0	3	0	1	0
Discount scheme:								
Cumulative	0	1	0	0	3	4	0	0
Noncumulative	0	1	0	0	4	3	0	0
Packaging:								
Waterproof paper	0	0	0	0	7	1	0	0
Shrink plastic film	0	0	0	1	6	1	0	0
Guarantee:								
Comprehensive	0	0	0	0	2	5	1	0
Brand	0	0	0	0	6	2	0	0

Table 26 (cont'd.)

Credit available	0	0	0	0	3	5	0	0
Supply contract	0	0	1	1	2	4	0	0
Dimensions:								
All random	2	3	1	0	1	1	0	0
Thickness only specified	0	1	0	0	6	1	0	0
Width:								
8 inches	0	0	2	1	5	0	0	0
14 inches	0	0	0	0	4	3	1	0
Length:								
14 feet	0	0	0	0	5	3	0	0
20 feet	0	0	0	0	5	2	1	0
Thickness:								
2 inches	0	0	1	0	6	0	1	0
4 inches	2	0	0	0	5	0	1	0

Note
1 : Excludes a single 'Missing data' response.

Select or better grade lumber of the basic purchase unit (each six of eight respondents). One respondent marked down the price of these types of lumber so low as to suggest that neither was desired (i.e., less than 50%), while another was prepared pay a 6% or higher premium for each of them.

On the whole, respondents were prepared to pay a slightly higher price (1% to 5%) for lumber purchased from a vendor who provided either of two types of discount rather than none. The cumulative and noncumulative schemes were about equally favored. A single respondent discounted price under both discount schemes by 16% to 50%.

How the lumber was packaged did not appear to be important to respondents. Six or more respondents were indifferent to both packaging alternatives offered, compared to the basic purchase unit.

All respondents indicated they were willing to pay the same or a slightly higher price for the basic purchase unit, if some form of satisfaction guarantee accompanied the purchase. A straight-forward comprehensive guarantee of customer satisfaction rather than the same guarantee embodied in a brand name was favored, though not by much (1% to 5%).

Five of eight respondents expressed willingness to pay a small premium (1% to 5%) if lumber could be purchased using credit provided by the vendor. The remaining respondents were indifferent as to whether such credit was

available. No respondents offered a reduced price on the basis of credit availability.

Reactions to a contractual supply assurance with a vendor were ambiguous. Four of eight respondents expressed a willingness to pay a slight price premium (1% to 5%), but two respondents discounted by up to 15% what they would pay for lumber purchased under a supply contract. The remaining two respondents viewed such supply contracts with indifference.

With respect to dimensional assortment, respondents were largely indifferent between purchasing softwood lumber in units of specified width, length, and thickness (cf. basic purchase unit), or in units of specified thickness, but random widths and lengths. Six of eight respondents expressed a strong aversion to purchasing softwood lumber in units whose dimensional assortment was entirely random. They discounted price for this dimensional assortment by anything from 6% to 50% or more.

All eight respondents were prepared to pay either a discounted (1% to 15%) or the same price for a board eight rather than four inches wide. Four respondents were willing to pay the same price or a premium (1% to 15%) for a board 14 rather than four inches wide, but another four were indifferent between these widths. Respondents were either indifferent or prepared to pay a premium (1% to 15%) for 14 and 20 feet long boards compared to the eight feet length of the basic purchase unit. Although most respondents were

indifferent between boards one inch and either two or four inches thick, two respondents marked the price of boards four inches thick so low as to suggest they would not purchase them (more than 50% below). A single respondent was willing to pay a 6% to 15% premium for two and four inch thick boards.

2. Conjoint analysis

The part-worths for price and nonprice bases are displayed in Appendix IX. These part-worths are really coefficients in an additive utility model, with the variables in these models being dummies for the product characteristic levels themselves (i.e., having values of either zero or unity). Stress is a measure of 'badness of fit' between the fitted (monotonic) utility function[23] and the input data itself (Smith, 1985). A stress value of 0.10 or less indicates an acceptable conjoint model has been estimated (Green *et al.*, 1973).

With one set of exceptions the stress values obtained for the derived conjoint models are less than 0.10. The exceptions all concern a single respondent making grade-related tradeoffs. In these cases the respondent failed to rank order sufficient product combinations to allow accurate estimation of the contributory part-worth functions.

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23 The analogous measure in least squares regression analysis is $(1-R^2)$.

Consequently, these responses are not included in reporting these findings.

The results of the conjoint analysis are presented in Tables 27 (price base) and 28 (other bases). These tables are based on individual responses; they display the frequency counts for the most and least preferred levels of the characteristic combinations examined.

Almost without exception, respondents indicated that they most preferred to pay the lowest level of price (i.e., a) for softwood lumber regardless of product characteristic. Conversely, they least preferred to pay the highest level of price (i.e., c). If nothing else, this result provides reassurance that conjoint analysis results conform to empirical experience.

The only exception to the 'lowest price-most preferred' generalization above occurred for the price-length combination of characteristics. The highest preference of one respondent was for paying the highest level of price for boards 20 feet long (i.e., c), with the least preference being the lowest price for boards eight feet long (i.e., a). Why this individual expressed such a preference is unknown, but the response does provide a useful example of interpreting the results presented in Tables 27 and 28.

The results presented in Table 27 are not entirely consistent with respondents' expressed willingnesses to pay for various levels of softwood lumber characteristics

Table 27 : Frequency of most and least desired levels of product characteristics (price base).

Softwood lumber product characteristic combination	Most desired[1] level:			Least desired[1] level:		
	a	b	c	a	b	c
Price	8	0	0	0	0	8
Dimensional assortment of purchase unit	0	3	5	7	0	1
Price[2]	7	0	0	0	0	7
Grade	2	3	2	0	3	4
Price	8	0	0	0	0	8
Thickness	4	3	1	1	0	7
Price	8	0	0	0	0	8
Product guarantee	0	4	4	8	0	0
Price	8	0	0	0	0	8
Type of discount scheme	0	6	2	8	0	0
Price	8	0	0	0	0	8
Type of packaging	2	4	2	5	1	2
Price	8	0	0	0	0	8
Credit supplied by lumber vendor	0	8	n.a.	8	0	n.a.
Price	7	0	1	1	0	7
Length	3	4	1	5	0	3
Price	8	0	0	0	0	8
Width	3	0	5	5	0	3

Table 27 (Cont'd.).

Price	8	0	0	0	0	8
Contract assurance of supply	1	7	n.a.	7	1	n.a.

Key
n.a. = not applicable.

Notes
1 : The most desired levels of product characteristics are those having the highest part-worth in a particular combination; conversely for the least desired. Refer to Table 3 for a description of product characteristic levels.
2 : One response having a stress value exceeding 0.10 has been omitted.

Table 28 : Frequency of most and least desired levels of product characteristics (various bases).

Softwood lumber product characteristic combination	Most desired[1] level:			Least desired[1] level:		
	a	b	c	a	b	c
Grade base[2]						
Grade	3	3	1	0	3	4
Type of discount scheme	0	5	2	7	0	0
Grade	2	3	2	1	2	4
Length	3	2	2	4	0	3
Grade	3	2	2	1	2	4
Width	3	1	3	3	1	3
Grade	2	3	2	1	2	4
Product guarantee	0	3	4	7	0	0
Grade	2	3	2	1	2	4
Contract assurance of supply	1	6	n.a.	6	1	n.a.
Type of discount scheme base						
Type of discount scheme	0	6	2	7.5[3]	0	0.5[3]
Product guarantee	0	4	4	7	1	0
Type of discount scheme	0	6.5[3]	1.5[3]	7.5[3]	0	0.5[3]
Contract assurance of supply	1	7	n.a.	7	1	n.a.

Table 28 (Cont'd.).

Product guarantee base						
Product guarantee	0	4	4	8	0	0
Dimensional assortment of purchase unit	0	2	6	8	0	0
Product guarantee	0	5	3	8	0	0
Contract assurance of supply	1	7	n.a.	7	1	n.a.
Contract assurance of supply base						
Contract assurance of supply	1	7	n.a.	7	1	n.a.
Width	3	0	5	5	0	3
Contract assurance of supply	1	7	n.a.	7	1	n.a.
Length	3	3	2	5	0	3

Key
n.a. = not applicable.

Notes
1 : The most desired levels of product characteristics are those having the highest part-worth in a particular combination; conversely for the least desired. Refer to Table 3 for a description of product characteristic levels.
2 : One response having a stress value exceeding 0.10 has been omitted.
3 : Fractions result from tied part-worths.

(Table 26). Exceptions detected include board thickness (four inch), length (20 feet), and width (eight inch).

The most preferred bundle of product characteristics can be specified based on the number of respondents expressing a preference for one or other of the levels of the various product characteristics. For example, using price as the comparative base (Table 27), the majority of respondents preferred these product characteristic levels: price - $0.95/bf; dimensional assortment - boards of specified width, length, and thickness; grade - shop; board thickness - one inch; product guarantee - indifferent between either type offered, as long as one is available; type of discount scheme - cumulative; type of packaging - waterproof paper; credit - supplied by vendor; board length - 14 feet; board width - 14 inches; and with the vendor providing a contractually assured lumber supply. Likewise, it is possible to specify a bundle of least preferred product characteristics: price - $1.05/bf; dimensional assortment - entirely random; grade - fingerjointed lumber; board thickness - four inch; product guarantee - none; type of discount scheme - none; type of packaging - none; credit - unavailable from the vendor; board length - eight feet; board width four inches; and with the vendor providing lumber without a contractual assurance of supply.

The cumulative discount scheme was preferred consistently over the noncumulative scheme under all the bases tested, with no discount scheme consistently being

least preferred. A contractual assurance of supply and a dimensional assortment consisting of completely specified board dimensions were both preferred over no supply assurance and a completely random board assortment for the comparative bases examined.

Distinct preferences for specific levels were distinguishable using conjoint analysis, but some changes were detected in the preference orderings for different comparative bases (Tables 27 and 28). The most preferred board length changed from 14 feet under a price base, to indifference between eight and 14 feet under a supply assurance base, to eight feet under a grade base. The most preferred board width changed from indifference between four and 14 inches under a grade base to 14 inches under price and supply assurance bases.

The mean importance ratings (Table 29) are measures of the contribution of specific product characteristics relative to the comparative base used[24]. All product characteristics were more important than price by amounts ranging from 6% (contract assurance of supply) to 47% (dimensional assortment of purchase unit). Some inconsistencies appeared when ratings derived for different comparative bases were compared. A product guarantee was

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24 The importance rating is calculated as the difference between the highest and lowest part-worths for a given product characteristic divided by the sum of the highest and lowest part-worth differences for the product characteristic and the comparative base. This ratio is divided by 0.5 to derive the rating index presented.

Table 29 : Mean importance ratings[1] of product characteristics by specified base.

Product characteristic	Comparative base:				
	Price	Grade	Type of discount scheme	Product guarantee	Contract assurance of supply
Dimensional assortment of purchase unit	1.47	--	--	1.38	--
Grade	1.42	--	--	--	--
Thickness	1.38	--	--	--	--
Product guarantee	1.27	0.70	1.21	--	--
Type of discount scheme	1.27	1.07	--	--	--
Type of packaging	1.20	--	--	--	--
Credit supplied by vendor	1.20	--	--	--	--
Length	1.13	0.89	--	--	1.11
Width	1.11	0.81	--	--	1.14
Contract assurance of supply	1.06	0.62	1.00	0.80	--

Key
-- = Product characteristic combination not examined.

Note
1: The ratings are interpreted as follows: for values above (below) 1.00 the product characteristic is proportionally more (less) important than the comparative base; for values equal to 1.00 the product characteristic and comparative base have equally important part-worth contributions.

found to be less important than the type of discount scheme, board length, and board width for a grade base, but this was not so for a price base. Similarly, the importance ranking of board length and board width for a contract assurance of supply base was the reverse of that for both price and grade bases.

CHAPTER IV - DISCUSSION AND CONCLUSIONS

It will be recalled that the objective of this study was to investigate how a firm might use competitive strategy to help avoid the adverse impacts of commodity price fluctuation. The approach adopted involved converting a commodity into a differentiated product.

A three-part process for achieving this conversion was examined. Results concerning each of the three parts (identification of the main competitive forces influencing industry structure, industrial buying behavior, and preference determination) are discussed in turn below. Managerial implications and future research possibilities are noted, before the conclusions are presented.

Analysis of competitive forces

1. Potential entry

While not the only possible entrants, the most likely prospects for entering an industry are those companies which already have contact with that industry (Porter, 1980). The information which these companies acquire concerning industry and company practices gives them insights into how attractive entry is, and some of the barriers facing a prospective entrant.

Entry barriers to millwork manufacture appear to be low. It seems unlikely that annual fixed costs, for example, would discourage a determined entrant even though these generally exceeded $600,000 (Table 7).

The perception of respondents who viewed their customers as making an explicit decision to either make or buy millwork (Table 6) suggests that millwork production technology is readily available. If so, then obtaining the required expertise is a matter of learning, especially if hiring personnel proves problematic.

Raw material availability may constrain entry, particularly when reliance on lumber of a specific type exists. The difficulties experienced by some companies acquiring suitable raw material in times of shortage and rising prices may deter entry if supply security is difficult to achieve at these times. Also, freight costs will limit the pool of vendors from whom suitable materials may be obtained.

Branded millwork products were manufactured by some companies, but the effectiveness of entry barriers imposed by these products is unclear. On the one hand, respondents did not rate the importance of their companies' products to their customers particularly highly (Table 18). On the other hand, the six companies which produced one or more differentiated millwork products regarded the differentiation undertaken as successful. In either event, the effectiveness of product differentiation as an entry

barrier is likely to be offset at least partially by substitute millwork products functionally indistinguishable from the branded products.

Regulatory constraints exist for some millwork products. Among other things, these regulations define acceptable materials and in-service performance standards. In most cases manufacturing legally approved products is likely to be straightforward and inexpensive. However, seeking approval for new or unusual millwork products or those made of untested or unapproved materials, for example, may prove so costly as to become an effective entry barrier. Responses to these sorts of entry barriers require careful consideration.

Freight costs are the only switching costs likely to be an effective entry barrier facing customers and manufacturers. Even though many relationships between regular vendors and manufacturers were found to be long-established (implying the existence of goodwill and loyalty), five manufacturers maintained irregular vendors too. The presence of both types of vendors reduces switching costs attributable to goodwill and loyalty, thus lowering entry barriers facing prospective vendor entrants.

Although it is hard to believe that entry simply to make rather than buy millwork products would be difficult for a determined entrant, entry with the intention of becoming a major millwork manufacturer is apt to be more difficult than any of the replies received suggested. The

principal entry barrier facing a prospective entrant with this intention occurs at the product distribution phase of the operation. Here the millwork manufacturer may face powerful customers which are part of an industry more highly concentrated than millwork manufacturing (Tables A.II.1 and A.II.2, Appendix II).

Exit barriers in millwork manufacturing were not explicitly examined, however this study suggests such barriers are not high. For one thing, stock millwork manufacturers produce custom millwork regardless of whether they successfully differentiate their stock products. To a greater or lesser extent, these companies were already involved in custom and nonmillwork manufacturing activities (cf. Table 5). For another thing, the woodworking machinery necessary to manufacture millwork is not so specialized that it can be used to manufacture millwork products only.

The question of if and where scale economies occurred in millwork manufacturing was not investigated in this study. It remains unknown whether entry barriers caused by scale economies exist in millwork manufacturing.

2. Substitutes

Substitution away from solid wood to other materials has occurred already in millwork manufacturing, as some respondents observed (Table 10). The extent of substitution is partially revealed in retail trade data for metal millwork (Table A.XI.1, Appendix XI): in 1972 metal millwork

accounted for 40% of millwork sales; by 1982 this had increased to 47%.

Surprisingly few companies had made any response to the above substitution trends (Table 11). The only company to increase its solid-wood manufacturing capability did so to enhance its position as a wood millwork manufacturer[1]. Three responses characterized the companies which developed substitute manufacturing capability: outright substitution (e.g., steel doors, extruded plastic instead of solid-wood mouldings); incorporating substitute raw materials and solid wood in a single product; and substitution between solid and reconstituted wood in what may or may not be an entirely wooden product.

Vinyl-covered, wooden window frames are an example where the latter two types of substitution occur simultaneously. Plastic (vinyl) sheathing provides the window frame (sometimes just the exterior facing portion) with the desired properties (e.g., appearance, maintenance, weatherproof, etc.). Underneath the plastic cover is a solid-wood frame, but of a lower lumber grade than required for an exposed wooden window. Fingerjointed rather than solid lumber may be used under the plastic cover also.

Although most respondents did not anticipate much, if any, further substitution from solid wood, this result should be regarded with some skepticism. Where products are

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1 This company used the solid-wood characteristic of its millwork as a major selling point.

somewhat standard and consumers are price sensitive in their purchasing behavior (e.g., stock millwork), further substitution, possibly extensive, is easy to envisage.

'Pushing grade'[2] is a form of within-grade substitution holding possible significance for differentiating purposes. It involves manipulating the distribution of lumber defects so as to change defect distributions within the ranges acceptable for a grade. Though usually negative in connotation, this practice also can be used to shift defect distributions in directions favorable for millwork manufacturers.

3. Intensity of rivalry

Millwork manufacturers can be divided into 2 groups based on an employment measure of size (Table 4). The presence of small companies lends considerable diversity to the millwork manufacturing industry, the more so since many are owner-operated. These small companies may be persisting because of a lack of alternatives, or may be earning a subnormal rate of return (perhaps their owners wish to remain in a business that they find attractive in other respects). If so, then the profitability of the large companies will be limited, and interfirm rivalry encouraged.

The structures of the large millwork companies are remarkably similar. All had the basic face-planing and moulding machinery necessary for millwork manufacturing, and

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2 Mentioned by one respondent.

this machinery had similar board dimensional capacities (Tables A.VIII.2, A.VIII.3, and A.VIII.4, Appendix VIII). Purchasing and sales were separately defined functional areas in over half of the companies. Most were engaged in manufacturing only; only two were vertically integrated to any extent. The fixed cost structure of the companies was similar, both in aggregate and by component (Tables 7 and 8). These similarities suggest the companies manufacturing millwork from softwood lumber are balanced compared to each other.

Low switching costs create pressure for individual millwork manufacturers to emphasize price in selling their products. Along with the low switching costs already identified, interfirm rivalry is likely to be further promoted by non-wood substitute millwork products (cf. Table 10), regardless of the success of manufacturers' differentiation efforts.

4. Bargaining power - Millwork manufacturers vis-a-vis buyers

The millwork manufacturers studied were not in a powerful bargaining position compared with their buyers. The products they manufactured, by their own admission, were not generally of the highest importance to their customers (Table 18). Manufacturers' attempts to establish branded millwork products appeared to be constrained by the availability of substitutes. Only a few manufacturers

reported any degree of forward integration capable of providing them with credible bargaining power (i.e., two or less at both wholesale and retail levels).

The limited bargaining power millwork manufacturers did possess seemed to be derived from one main source, i.e., low switching costs. These costs are reflected in the distribution of sales both between and within customer types (Table 16). For example, some manufacturers specialized in serving builders and contractors which may make it easy for them to take or leave an individual customer (depending on performance and importance as customers).

Members of the general public appear to have the least bargaining power in purchasing millwork. It seems unlikely that the volume and value of individual orders will be large enough for a manufacturer to find bargaining (or even selling) worthwhile (Table 16). In addition, serving the general public may well place the manufacturer in direct rivalry with other sales outlets (perhaps other customers of the manufacturer) which are better positioned to cater to this customer type.

Builders and contractors have more bargaining power than the general public. They offer millwork manufacturers the attractive prospect of repeat business even though millwork may be only a small component of a large operation. When used for finishing purposes millwork is very visible in the finished structure (e.g., door frames and entrances) possibly providing these buyers with some bargaining power.

Builders and contractors also may be able to manufacture the required products themselves, if substitutes cannot be purchased elsewhere.

Depending on their degree of specialization, independent wholesale distributors are in the strongest bargaining position vis-a-vis millwork manufacturers. They control manufacturer access to other customer types, and possibly even other wholesale distributors. They pose a credible threat of backward integration, especially if they make an explicit decision to make or buy millwork products, or actively look for ways to improve utilization, add value, and offer extra services. Millwork manufacturers appear to have countered wholesale distributors' power by spreading their sales among them (Table 16).

The bargaining position of independent retail outlets is unclear. They control customer access, but millwork manufacturers sold them only small amounts compared to total sales, and spread such sales thinly (Table 16). One possible explanation is that this practice enables millwork manufacturers to reduce their reliance on powerful wholesale distributors, or at least enables them to obtain information which can be used in bargaining with them. Independent retailers dealing with these distributors are likely to find direct purchasing from manufacturers beneficial for the same reasons.

5. Bargaining power - Millwork manufacturers vis-a-vis vendors

The bargaining power of softwood lumber vendors can be attributed to at least three sources: the importance of millwork manufacturers to a particular vendor (not investigated here), the importance of softwood lumber to a millwork manufacturer, and whether the vendor is obliged to contend with substitute products for sale to millwork manufacturers. The cost of softwood lumber, though sometimes small in absolute terms, was found to be quite large compared to average variable costs. This, coupled with the limited use of substitute raw materials by millwork manufacturers, indicates that softwood lumber is a major input purchased by (wood) millwork manufacturers. This tends to diminish vendor bargaining power, as evidenced by those manufacturers who used the value and physical volume of lumber purchased as a bargaining tool.

The switching costs facing millwork manufacturers in dealing with softwood lumber vendors are higher than for buyers. These switching costs arise from two main sources: freight costs, and uncertainties associated with switching vendors (e.g., credit availability, yield of material obtained from lumber purchased from a 'new' vendor, and the consequences of successful versus unsuccessful switches). Provided a pool of eligible vendors is available, and the above uncertainties can be reduced (or are accepted), the balance of bargaining power favors the manufacturer.

Other factors favoring the manufacturers' bargaining position include readily available market information, the source from which the lumber is purchased, and the apparently indifferent success of vendor efforts so far in differentiating the lumber they sell. The first factor in particular is important; most participating companies avoided purchasing a large proportion of their lumber requirements from independent wholesale distributors, preferring instead to deal directly with sawmills and planing mills (Table 16). The reason why was not identified, but could be associated with a desire to attain supply security, or the relative bargaining power of those involved.

Decision-making loci in the softwood lumber purchase process

The findings of this section illustrated a common feature of industrial buying, i.e., many persons influencing the buying process (cf. Webster *et al.*, 1972). For just four companies the diversity encountered was extensive. This emphasizes the need to determine accurately who does or contributes to what in the purchase process.

Prospects for the differentiation of softwood lumber

Distinguishing between characteristic levels for both most and least preferred combinations becomes difficult as response frequencies within a particular preferred combination approach each other (e.g., the two types of

product guarantee under the discount scheme base; Table 28). It is also difficult when two groups of respondents have their strongest or weakest preferences for the same level of a given product characteristic (e.g., shop grade lumber under the price base; Table 27). An example where both effects were occurring was obtained also, i.e., boards four and 14 inches wide under the grade base (Table 28).

The product characteristics affected by these sorts of interpretive difficulties were grade, board length, and board width (depending on the comparative base). Distinguishing between characteristic levels may depend on the number of individual responses obtained, and the specific levels chosen (a question of conjoint analysis design). It may indicate also the presence of distinct preference groupings among respondents.

One explanation for the preference intransitivities observed in Tables 27, 28, and 29 is that these intransitivities may indicate the presence of third and higher order interactions between the particular product characteristics involved. Along with price, these characteristics were grade, board length, and board width. Empirical evidence of interactions between these factors is observable as the price premium sometimes paid for long, wide boards.

The possibility of such interactions is very suggestive. If indeed correlations between three or more factors do exist, then these interactions could offer

differentiating opportunities. Understanding this result is particularly vital since three of the four nontied product characteristics are involved. These nontied characteristics are apt to be most difficult for rival vendors to imitate.

Empirical and technical reasons supporting the use of an additive utility conjoint model where third and higher order interactions are ignored have been discussed elsewhere (Green *et al.*, 1971). If such interactions do indeed exist, then participants in softwood lumber purchasing have more sophisticated buying behavior than is suggested by tradingoff paired product characteristics.

The preferences expressed in Table 27 have managerial implications beyond specifying a most and least preferred bundle of characteristics. They also give an indication of the potential of the different characteristics as differentiating dimensions. The most promising dimensions are not necessarily those which respondents preferred most, frequently (e.g., vendor supplied credit, and a contractual assurance of supply). If these characteristics already are being offered routinely by vendors, then they form part of the minimum purchase conditions and can be ignored as far as product differentiation is concerned. Instead, it is the remaining characteristics which offer the most potential as differentiating dimensions. Preferences for these characteristics vary widely enough between levels for distinct preference groupings to be identifiable.

Limitations of study

The principal assumption underlying this study is that softwood lumber is a commodity. The main finding supporting this assumption was price fluctuation (typical of commodity markets; Chapter I); half of the primary respondents found price fluctuation created problems in procuring softwood lumber. While this is not the same as asking whether or not respondents had actually experienced price fluctuations *per se*, it likely understates the proportion of respondents who have.

The emphasis on the process of converting a commodity to a differentiated product, rather than generalizing from these results to a population, offsets the small number of companies and respondents participating in this study. Small numbers of participants are common in many industrial marketing studies (Wilson, 1985), often because of a small eligible target population in the first instance (as in this study).

As well as biases attributable to the target population listing (Chapter II), several other sources of bias may have influenced the results of this study. The effects of two sources of bias are unknown. First, self-selection bias may have occurred since participation in this study was voluntary. Second, the questions concerning the desirability of specific product characteristics (Questionnaire Part 2, Appendix V) sought reactions to hypothetical choice situations. Their responses may not

necessarily correspond to choices made in actual choice situations[3].

Only one case of potential bias associated with specific questions (e.g., structure and underlying assumptions) is relevant here[4]. It concerns the omission of a response category for groups outside the firm which contribute to decisions in the softwood lumber purchase process. No such input was detected, which was surprising because certain millwork products are required to conform to building and other codes.

At the extremes, competitive strategy is concerned with either developing and maintaining market power, or adapting to an environment inimicable to power consolidation. If market power can be consolidated by means other than product differentiation, then the relevance of differentiating a commodity product is questionable. Perhaps Porter's (1980) extremes of competitive strategy should be redefined in terms of a firm's ability to develop market power instead.

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3 Some respondents refused to answer certain of these questions on precisely these grounds; others noted that they themselves regarded their responses as being hypothetical, and sometimes contingent upon a precise specification of purchase characteristics (e.g., the type of discount scheme they preferred depended on the net cost reduction under whatever alternative schemes were available).

4 Two others concern the failure to define 'market information' and 'in the past' in the questions where these phrases occurred.

Future research

Responses concerning the impact of substitutes on production and sales of millwork, along with the reactions of companies and their future outlooks were split (Table 10). This finding was surprising for two reasons: the strategic significance of substitutes, and the trend towards manufacturing millwork from materials other than solid wood. Examining the impact of substitute materials on both intermediate and final product markets could provide insights into bases for differentiating softwood lumber from substitute materials. A particularly important aspect is the substitution impact of fingerjointed and edge-glued lumber, about which little is presently known[5].

One of the more intriguing findings was the process by which millwork manufacturers switched between softwood lumber vendors (Table 9). Eight stages were identified. The first stage was problem recognition and discussing possible resolutions with the original vendor. If no satisfactory resolution was reached, then the next stage was to identify alternate vendors. Setting specifications and obtaining quotes from these alternate vendors, before placing a trial order were the third and fourth stages. The

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5 Data on the production and/or consumption of either types of 'lumber' could not be found in any of the statistical sources consulted. Direct approaches to equipment manufacturers proved fruitless also. Yet more than one third of the companies participating in this study possessed fingerjointing and edge-gluing machines (Tables A.VIII.2, A.VIII.3, and A.VIII.4, Appendix VIII), without counting those companies which purchased either type of lumber.

trial order specifications were checked in the fifth stage, followed by yield testing. Communicating the results of the yield testing with the vendor (especially if a minor modification was desired) preceded the final stage. The final stage consisted of post-purchase monitoring, i.e., conducting subsequent yield tests at regular or irregular intervals after the switch. The robustness of this switching process described needs to be tested, and modified if appropriate. Once its validity is established, then it may be possible to find ways to influence specific stages within the process.

Wilson (1985), in dealing with how small samples can be used to help develop organizational buying theory, noted that "...back-and-forth movement from small-sample data rich studies to large-scale field testing ... is likely to lead to solid applied theory" (p. 184). Following Wilson's (1985) cue, three logical research extensions of this study appear feasible. First, the link between industry structure and potential dimensions for product differentiation is critical for successful differentiation. The eight-stage switching process described above is relevant here, but questions of who does what in softwood lumber purchasing need further refinement. One such refinement would be to examine characteristic preferences by purchasing process role. Another would be to try and identify groups of individuals involved in lumber purchasing who have similar product characteristic preferences.

The second extension involves closer examination of differentiating characteristics than was conducted here. In particular, interactions between differentiating characteristics may provide information useful for differentiating softwood lumber. An approach similar to that used here would be suitable (tradeoff tables), but the pairs of characteristics offered would have to conform to a formal experimental design in order to expose interactions between product characteristics.

The third extension concerns quality and customer service. Both primary and secondary respondents frequently offered these responses to many of the questions asked. Their responses were probed in detail so as to identify specific characteristics within subsets of the quality and customer service categories. These characteristics are potential dimensions for product differentiation. In addition, the rich assortment of these characteristics provides an opportunity for empirical examination of the perceptual nature of quality and customer service. A possible starting point is discussed briefly in Appendix X.

Conclusion

A three part process was presented as a possible means of converting a commodity into a differentiated product. The first part was an analysis of the competitive forces impacting on millwork manufacturing companies. The second part involved determining who, in an individual firm, was

(were) responsible for specified decision tasks at different stages of the lumber purchasing process. In the third part conjoint analysis was used to determine preferred levels of product characteristics.

In Porter's (1980) terms the structure of the millwork manufacturing industry in Michigan's lower peninsula may be described as fragmented. The implied state of intense rivalry among firms in the industry was confirmed by this study. The principal sources of rivalry were found to be raw materials substitution giving rise to substitute millwork products, and ease of entry to millwork manufacturing.

A pragmatic approach was used to determine who made what decisions with respect to the softwood lumber purchased by a company. The purchase process stages were specified, and the critical roles within each stage were identified (i.e., decisionmakers) along with the required decisions from the perspective of a prospective softwood lumber vendor. This approach allowed persons with specific roles in softwood lumber purchasing to be identified so that their product characteristics preferences could then be evaluated.

It was possible to specify a bundle of the most preferred product characteristics for softwood lumber from individuals' responses. The preferred bundle consisted of softwood lumber purchased at the lowest price level ($0.95/bf) from a vendor who extended credit to her customers, offered them cumulative discounts and a customer-

satisfaction guarantee, and was willing to enter a contractual supply assurance. Respondents most preferred to purchase a dimensional assortment of shop grade lumber consisting of boards of specified dimensions (14 feet long, 14 inches wide, and one inch thick) packaged in waterproof paper.

The three-part method used in this study shows considerable promise as a means of converting a commodity to a differentiated product, assuming product characteristics remain difficult to imitate. Some method modifications are desirable for subsequent applications. These include: restricting the industry analysis to secondary data sources where suitable data are available; examining means to increase the response rates (perhaps by rewarding respondents or their employers for participation, or enlisting the support of manufacturer organizations); and designing the conjoint analysis so as to obtain information concerning the third and higher order interactions between product characteristics.

APPENDIX I

The transition from a commodity to a differentiated product

Structural analysis of an industry[1]

Porter's (1980) insights into competitive strategy originated in industrial organization theory (for a brief description of this theory, see Caves, 1982). He developed a paradigm which allowed the firm to view an industry from its own, rather than a societal, perspective. This paradigm is described below.

The five competitive forces illustrated in Figure 1 - rival firms in the industry, potential entrants, buyers, vendors, and substitute products - contribute to industry rivalry and hence profitability. A firm seeks to enhance its profitability by manipulating one or more of these forces to its own advantage. Also, a firm can benefit by anticipating shifts in the forces. The process of examining these competitive forces is described as the structural analysis of an industry.

Entry into an industry occurs when ineffective entry barriers exist and/or firms already present do not or cannot retaliate effectively against new entrants. Firms in an industry try to secure their position against potential entrants by creating barriers to entry and cultivating a reputation (if not the resources) for discouraging entering firms. The main entry barriers are: absolute and relative cost advantages accruing to incumbent firms (attributable to

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1 This section draws heavily on Porter (1980).

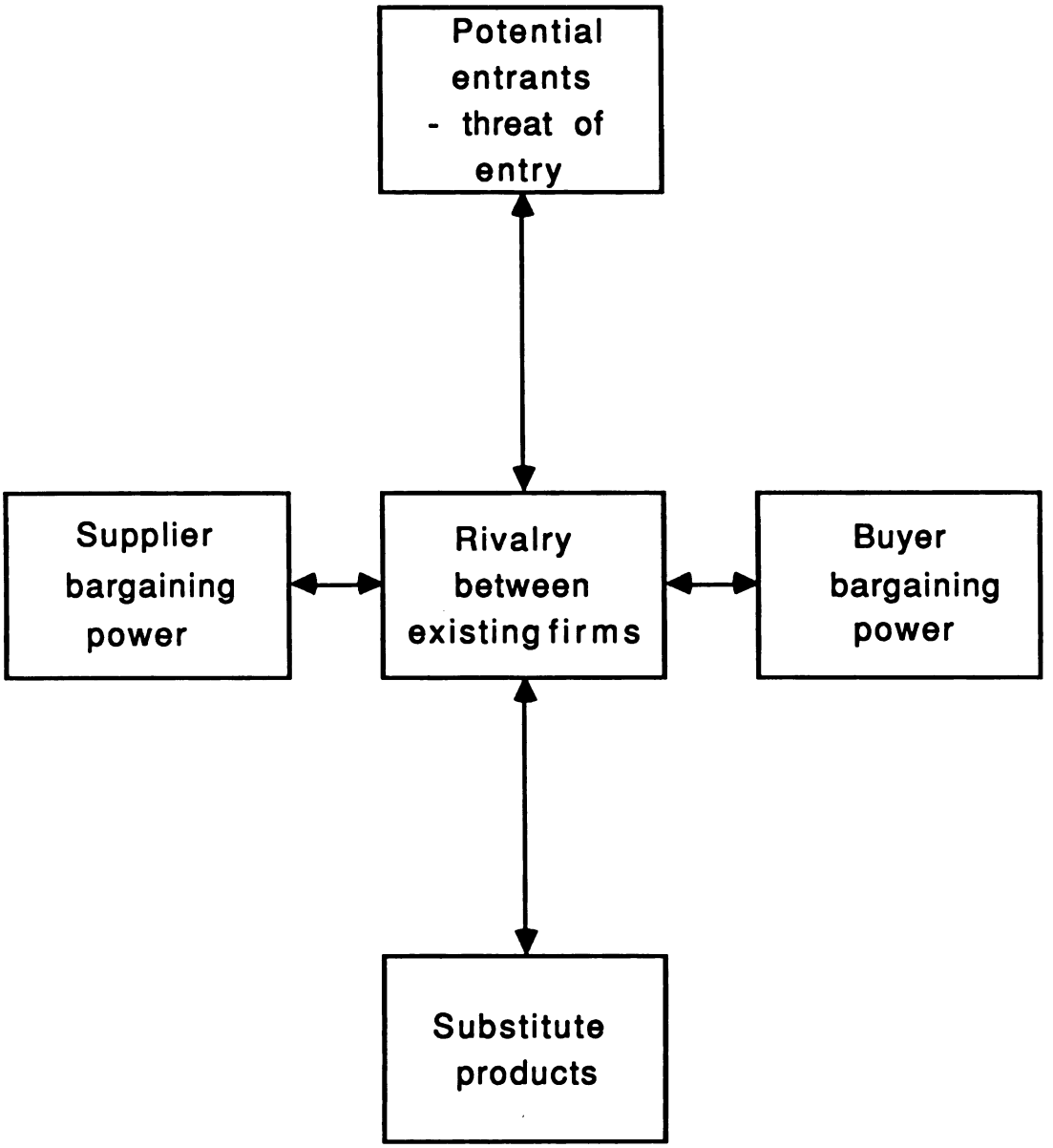

Figure A.I.1 : Competitive forces influencing industry structure (Porter, 1980).

scale economies, experience, proprietary knowledge, unique factor costs, etc.); product differentiation; large capital requirements; high costs of switching between vendors; access to distribution channels; and government policy (e.g., licensing).

The net effectiveness of entry barriers also depends on the relative resources, skills, and determination of entering and incumbent firms. This is why the threat of retaliation is important. Incumbent firms may have a history of obstructing new entrants and may partially display resources available to discourage entry attempts (e.g., unutilized production capacity). In addition, firms in industries characterized by slow growth or firms that have large, expensive fixed assets can be expected to defend their market and industry positions.

Entry barriers are not necessarily static. They change as industry or external conditions change. Also, different types of entry barriers interact, altering their net effectiveness.

Within an industry, rivalry between firms occurs because individual firms feel competitive pressures or can see and adopt ways of improving their competitive positions. In the absence of collusion, interdependence forces rival firms to act and react continually to each other's moves and countermoves. The dynamics and intensity of rivalry depend upon a variety of often interacting factors: the numbers of or balance between competitors; the rate of industry growth;

whether high fixed or product storage costs are incurred; the lack of differentiation or switching costs; whether capacity increases are achievable only in large increments; and the strategic importance of the industry to the firm.

Firms will remain in an industry either as long as their resources allow them to remain profitable or until they can overcome exit barriers. Exit barriers are the opposite of entry barriers. They are barriers which prevent a firm leaving an industry. They include: highly specialized assets having low salvage values and/or high transfer or conversion costs; high fixed costs of exit (e.g., contract nullification costs, on-going customer servicing including any associated production capacity, resettlement costs, etc.); the strategic importance of the business to the firm; unwillingness on the part of management to leave an industry; and government or social restrictions on exit.

Over time, the intensity of rivalry may change, especially if the industry growth rate declines (common as industries mature), merger and acquisition changes the character of previous rivals, or technological innovation raises the fixed costs of production. A firm aims to position itself so that entry barriers protect it from potential entrants (and perhaps current rivals), while at the same time seeking to avoid or reduce the exit barriers which both it and its rivals face. Sometimes exit barriers change after a firm leaves an industry; when this happens

(or is likely to happen) to the detriment of the remaining firms, a delicate question of exit timing becomes important.

The importance of buyers and vendors as competitive forces influencing industry rivalry is determined by their bargaining power relative to that of firms in the industry. Their bargaining leverage reflects underlying demand and supply elasticities. In general, these groups tradeoff product characteristics against price during bargaining.

Buyer bargaining power is high when buyers are concentrated or purchase large volumes relative to vendor sales, when the purchased products constitute a large proportion of the buyers's costs or purchases, or when undifferentiated products are purchased (especially if their product quality is unimportant to the buyer's product quality). Their bargaining power is increased even more when they face low switching costs, earn low profits, can credibly threaten backward integration, or have full information. In addition, some buyers may control access to specific group within a production-marketing-consumption (p-m-c) system (e.g., retailers and final consumers). Vendor bargaining power tends to be determined by conditions opposite to those described for buyers.

The firm aims to choose buyers and vendors with the least bargaining power to adversely affect itself. The sources of buyer and vendor power must be recognized before the firm establishes its bargaining position. Buyer and vendor selection processes assist this process, but it may

also be possible for individual firms to consolidate their bargaining position over time as relationships expand.

The final competitive force is the pressure which substitute products place on industry and thus, firm profitability. Substitutes are products which are correlated with each other in terms of use. They place an upper limit on the price which firms in the industry can charge, with the (functional) performance of the substitute products determining where this upper limit lies. Substitutes tend to have a greater suppressive impact on industry profit during expansionary phases of cyclic economic activity than during contractionary phases.

The industrial buying process: A behavioral link

Buying is a process consisting of a "...set of social tasks which must be undertaken for orderly purchase action to occur" (Bonoma *et al.*, 1983, p. 43). Buyer behavior models help define and pinpoint persons who contribute to the buying process, how they interact during buying, and where the power to make or change buying decisions lies. Thus buyer behavior links the firm and the products it purchases as inputs.

The concept of the buying center (Webster *et al.*, 1972) summarizes the roles which must be performed during the industrial buying process. Five distinct roles are identified: users, influencers, buyers, gatekeepers, and deciders. Persons in the buying center can all be regarded

as influencers, but not all influencers perform other roles. Also, a single person may act in more than one of the above roles.

From the perspective of transforming a commodity to a differentiated product all the above roles are important. Users may suggest a need for certain types of materials, and specify processing and performance standards. Constraints and information on purchase choices are common means by which influencers contribute to the buying process. Buyers possess the formal authority to select vendors and arrange purchase terms. Access of all types (e.g., physical, personal, information, etc.) is regulated by gatekeepers; they mainly help to identify buying alternatives. Deciders possess the (formal or informal) power to shift purchasing activities through the buying process.

According to Hill *et al.* (1986) there are four distinct stages in the industrial buying process: precipitation, product specification, vendor selection, and vendor commitment. Precipitation involves initiating the buying process. Conformity of vendors' products to purchaser requirements is determined during the product specification stage. This stage is particularly important where numerous vendors are available to the purchaser, as for many commodities. In the cases of similar products (cf. commodities) or buyer specified products, vendor selection is necessary. The commitment stage involves post-purchase activities aimed at ensuring purchase satisfaction, with a

view to encouraging future (perhaps repeat) purchases. Each stage consists of one or more interrelated decisions which must be coordinated before the desired purchasing outcome can be achieved.

Further insight can be gained by examining a classification of buying situations proposed by Robinson *et al.*, (1967). Purchases of softwood lumber are most likely to fall into either the modified rebuy or the straight rebuy classes rather than the new task class, with the modified rebuy class being most appropriate for a potential softwood lumber vendor wishing to supply established manufacturers. In this situation the buyer reevaluates vendor alternatives, offering a potential vendor the chance to become established as an accepted vendor. Also, a vendor facing a straight rebuy situation may be able to engineer a modified rebuy situation by her marketing efforts, again with the chance of becoming established as an accepted vendor.

The concept of a product

A product[2] can consist of tangible or intangible characteristics. One of these characteristic types may constitute the product, but they are often combined (Levitt, 1981). In either case, a product embodies one or more characteristics which will meet underlying consumer needs and wants, and provide a satisfying consumption experience.

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2 Product henceforth means either goods or services.

This product concept has been termed the core product (Kotler, 1984). The core product provides a consumer with incentive for product acquisition.

A product embodies the functional services[3] which a consumer experiences during consumption. At its center lies the core product (Figure 2). A product can be further subdivided into a generic product and an expected product. The generic product is "... the fundamental, but rudimentary substantive 'thing' that's the table stakes of business" (Levitt, 1980, p. 85), and is regarded as "functionally undifferentiated" (Levitt, 1980, p. 89). The product characteristics a consumer considers absolutely essential constitute the minimum purchase conditions. These conditions define the expected product which is the basic object of exchange in (market) transactions.

A product may be further enhanced by incorporating additional benefits into the product. An augmented product results (Levitt, 1980; Kotler, 1984), yielding satisfaction beyond a consumer's expectations. The product thus becomes differentiated in ways that assist a consumer to use or consume that product. Consumer awareness of product differentiation benefits is essential for an augmented product to compete with rival products.

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3 A product which is a service should also be distinguished from the services of a product. The latter involves extraction of utility from a product during the act of consumption.

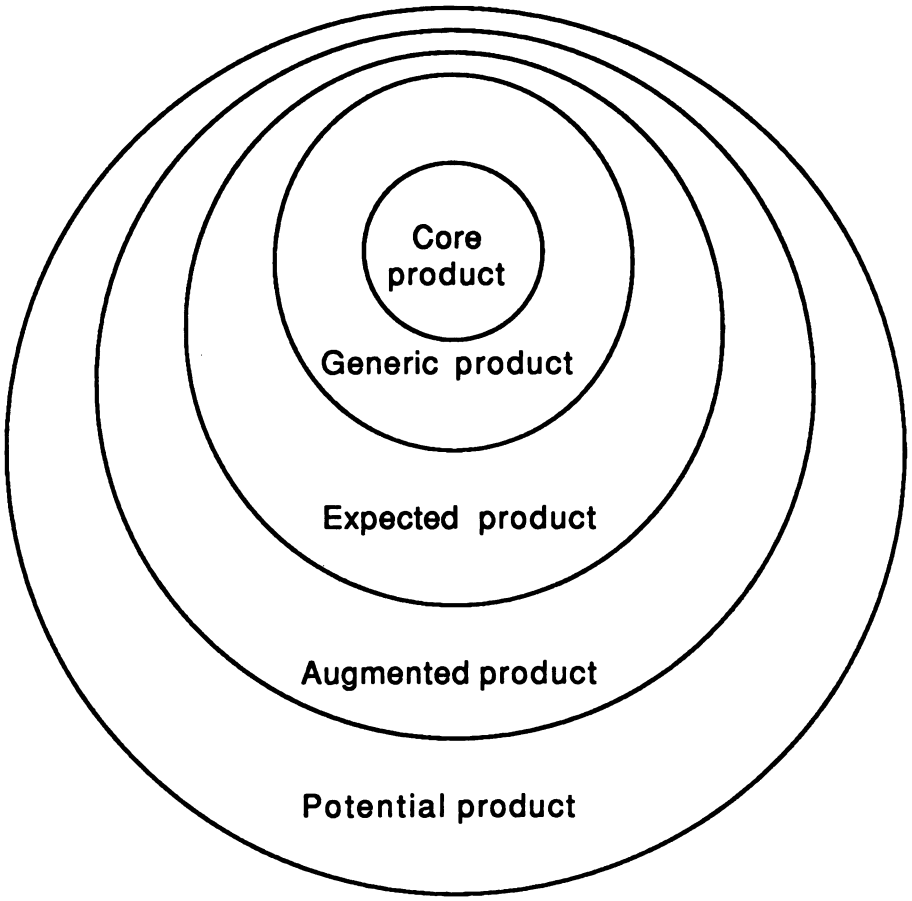

Figure A.I.2 : The product concept (Levitt, 1981).

All the different ways in which a product may be differentiated form the potential product (Levitt, 1980). The relative importance of potential product characteristics depends on exogenous economic and other factors (e.g., business cycles, changes in consumer tastes, etc.). A firm can attempt to use its product to both retain and attract customers by changing these differentiating characteristics (or their levels) in response to, or anticipation of, such exogenous change.

There are several functions[4] which must be performed concurrently with the utility transformations implied by each of the above types of product. Each function contributes to the overall utility of the product enjoyed by the ultimate consumer. The functions are transferable between stages in a p-m-c system and, like other product characteristics, are incorporated in a product. One or more of these functions can be used to differentiate products also.

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4 The functions include (Shaw, 1912; Kotler, 1984): (a) sharing risk between system participants; (b) transporting the product, including provisions for storage and timely delivery; (c) financing the operations, i.e., acquiring and dispersing the funds required to cover the costs of creating and/or maintaining a viable system; (d) selling, which involves searching out and communicating with prospective buyers, associated sales promotion, and negotiating to establish price and offer terms so as to effect a change in ownership; (e) shaping and fitting the product to the buyer's requirements including manufacturing, grading, assembling, packaging, specialty services and regrouping activities; and (f) research and advisory services to gather and communicate information required for planning and facilitating exchange within the system.

An example may help to clarify these product concepts. Consider softwood lumber used by a moulding manufacturer. The core product desired by the manufacturer might be plant utilization, with the generic product being softwood lumber suitable for moulding manufacture. The expected product might then be softwood lumber of certain grade and dimensions delivered in a frequent and timely fashion so as to ensure a minimum level of plant utilization. Augmentation of the expected product may occur by utilizing one or more of many potential product characteristics such as credit and/or discount incentives, guarantees of various types, species, delivery schedule and mode, moisture content, preservative treatment, etc.

As shared characteristics can be used to describe commodities, so too can the lack of shared characteristics distinguish a product within a group of products or a product from a group of products. This is the heart of product differentiation (cf. Chapter I). The characteristics of a particular product must be deliberately and distinctively specified for those characteristics distinguishing the product group (Lancaster, 1979) if product differentiation is to have a chance of being successful. Part of this process involves evaluating the utility tradeoffs between product characteristics - as perceived by the consumer.

APPENDIX II

Softwood lumber, the millwork industry, and millwork manufacturers.

Softwood lumber is not a homogeneous commodity. Not only do intrinsic wood properties vary between softwood species, but so do several other lumber characteristics. Two examples are grade and dimension.

Lumber grades are indicative of certain manufacturing and end-use properties. They can be altered readily when expedient (e.g., with changes in underlying commodity characteristics, new supply sources, etc.). The usefulness of grade as a differentiating characteristic depends in part upon specific (minimum) grade requirements for a given end use, and in part upon consumers' desires.

Lumber dimensions are of potentially major significance as a differentiating characteristic. It is easy to produce small dimension lumber from large. It is not as easy to produce large dimension lumber from small. Large dimension softwood lumber can be produced from large diameter sawlogs, but these logs are forecast to become increasingly scarce in the U.S. and Canada (Adams *et al.*, 1979; Flora, 1986). It also can be manufactured from small dimension lumber[1] in processes such as fingerjointing, edge-gluing, and lamination.

Length and width, rather than thickness, are the main dimensions of interest. Long length and wide width softwood lumber have historically commanded a price premium over other lumber (e.g., Richards *et al.*, 1986). There are two

[1] Reconstituted wood products made from wood particles such as chips and fiber are ignored here, but may compete with solid softwood lumber in some end uses.

possible reasons for these premiums: first, long length and wide width softwood lumber may simply be scarce; and second, the demand for large lumber is a derived demand originating from end uses where large lumber dimensions are more keenly sought after than small.

Millwork is a potential use for large dimension softwood lumber possessing favorable utilization properties. As defined under the SIC[2] 2431 code, it includes window and sash units, blinds and shutters, door frames and entrances, doors, mouldings, and stairwork (U.S. Bureau of the Census[3]).

Millwork does not consume large quantities of softwood lumber relative to other wood uses. In 1982, 32.5 billion bf[4] of softwood lumber was consumed in the U.S. (Ulrich, 1985) of which at least 3% was used in millwork manufacture[5]. In value terms however, millwork accounted for about 13% of the value of softwood lumber shipments

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2 Standard Industrial Classification.

3 Henceforth unless otherwise indicated, quoted data have been obtained from U.S. Bureau of the Census sources (various dates), namely, the Census of Manufactures, the Census of Wholesale Trade, and the Census of Retail Trade for 1972, 1977, and 1982, and the price index data used to convert current into real dollars. To avoid needless repetition, these sources appear only once in the references.

4 bf = board foot; 1000 bf = 156 cubic feet log volume (Anonymous, 1982).

5 This proportion includes softwood logs, bolts and unsliced fliches, and rough-sawn lumber only. Comparable 1977 figures inclusive of surfaced lumber are: total U.S. softwood lumber consumption 41.6 billion bf (Ulrich, 1985); proportion consumed by millwork manufacturers 6%.

(including transport costs) from SIC 2421 (sawmills and planing mills) and about 40% of the value of softwood lumber consumed in SIC groups 24 (lumber and wood products)[6] and 25 (furniture and fixtures). The difference probably arises because of the premium lumber grades required for millwork.

End-use consumption of softwood lumber in the U.S. ranged between about 28 and 40 billion bf from 1949 to 1981 (Spelter *et al.*, 1984). Ignoring cyclical variations, residential construction accounted for about 60% of the softwood lumber consumed over the 1949-81 period, and industrial usage accounted for about another 12%. Softwood lumber use in non-residential construction declined from 18% of total consumption in 1949 to 9% in 1981. The remaining 2% (1949) to 20% (1981) was attributed to consumption in non-construction markets (e.g., exports), inventory changes, and statistical discrepancies.

Marcin *et al.* (1981) have observed that the share of softwood lumber use in millwork subsequently used in residential construction (including remodeling and home improvements) has been fairly constant over the decades of the sixties and seventies, but data from the early 1980's are scarce[7]. The proportion of softwood lumber used for

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6 Excludes SIC 241 and 242, logging camps and contractors, and sawmills and planing mills, respectively.

7 One source (Anonymous, 1984b) reported that the average number of millwork products used in a new home were: entry doors - 2.5, interior passage doors - 8.2, closet doors - 5.8, windows (above grade) - 14.9, and mouldings - 1450 lineal feet. The average number of millwork products used for major home improvement projects were 1.0 entry doors,

millwork and flooring in new, one-family dwellings increased from 10% in 1950 to 16% in 1976 (Spelter *et al.*, 1984). Softwood lumber use per unit of floor area diminished over the 1950-76 period, but softwood millwork and flooring maintained its usage position relative to other softwood lumber uses at about 1.1 bf/ft^2 - at least for new one-family dwellings. More specifically, softwood lumber used for flooring has diminished from 316 million bf in 1954 (U.S. Bureau of the Census, ca 1957) to 34 million bf in 1977. These data suggest that softwood millwork may well have increased its relative usage position in residential construction.

Millwork accounted for about 4% of all lumber used in non-residential building construction in 1982 - equivalent to 83 million bf, or less than 0.1 bf/ft^2 on a floor area basis (Spelter *et al.*, 1985). The proportion of softwood lumber contained therein is unknown. The use of millwork in non-residential, non-building construction is also unknown.

Industrial lumber uses include shipping (containers, pallets, dunnage), furniture and other manufacturing, railroad ties, and mine lumber. Some millwork is used in furniture and other manufacturing uses, but in these end uses the importance of softwood millwork is apt to be minor. Forty percent of lumber used for furniture was softwood (1.3 billion bf), but only 19% (0.6 billion bf) of all lumber

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0.7-2.0 interior passage doors, 0.7-4.0 closet doors, 0.2-2.0 windows, and 10-60 lineal feet of mouldings.

consumed consisted of semi-finished parts purchased from other industries, including millwork (Spelter *et al.*, 1984). Furthermore, lumber consumption in 'other' manufacturing has been declining slowly.

The outlook for consumption of millwork products is strongly dependent on new, and remodeling, renovation, and maintenance components of the residential building construction market. A 1984 report estimated that millwork shipments would increase at a 3% compound growth rate over the ensuing 5 year period (U.S. Bureau of the Census, 1984a). Another recent report (Data Resources Interindustry Service, 1985) projected annual growth rates in real output for U.S. millwork firms (SIC 2431) of 3.2%, 0.3%, and 1.5% for the periods 1985-90, 1990-95, and 1995-2000 (equivalent to a 0.9% real growth rate over the entire period). The declining growth rate was attributed largely to demographic changes in the U.S. population. Real growth rates in millwork exports were projected to decline from 6.6% in 1985-90 to 4.4% in 1995-2000, with imports rising only slightly from 3.5% to 3.7% over the same period.

In summary then, the consumption of millwork is strongly dependent upon the building construction market, and in particular the residential component of that market. In residential building construction millwork appears to have at least maintained its position relative to other lumber uses. Millwork is of minor significance in the non-residential building market in which lumber use in general

has been declining. The importance of other non-residential and industrial markets to the softwood millwork industry is unknown. Real growth prospects for millwork output are modest.

From a potential vendor's perspective, millwork manufacturers are attractive as consumers of softwood lumber for at least three reasons. First, their concentration relative to other stages in the millwork p-m-c system is low enough (Table A.II.1) for a vendor to select a small number of manufacturers initially, and ensure that the product characteristics of the softwood lumber supplied will best meet their needs and wants. Subsequent expansion prospects can be evaluated once product acceptance is established.

A second reason for concentrating on millwork manufacturers is that they are somewhat insulated from the economic and business cycles typically affecting residential building activity. Price fluctuations induced by the derived nature of softwood lumber demand are apt to be diminished also. These two factors imply that the derived demand for softwood lumber for millwork manufacturing is probably more stable than the broad commodity softwood lumber market.

Ease of identifying large consumers of softwood lumber among millwork manufacturers is a third reason. Large consumers can be more easily targeted, approached and serviced than their smaller counterparts. Assuming these large manufacturers also have well-established access to

Table A.II.1 : Concentration by value of shipment or sales for the U.S. millwork industry (SIC 2431, SIC 5031, SIC 521), 1972-82.

Stage of millwork p-m-c system	Year	Concentration ratio[1] (%):			
		4 firm	8 firm	20 firm	50 firm
SIC 2431-millwork manufacturers	1982	15	20	30	44
	1977	14	20	31	46
	1972	10	15	25	41
SIC 5031-lumber, plywood and millwork distributors	1982	20	23	30	37
	1977	16	21	29	38
	1972	14	19	26	34
SIC 521-lumber and building materials retailers	1982	10	16	23	29
	1977	8	11	17	23
	1972	7	10	14	19

Note
1 : Based on value of shipments for SIC 2431; value of sales for SIC 5031 and SIC 521.

References
U.S. Bureau of the Census, ca 1976a,b,c, ca 1981a,b,c, ca 1985a,b,c.

distribution channels, any distribution entry barriers can be avoided or reduced (cf. Table A.II.2). Further, the strategic benefits conferred by regular access to a secure supply of softwood lumber meeting their specific needs and wants may be attractive to certain millwork manufacturers.

Table A.II.2 : Concentration by value of sales for different types of lumber, plywood and millwork distributors (SIC 5031) in the U.S., 1972-82.

Type of distributor	Year	Concentration ratio[1] (%):			
		4 firm	8 firm	20 firm	50 firm
Merchant wholesaler	1982	15	19	25	33
	1977	7	11	18	26
	1972	5	9	15	25
Manufacturers' sales branches and offices	1982	60	72	84	93
	1977	63	73	86	96
	1972	66	80	91	97
Agents, brokers and commission merchants	1982	16	23	36	53
	1977	17	24	36	53
	1972	16	21	32	47

Note
1 : Based on value of sales.

References
U.S. Bureau of the Census, ca 1976b, ca 1981b, ca 1985b.

APPENDIX III

Pilot study results

Table A.III.1 : A comparison of various characteristics of two samples of Michigan millwork (SIC 2431) and wood kitchen cabinet (SIC 2434) manufacturing companies, 1986.

Company characteristic	SIC 2431 (n=12, N=23)	SIC 2434 (n=12, N=23)
Comparisons statistically tested		
Mean employees per company (#)	37[2]	12[2]
Mean length of relationship with oldest regular supplier (years)	16	21
Most recent softwood lumber purchase		
Mean elapsed time (weeks)	4	6
Quantity purchased (100bf[1])	41[2]	5[2]
Mean length (feet)		
Minimum	7	7
Maximum	17[3]	15[3]
Mean width (inches)		
Minimum	3[2]	6[2]
Maximum	13	14
Mean thickness (1/4 inches)		
Minimum	5	5
Maximum	7	6

Table A.III.1 (cont'd.).

Comparisons not statistically tested		
Company ownership (%)		
Corporate	83	75
Individual proprietorship	17	17
Partnership	0	8
Form of organization (%)		
Single unit	75	92
Multiple unit	25	8
Types of products manufactured (%)		
Custom only		
Millwork	66	17
Wood kitchen cabinets	42	75
Stock only		
Millwork	0	8
Wood kitchen cabinets	0	0
Both custom and stock		
Millwork	33	0
Wood kitchen cabinets	0	0

Notes
1 : bf = board feet.
2 : Statistically significant at 95% (t test).
3 : Statistically significant at 99% (t test).

Source
Pilot study survey of 15 millwork and wood kitchen cabinet companies in Michigan, 1986.

Table A.III.2 : Supplier-purchaser relationships for Michigan millwork (SIC 2431) and wood kitchen cabinet (SIC 2434) companies, 1986.

	SIC 2431 (n=12, N=23)	SIC 2434 (n=12, N=23)
Supplier status (%)		
Regular	92	100
Irregular	58	50
Reasons for maintaining regular suppliers (%)		
Price	58	42
Availability	50	17
Service	42	42
Type of product	42	17
Quality	25	33
Convenience	25	17
Other	25	17
Reasons for seeking irregular suppliers (%)		
Type of product	50	33
Availability	17	17
Price	8	17
Other	0	8

Source
Pilot study survey of 15 millwork and wood kitchen cabinet companies in Michigan, 1986.

APPENDIX IV

Questionnaire Part 1

COMPANY # : _____ RESPONDENT # : _____ PAGE 1 OF 36

SURVEY QUESTIONNAIRE

LUMBER PURCHASING PRACTICES OF MICHIGAN MILLWORK MANUFACTURERS

PART 1 - BACKGROUND AND STRUCTURE

COMPANY NAME : _____

COMPANY # : _____

RESPONDENT NAME : _____

RESPONDENT # : _____

DATE OF INTERVIEW : (DATE/MONTH/87) / /87

DAY : _____

TIME INTERVIEW STARTED : (HOUR/MINUTE) /

A.M./P.M.

SECTION I - DESCRIPTIVE BACKGROUND

This set of questions is designed to obtain the background information necessary to establish a benchmark which can be used for both descriptive and comparative purposes. Firstly, I'd like to ask some general questions regarding the company.

1 Preliminary respondent screening

A What is your position in the company? *(SPECIFY)*

_____

B How long have you held this position? *(Years)* _____

C Does the company manufacture:

1 Sash and window components and/or sets? _____
2 Door frames and entrances? _____
3 Blinds and shutters? _____
4 Interior and/or exterior doors? _____
5 Mouldings? _____
6 Stairwork? _____
7 Other? *(SPECIFY)* _____

(If the company does not manufacture at least one of the first six items, then end the interview)

D Has your company purchased fingerjointed softwood lumber on at least one occasion in the last twelve months?

1 Yes
2 No _____

E Has your company purchased softwood lumber on at least one occasion in the last twelve months?

1 Yes *(If YES, skip to Question 2)*
2 No *(If NO, end the interview)* _____

2 Legal form of company

A Is the company you work for incorporated?

1 Yes *(If YES, skip to Question 3)*
2 No _____

B Is the company you work for:

1 An individual proprietorship?
2 A partnership?
3 Other? *(SPECIFY)* _____

3 Number of employees

A Approximately how many people are presently employed by the company you work for:

1 Less than 10?
2 10 - 19?
3 20 - 49?
4 50 - 99?
5 100 - 499?
6 500 or more? _____

4 Age of the company

A When was the present legal form of the company established:

1 After 1982?
2 1977 - 1982?
3 1967 - 1976?
4 Before 1967? _____

B Has the company previously conducted business in any other legal form?

1 Yes
2 No *(If NO, skip to Question 5)* _____

C When was the company first established:

1 After 1982?
2 1977 - 1982?
3 1967 - 1976?
4 Before 1967? _____

5 Location of operation

A Does your company operate at more than one location?

1 Yes
2 No *(If NO, skip to Question 6)* _____

B Approximately how many locations?

1 Less than 5
2 5 - 19
3 20 - 50
4 51 - 100
5 More than 100 _____

C Do your responsibilities cover:

1 This location only?
2 More than one location? *(SPECIFY how many)* _____
3 The entire company? _____

6 Types of millwork manufactured

A Stock millwork is manufactured to a standard size, pattern, and layout ready for use. Does the company manufacture this sort of millwork?
1 Yes
2 No _____

B Custom millwork is manufactured to a nonstandard size, pattern, and layout, being made to order to meet a particular set of specifications. Does the company manufacture this sort of millwork?
1 Yes
2 No _____

C I am interested in how your customers order millwork from your company. Does the company manufacture millwork for customers to use on a job by job basis?
1 Yes
2 No
3 Don't know _____

D Does the company manufacture millwork which customers then purchase in bulk quantities without intending use for any specific job?
1 Yes
2 No
3 Don't know _____

E Does the company manufacture millwork under either oral or written contract drawn up with its customers?
1 Yes
2 No
3 Don't know _____

G Are there other ways by which your customers purchase millwork from the company?
1 Yes *(SPECIFY)* _____
2 No _____

7 Description of production facilities

Now I'd like to ask a few questions about the different types of facilities which your company operates in manufacturing millwork at this site.

A Remanufacturing

1 Remanufacturing mills convert large dimension lumber to small dimension lumber for purposes of further manufacturing. Does the company operate one or more remanufacturing mills at this site?
   1 Yes
   2 No *(If NO, skip to B)* _____

2 Is the maximum lumber length which can be handled in remanufacturing:
   1 Less than 8 feet?
   2 From 8 to 15 feet?
   3 From 16 to 20 feet?
   4 21 feet or more?
   5 Don't know _____

3 Is the maximum lumber width which can be handled in remanufacturing:
   1 Less than 4 inches?
   2 From 4 to 8 inches?
   3 From 9 to 13 inches?
   4 14 inches or more?
   5 Don't know _____

4 Is the maximum lumber thickness which can be handled in remanufacturing:
   1 Less than four quarter?
   2 From four to seven quarter?
   3 From eight to fifteen quarter?
   4 Sixteen quarter or more?
   5 Don't know _____

B Face-planing

1 Face-planing involves surfacing either one face or opposite faces of a piece of lumber using a machine driving high speed rotating knives. Does the company operate one or more face-planers at this site?
   1 Yes
   2 No *(If NO, skip to C)* _____

2 Is the maximum lumber length which can be handled in face-planing:
   1 Less than 8 feet?
   2 From 8 to 15 feet?
   3 From 16 to 20 feet?
   4 21 feet or more?
   5 Don't know _____

3 Is the maximum lumber width which can be handled in face-planing:

1 Less than 4 inches?
2 From 4 to 8 inches?
3 From 9 to 13 inches?
4 14 inches or more?
5 Don't know

_____

4 Is the maximum lumber thickness which can be handled in face-planing:

1 Less than four quarter?
2 From four to seven quarter?
3 From eight to fifteen quarter?
4 Sixteen quarter or more?
5 Don't know

_____

C Moulding

1 Moulders are woodworking machines designed to shape lumber to either regular or irregular profiles. They are sometimes called 'stickers'. Does the company operate one or more moulders at this site?

1 Yes
2 No *(If NO, skip to D)*

_____

2 Is the maximum lumber length which can be handled in moulding:

1 Less than 8 feet?
2 From 8 to 15 feet?
3 From 16 to 20 feet?
4 21 feet or more?
5 Don't know

_____

3 Is the maximum lumber width which can be handled in moulding:

1 Less than 4 inches?
2 From 4 to 8 inches?
3 From 9 to 13 inches?
4 14 inches or more?
5 Don't know

_____

4 Is the maximum lumber thickness which can be handled in moulding:

1 Less than four quarter?
2 From four to seven quarter?
3 From eight to fifteen quarter?
4 Sixteen quarter or more?
5 Don't know

_____

D Fingerjointing

1 Fingerjointing is a means of end gluing short lengths of lumber to form a single long length of lumber where the joint used consists of a set of interlocking fingers. Does the company operate one or more fingerjointing machines at this site?
1 Yes
2 No *(If NO, skip to E)* _____

2 Is the maximum lumber length which can be handled in fingerjointing:
1 Less than 8 feet?
2 From 8 to 15 feet?
3 From 16 to 20 feet?
4 21 feet or more?
5 Don't know _____

3 Is the maximum lumber width which can be handled in fingerjointing:
1 Less than 4 inches?
2 From 4 to 8 inches?
3 From 9 to 13 inches?
4 14 inches or more?
5 Don't know _____

4 Is the maximum lumber thickness which can be handled in fingerjointing:
1 Less than four quarter?
2 From four to seven quarter?
3 From eight to fifteen quarter?
4 Sixteen quarter or more?
5 Don't know _____

E Edge-gluing

1 Edge-gluing is the process of length-wise joining narrow lumber to produce wide lumber. A variety of different types of joint designs may be used. Does the company operate one or more edge-gluing machines at this site?
1 Yes
2 No *(If NO, skip to F)* _____

2 Is the maximum lumber length which can be handled in edge-gluing:
1 Less than 8 feet?
2 From 8 to 15 feet?
3 From 16 to 20 feet?
4 21 feet or more?
5 Don't know _____

3 Is the maximum lumber width which can be handled in edge-gluing:
1 Less than 4 inches?
2 From 4 to 8 inches?
3 From 9 to 13 inches?
4 14 inches or more?
5 Don't know _____

4 Is the maximum lumber thickness which can be handled in edge-gluing:
1 Less than four quarter?
2 From four to seven quarter?
3 From eight to fifteen quarter?
4 Sixteen quarter or more?
5 Don't know _____

F Inventory

1 Does the company try to maintain a softwood lumber inventory on hand for manufacturing?
1 Yes
2 No *(If NO, skip to 4)* _____

2 Which of the following corresponds to the minimum operating inventory of softwood lumber the company tries to maintain on a monthly basis:
1 Less than 10,000bf?
2 From 10,000 to 50,000bf?
3 From 50,001 to 100,000bf?
4 From 100,001 to 250,000bf?
5 From 250,001 to 500,000bf?
6 500,001bf or more? _____

3 Which of the following corresponds to the average operating inventory of softwood lumber the company tries to maintain on a monthly basis:
1 Less than 10,000bf?
2 From 10,000 to 50,000bf?
3 From 50,001 to 100,000bf?
4 From 100,001 to 250,000bf?
5 From 250,001 to 500,000bf?
6 500,001bf or more? _____

4 Does the company try to share the inventory function with its softwood lumber vendors, either with or without vendor cooperation?
1 Yes
2 No *(If NO, skip to 6)* _____

5 How does the company seek to achieve this? *(Probe, asking for examples)* _____

6 Does the company try to maintain a millwork inventory on hand for sales?
1 Yes
2 No *(If NO, skip to 9)* _____

7 Which of the following corresponds to the minimum value of the millwork inventory the company tries to maintain on a monthly basis:
1 Less than $10,000?
2 From $10,000 to $20,000?
3 From $20,001 to $50,000?
4 From $50,001 to $100,000?
5 From $100,001 to $250,000?
6 $250,001 or more? _____

8 Which of the following corresponds to the average value of the millwork inventory the company tries to maintain on a monthly basis:
1 Less than $10,000?
2 From $10,000 to $20,000?
3 From $20,001 to $50,000?
4 From $50,001 to $100,000?
5 From $100,001 to $250,000?
6 $250,001 or more? _____

9 Does the company try to share the millwork inventory function with its customers either with or without customer cooperation?
1 Yes
2 No *(If NO, skip to SECTION II)* _____

10 How does the company seek to achieve this? *(Probe, asking for examples)* _____

SECTION II - STRUCTURAL CHARACTERISTICS

The next set of questions is designed to obtain information on the type of costs which the company faces, the structure of the company, and how the the company has shaped its business practices. The questions asked are seeking general rather than specific responses, recognizing that commercially sensitive information may be involved. Firstly, a few questions about the cost structure which the company faces.

1 Cost structure

A Fixed costs are sometimes called 'overhead' costs. These are costs which must be paid regardless of whether the company is producing at zero, half, or full capacity. Some examples include rent, property taxes, interest on borrowed capital, equipment leasing charges, depreciation, property and accident insurance, salaries, etc. On the basis of this understanding of fixed costs, in which of the following classes does the company's *annual* fixed cost lie:

1 Less than $100,000?
2 From $100,000 to $200,000?
3 From $200,001 to $400,000?
4 From $400,001 to $600,000?
5 From $600,001 to $1,000,000?
6 $1,000,001 or more?
7 Don't know

_____

B In which of the following classes does the combined *annual* cost of property taxes and property rent lie *(including buildings on the owned and/or rented property)*:

1 Less than $10,000?
2 From $10,000 to $25,000?
3 From $25,001 to $50,000?
4 From $50,001 to $100,000?
5 From $100,001 to $250,000?
6 From $250,001 to $500,000?
7 $500,001 or more?
8 Don't know

_____

C In which of the following classes does the combined *annual* cost of equipment and equipment lease lie *(including depreciation, as well as company vehicles, plant and equipment, etc.)*:

1 Less than $10,000?
2 From $10,000 to $25,000?
3 From $25,001 to $50,000?
4 From $50,001 to $100,000?
5 From $100,001 to $250,000?
6 From $250,001 to $500,000?
7 $500,001 or more?
8 Don't know

_____

D In which of the following classes does the *annual* cost of property and accident insurance lie:

1 Less than $10,000?
2 From $10,000 to $25,000?
3 From $25,001 to $50,000?
4 From $50,001 to $100,000?
5 From $100,001 to $250,000?
6 From $250,001 to $500,000?
7 $500,001 or more?
8 Don't know

_____

E In which of the following classes do the remaining combined *annual* fixed costs lie:

1 Less than $10,000?
2 From $10,000 to $25,000?
3 From $25,001 to $50,000?
4 From $50,001 to $100,000?
5 From $100,001 to $250,000?
6 From $250,001 to $500,000?
7 $500,001 or more?
8 Don't know

_____

F Variable costs are sometimes referred to as 'out-of-pocket' expenses. These costs change depending on the level of production and sales. They include items such as the cost of raw materials, labor cost, utility charges, sales commissions, etc. On the basis of this understanding of variable costs, in which of the following classes does the company's *average monthly* variable cost lie:

1 Less than $10,000?
2 From $10,000 to $25,000?
3 From $25,001 to $50,000?
4 From $50,001 to $100,000?
5 From $100,001 to $250,000?
6 From $250,001 to $500,000?
7 $500,001 or more?
8 Don't know

_____

G In which of the following classes does the *average monthly* cost of softwood lumber purchased by the company for millwork manufacture lie:

1 Less than $10,000?
2 From $10,000 to $20,000?
3 From $20,001 to $40,000?
4 From $40,001 to $60,000?
5 From $60,001 to $100,000?
6 From $100,001 to $250,000?
7 From $250,001 to $500,000?
8 $500,001 or more?
9 Don't know

_____

H In which of the following classes would you estimate the cost of purchased softwood lumber as a percentage of *average monthly* millwork sales to lie:

1 Less than 10%?
2 From 10 to 25%?
3 From 26 to 40%?
4 From 41 to 60%?
5 From 61 to 80%?
6 81% or more?
7 Don't know _____

Now I'd like to ask some questions concerning how the company is organized and carries out the various functional tasks involved in procuring softwood lumber and selling millwork products.

2 Company structure

A 1 Does the company have a separate purchasing department?

1 Yes
2 No *(If NO, skip to B)* _____

2 How many people are presently employed in the purchasing department?

1 Less than 5
2 5 - 10
3 11 - 20
4 More than 20 _____

3 How many softwood lumber buyers are presently employed in the purchasing department?

1 Less than 5
2 5 - 10
3 11 - 20
4 More than 20 _____

(Skip to C)

B Approximately how many people presently purchase softwood lumber for the company?

1 Less than 5
2 5 - 10
3 11 - 20
4 More than 20 _____

C 1 Does the company have a separate sales and marketing department?

1 Yes
2 No *(If NO, skip to D)* _____

2 How many people are presently employed in the sales and marketing department?

1 Less than 5
2 5 - 10
3 11 - 20
4 More than 20 _____

3 How many salespersons are presently employed in the sales and marketing department?

1 Less than 5
2 5 - 10
3 11 - 20
4 More than 20 _____

(Skip to E)

D Approximately how many people presently sell millwork for the company?

1 Less than 5
2 5 - 10
3 11 - 20
4 More than 20 _____

E 1 Does the company own one or more sawmills which supply softwood lumber to the millwork operation?

1 Yes
2 No *(If NO, skip to F)*
3 Don't know *(If DON'T KNOW, skip to F)* _____

2 How many such sawmills?

1 Less than 5
2 5 - 10
3 11 - 20
4 More than 20 _____

F 1 Does the company own forestland from which the softwood lumber for the millwork operation is derived?

1 Yes
2 No *(If NO, skip to G)*
3 Don't know *(If DON'T KNOW, skip to G)* _____

2 Approximately what percentage of the millwork operation's softwood lumber requirements is supplied from these forestlands?

1 None - 0%
2 1-25%
3 26-50%
4 51-75%
5 76-99%
6 All - 100% _____

G 1 Does the company own wholesale distribution outlets through which its millwork is sold?

1 Yes
2 No *(If NO, skip to H)* _____

2 How many such outlets?

1 Less than 5
2 5 - 25
3 26 - 50
4 More than 50 _____

H 1 Does the company act as an intermediate processing agent for a wholesale distributor, processing softwood lumber to specifications supplied by the wholesale distributors themselves?

1 Yes
2 No *(If NO, skip to I)* _____

2 Approximately how many such distributors?

1 Less than 5
2 5 - 25
3 26 - 50
4 More than 50 _____

3 What proportion of the company's sales are made in this manner?

1 None - 0%
2 1-25%
3 26-50%
4 51-75%
5 76-99%
6 All - 100% _____

I 1 Does the company own retail stores through which it's millwork is sold to the general public?

1 Yes
2 No *(If NO, skip to SECTION III - Sales practices)* _____

2 Approximately how many such retail outlets?

1 Less than 5
2 5 - 20
3 21 - 50
4 51 - 100
5 More than 100 _____

3 What proportion of the company's sales are made in this manner?

1 None - 0%
2 1-25%
3 26-50%
4 51-75%
5 76-99%
6 All - 100% _____

4 Is the company's millwork sold to these retail stores:

1 Directly? _____
2 Through the company's wholesale distributor(s)? _____
3 Other? *(SPECIFY)* _____

SECTION III - SALES PRACTICES

This section is concerned with how the company goes about selling the millwork it produces. The questions asked will help provide insights into the sales practices the company has adopted which might help a lumber vendor to better understand the needs and wants of millwork manufacturers. Again, the questions asked are seeking general rather than specific responses, recognizing that commercially sensitive information may be involved. Firstly, some questions concerning the customers to whom your company sells the millwork products it manufactures.

1 What percentage of the company's millwork sales are made to the general public *(excludes builders and contractors)*?

1 None - 0%
2 1-10%
3 11-25%
4 26-40%
5 41-60%
6 61-80%
7 81-99%
8 All - 100%
9 Don't know _____

2 A What percentage of the company's millwork sales are made to builders and contractors?

1 None - 0% *(If NONE, skip to Question 3)*
2 1-10%
3 11-25%
4 26-40%
5 41-60%
6 61-80%
7 81-99%
8 All - 100%
9 Don't know *(If DON'T KNOW, skip to Question 3)* _____

B Approximately how many builders and contractors does the company sell millwork to?

1 Less than 5
2 5 - 25
3 26 - 50
4 51 - 100
5 More than 100
6 Don't know _____

C Do these builders and contractors purchase approximately equal shares (in value terms) of the company's millwork production?

1 Yes
2 No
3 Don't know *(If DON'T KNOW, skip to Question 3)* _____

D Why or why not? *(Probe, asking for examples)*

3 A What percentage of the company's millwork sales are made to independent wholesale distributors?

1 None - 0% *(If NONE, skip to Question 4)*
2 1-10%
3 11-25%
4 26-40%
5 41-60%
6 61-80%
7 81-99%
8 All - 100%
9 Don't know *(If DON'T KNOW, skip to Question 4)* _____

B Approximately how many independent wholesale distributors does the company sell millwork to?

1 Less than 5
2 5 - 25
3 26 - 50
4 51 - 100
5 More than 100
6 Don't know _____

C Do these distributors purchase approximately equal shares (in value terms) of the company's millwork production?

1 Yes
2 No
3 Don't know *(If DON'T KNOW, skip to Question 4)* _____

D Why or why not? *(Probe, asking for examples)*

4 A What percentage of the company's millwork sales are made to independent retailers?

1 None - 0% *(If NONE, skip to Question 5)*
2 1-10%
3 11-25%
4 26-40%
5 41-60%
6 61-80%
7 81-99%
8 All - 100%
9 Don't know *(If DON'T KNOW, skip to Question 5)* _____

B Approximately how many such independent retailers?

1 Less than 5
2 5 - 25
3 26 - 50
4 More than 50
5 Don't know _____

C Do these retailers purchase approximately equal shares (in value terms) of the company's millwork production?

1 Yes
2 No
3 Don't know *(If DON'T KNOW, skip to Question 5)* _____

D Why or why not? *(Probe, asking for examples)*

5 A Has the company deliberately and consciously attempted to shape its pattern of millwork sales along the lines just described?

1 Yes
2 No _____

B Why or why not? *(Probe, asking for examples)*

Now I'd like to ask some questions about how your company goes about selling the millwork products it manufactures and how you perceive certain future events might affect these practices. Since you might find some of the questions to be quite specific as to practices used, I'd like to remind you again that your responses will be treated in the strictest confidentiality, and that the results will be used only in a supportive capacity to test for hypothesized relationships and will not be reported directly in any fashion.

6 A Does the company use price and price-related variables (e.g., quantity discounts) as the principal means of selling its millwork?
1 Yes
2 No _____

B Why or why not? *(Probe, asking for examples)*

7 A In selling millwork does your company actively attempt to make its millwork products appear unique compared to those of its principal competitors?
1 Yes
2 No *(If NO, skip to Question 8)* _____

B How do you attempt to achieve this differentiation? *(Probe, asking for examples)*

C Do you regard this differentiation as being successful?
1 Yes
2 No
3 Don't know *(If DON'T KNOW, skip to Question 8)* _____

D Why or why not? *(Probe, asking for examples)*

8 A Sometimes a company finds, for various reasons, that it is desirable to add new customers and to discontinue serving present customers. Has your company switched between different customers or different types of customers (e.g., the general public, builders and contractors, independent wholesale distributors, independent retailers, etc) in the past?
1 Yes
2 No *(If NO, skip to Question 9)*
3 Not applicable - completely vertically integrated company *(If NOT APPLICABLE, skip to Question 9)*
4 Don't know *(If DON'T KNOW, skip to Question 9)* _____

B What prompted such switches? *(Probe, asking for examples)* _____

C Please describe how you went about making such switches. *(Please be specific)*

D What did you find were the major drawbacks associated with switching between different customers or different types of customers?

9 A Occasionally companies will enter or leave an industry. On such occasions the competitive environment of the industry may change. Often companies entering an industry will have had a previous association with that industry, perhaps as a customer. Consider the people and companies who are presently your company's customers. Do you view any of them as potential entrants to the millwork manufacturing industry?

1 Yes
2 No
3 Not applicable - completely vertically integrated company *(If NOT APPLICABLE, skip to Question 10)*
4 Don't know *(If DON'T KNOW, skip to Question 10)* _____

B Why or why not? *(Probe, asking for examples)*

10 A Consider the company's present customers. Some of them may rely exclusively on the millwork which your company manufactures as part of their businesses; others may have alternate millwork vendors; for still others millwork products may constitute only a small part of their businesses. How do you think purchasers of your company's millwork generally view the importance of this millwork as part of their businesses?

1 Essential for their business
2 Very important
3 Moderate importance
4 Little importance
5 Unimportant, indifferent
6 Haven't thought about it before *(If 6, skip to Question 11)*
7 Don't know *(If 7, skip to Question 11)* _____

B Why? *(Probe, asking for examples)*

11 A At times, reconstituted wood products (such as particle board, etc.), plastics, and metal are also used to manufacture millwork instead of solid wood. What impacts have reconstituted wood products had on production and sales of wood millwork by your company? *(Probe, asking for examples)*

B What steps has your company taken to either offset or take advantage of the increasing use of reconstituted wood products in millwork products? *(Probe, asking for examples)*

C What impacts have plastic products had on production and sales of wood millwork by your company? *(Probe, asking for examples)*

D What steps has your company taken to either offset or take advantage of the increasing use of plastic products in millwork products? *(Probe, asking for examples)*

E What impacts have metal products had on production and sales of wood millwork by your company? *(Probe, asking for examples)*

G What steps has your company taken to either offset or take advantage of the increasing use of metal products in millwork products? *(Probe, asking for examples)*

H How do you see the future impacts of reconstituted wood, plastic, and metal millwork products on manufacturing and sales of wood millwork developing? *(Probe, asking for examples)*

SECTION IV - THE SOFTWOOD LUMBER PURCHASE PROCESS

This set of questions is relatively short and should be quite easy to answer compared with some of those you've already faced. I am interested in who makes what decisions in the process of purchasing softwood lumber. Here is a list of individuals who might participate in this process in various capacities. *(Hand respondent the accompanying list and quickly run through it with the respondent).* Please answer with the number which best corresponds to what happens in your company. If you have any doubts or require explanations, feel free to ask.

The questions concern people in the company whose role it is to carry out certain tasks which I shall ask you about. In some cases I will want to know the names of the specific persons in your company who carry out these tasks so that, with your cooperation, I can pass on to them the second part of this survey questionnaire. Their names will not be used for any other purposes than as a means of contacting them for Part 2 of this questionnaire and the (hopefully) unlikely event of any follow-up work that might be entailed to clarify responses.

The first set of questions is concerned with who in the company is likely to initiate the softwood lumber purchase process in response to a variety of different stimuli.

1 Precipitation: Initiation of purchase situation

A Who is most likely to opt to start a process leading towards the purchase of softwood lumber to take advantage of a new price differential? *(Enter number from list)* _____

B What is(are) the name(s) of this(these) person(s)?

C Who is most likely to opt to start a process leading towards the purchase of softwood lumber to exploit a newly available supply source? *(Enter number from list)* _____

D What is(are) the name(s) of this(these) person(s)?

E Who is most likely to opt to start a process leading towards the purchase of softwood lumber to accommodate a change in the production process? *(Enter number from list)* _____

F Who is most likely to opt to start a process leading towards the purchase of softwood lumber to meet a new product performance requirement? *(Enter number from list)* _____

G Who is most likely to opt to start a process leading towards the purchase of softwood lumber to manufacture a new millwork product? *(Enter number from list)* _____

H Who is most likely to opt to start a process leading towards the purchase of softwood lumber to switch from lumber of one softwood species to that of another, assuming the same or equivalent grades in each case? *(Enter number from list)* _____

I What is(are) the name(s) of this(these) person(s)?

The next set of questions is concerned with identifying who in the company participates in determining the specifications of the softwood lumber to be purchased once the lumber purchasing process has been started.

2 Product specification

A Technical specifications are those standards to which lumber properties such as grade, moisture content, etc. must conform on account of how the lumber is expected to perform in the end uses for which it is intended, and including how that lumber will be processed into a final product. With this definition in mind, who determines the technical specifications which the purchased softwood lumber must satisfy? *(Enter number from list)* _____

B Who determines which or what types of softwood lumber would be suitable to use, i.e., conform to the technical specifications? *(Enter number from list)* _____

C Who finally chooses which or what softwood lumber to use? *(Enter number from list)* _____

D What is(are) the name(s) of this(these) person(s)?

The following sequence of questions is designed to determine who in the company is involved in the various tasks associated with the evaluation of potential softwood lumber vendors from a commercial perspective.

3 Vendor selection: Commercial evaluation

A Who identifies potential vendors? *(Enter number from list)* _____

B Who collects information on potential vendors' ranges and commercial terms? *(Enter number from list)* _____

C Who chooses eligible vendors from whom to examine commercial terms? *(Enter number from list)* _____

D Who is responsible for negotiating terms of purchase (price, delivery, etc)? *(Enter number from list)* _____

E Who finally chooses the vendor who gets the order? *(Enter number from list)* _____

F What is(are) the name(s) of this(these) person(s)?

With existing or new softwood lumber vendors there are usually either formal or informal procedures by which companies monitor vendor performance. The next sequence of questions is concerned with who in the company is involved in this process, which also includes switching between softwood lumber vendors.

4 Commitment: Monitoring performance

A Who monitors and evaluates the performance of the softwood lumber to make sure it conforms to the appropriate technical standards? *(Enter number from list)* _____

B Who monitors and evaluates the performance of the softwood lumber vendor? *(Enter number from list)* _____

C Who is most likely to suggest changing vendors for commercial reasons? *(Enter number from list)* _____

D Who is most likely to suggest changing vendors for technical reasons? *(Enter number from list)* _____

E Who finally determines that a change of vendor is appropriate? *(Enter number from list)* _____

F What is(are) the name(s) of this(these) person(s)?

TIME INTERVIEW ENDED : (HOUR/MINUTE) /

A.M./P.M.

(END OF QUESTIONNAIRE)

SOURCES OUTSIDE THE COMPANY

1 Customer
2 Architect
3 Engineer
4 Accountant
5 Trusted purchasing agent
6 Others outside the company *(SPECIFY)*
7 Convention, i.e., standard industry practices *(SPECIFY)*

SOURCES INSIDE THE COMPANY

A) COLLECTIVE DECISIONS

8 Board or executive committee
9 Interfunctional or interdepartmental committee
10 Functional or purchasing department committee

B) INDIVIDUAL DECISIONS

11 Owner
12 President
13 Vice-president *(SPECIFY)*
14 Director *(SPECIFY)*
15 Manager *(SPECIFY)*
16 Accountant or financial controller *(SPECIFY)*
17 Purchasing agent
18 Other purchasing staff *(SPECIFY)*
19 Other administrative staff *(SPECIFY)*
20 Engineer
21 Plant superintendent
22 Plant foreman
23 Machine operator
24 Others inside the company (SPECIFY)

OTHER

25 Nobody
26 Don't know

GLOSSARY OF TERMS

The following glossary is arranged in alphabetic order.

Blinds and shutters - wood frame assemblies designed to cover sash or window openings

Company-owned - a unit of the business which is more than 50% controlled by the parent company

Components - relatively small pieces of surfaced lumber of specified sizes ready for assembly into finished millwork products then ready for installation

Consistent - marked by steady continuity and lack of variation

Differentiation - the process or acts which an individual or organization takes to make the products they manufacture or handle and the functional and ancillary services they provide to their customers appear unique compared to their competitors

Door - a wooden hinged or sliding barrier between adjacent rooms within a structure (interior) or between the inside and the outside of a structure (exterior); allows personal access when open

Door frames and entrances - groups of wood parts machined and/or assembled to enclose and support a door

Employees - includes wage and salary recipients

Function - concerned with what some person or thing does, i.e., the action for which a person or thing is specially fitted or used

Incorporated - formed into a legal corporation

Independent - an individual wholesale distributor or retailer who is not legally affiliated with a larger controlling unit which may or may not also conduct business at other stages of the wood and wood products production and distribution system

Individual proprietorship - owner-operated company, one owner only

Inventory - goods being stored or stockpiled for subsequent processing or sales

Irregular - no discernible conformity to a pattern exists

Lumber - the product of a sawmill not being further manufactured than by sawing, resawing, crosscutting to length, or planing

Millwork - products manufactured from lumber in a planing mill or a woodworking plant, including sash and window components or sets, door frames and entrances, blinds and shutters, interior and exterior doors, mouldings, and stairwork

Moisture content - amount of water contained in wood expressed as a percentage of its oven-dry weight

Moulding - a strip of wood shaped to a specific profile throughout its length

Partnership - owner-operated company, multiple owners

Regular - conformity to a pattern exists

Retail stores (outlets) - individuals or organizations which sell the bulk of the millwork products they handle to the general public, including builders and contractors

Rough-sawn lumber - lumber which has not been surfaced with a planing machine

Sash and window components and/or sets - groups of wood parts machined and/or assembled to frame and fill a given opening and through which personal access is not (usually) intended

Softwood - wood of evergreen or cone-bearing tree species

Stairwork - the building and erection of stairs

Surfaced (planed, dressed) lumber - lumber which has been surfaced with a planing machine; hence : S2S=surfaced on two sides, S2E=surfaced on two edges, etc.

Unit - distinct organizational entity within the company

Wholesale distributors - individuals or organizations which undertake transportation and other coordination functions which thereby aid the process of moving millwork products from manufacturers to either retailers or other intermediaries exclusive of the final consumers of millwork products; they may or may not take legal title to the millwork products in the course of performing their functional roles

APPENDIX V

Questionnaire Part 2

COMPANY # : _____ RESPONDENT # : _____ PAGE 1 OF 60

SURVEY QUESTIONNAIRE

LUMBER PURCHASING PRACTICES OF

MICHIGAN MILLWORK MANUFACTURERS

PART 2 - SOFTWOOD LUMBER PURCHASING

COMPANY NAME : _____

COMPANY # : _____

RESPONDENT NAME : _____

RESPONDENT # : _____

DATE OF RESPONSE : (MONTH/DATE/87) / /87

DAY : _____

TIME RESPONSE STARTED : (HOUR/MINUTE) /

A.M./P.M.

GENERAL INSTRUCTIONS

This is Part 2 of a questionnaire designed to obtain information about how your company goes about buying softwood lumber. This questionnaire is a critical component of a study whose objectives are to document how Michigan millwork manufacturers buy their softwood lumber, and to examine underlying reasons for observed and hypothesized patterns. It is anticipated that the results of this study will be useful for companies seeking improvement of their softwood lumber purchasing processes. Your participation and cooperation is necessary for your ultimate benefit: only participating companies will receive a copy of the study's results when they become available. You have been carefully and specifically chosen to participate because of your role in the softwood lumber buying process. You will be asked to seal your completed questionnaire in the postage-paid envelope provided and then to mail it to us once you have finished. Thank you in advance for your participation and cooperation.

We are interested in your own opinion so please do not discuss these questions with other people until you have actually completed and mailed your responses. Please note that your responses will be treated in the strictest confidentiality; individual responses will not be reported directly in any fashion. Feel free to retain a copy of the questionnaire and your responses for your own records if you so desire. Should you decide to keep such a copy please check to ensure that you have placed all sheets of the original in the envelope before you seal and mail it. Otherwise processing delays will occur, which will then lead to delays in providing your company with the results.

This survey is concerned with purchasing of softwood lumber specifically for millwork manufacture. For the purposes of this questionnaire, millwork refers to the following specific products manufactured partially or entirely from softwood lumber: sash and window components or sets, door frames and entrances, blinds and shutters, interior and exterior doors, mouldings, and stairwork. A glossary of terms is attached at the end of the questionnaire if you are unsure of any terms used. If the term you are unsure of is not in the glossary, then write down what you have taken the term to mean.

In the questionnaire, questions and text are written in regular typeface; please pay special attention to those typed words, phrases, and sentences which are underlined. Instructions to you, the respondent, are written in *italic* typeface - generally these instructions form part of the individual question being asked.

For your assistance, each page of the 60 page total has been numbered in the top right corner. Although the questionnaire may appear daunting in length, it will not prove to be taxing in terms of the time required to answer the questions partly because questions which do not apply to you or your company's situation will be skipped over. Also, because we want you to answer the questions as clearly and completely as possible, much of the main body of the questionnaire involves reading and illustrating how we desire respondents to answer the questions. To help you to understand what we want you to do, please read the questionnaire text and questions carefully before answering.

Five more things before you start:
(a) Please write your responses as legibly as possible - this will reduce the chances that we will have to contact you at a later date;
(b) Please be as specific as possible in your responses. For example, instead of offering "quality" or "service" as a response, indicate what you mean by these terms, i.e., lumber grade , species, moisture content, timely delivery, etc. Again, this will reduce the chances that we will have to contact you at a later date;
(c) If you wish to make written comments concerning any question or other aspect of the questionnaire, then you may do so either at the appropriate point in the questionnaire or on the page provided at the end of the questionnaire (such comments are both welcomed and encouraged);
(d) If there is not enough space provided for your answer to a particular question, then continue writing on the back of the page - but please make a note to that effect; and
(e) There is no need to feel compelled to complete the questionnaire once you have begun it - if you wish to stop part way, then please record the date and time of both stopping and recommencing. We would ask however that you attempt to complete and mail the questionnaire to us within 10 days of receiving it.

Now that you have an understanding of what we hope to achieve and how you can help us to help you and your company, please proceed to the questionnaire.

SECTION I - PERSONAL CHARACTERISTICS

This set of questions is intended to provide us with background information on who is involved in buying softwood lumber. Once again, please be assured that the information gathered will be treated in strict confidentiality.

1 Gender *(Enter number)*
1 Male
2 Female _____

2 What is your highest level of schooling? *(Enter number)*

1 High school or less
2 Attended college
3 Bachelor's degree
4 Graduate study
5 Master's degree
6 Doctoral degree _____

3 What is your age? *(Enter number)*

1 Under 25
2 25 - 34
3 35 - 39
4 40 - 44
5 45 - 49
6 50 - 64
7 65 or over _____

4 What is your approximate total family income from all sources? *(Enter number)*

1 Less than $15,000
2 $15,000 - $20,000
3 $20,001 - $25,000
4 $25,001 - $30,000
5 $30,001 - $35,000
6 $35,001 - $50,000
7 More than $50,000 _____

5 What is your present position in the company?

6 In which of the following functions would you place your duties and responsibilities? *(Enter numbers)*

1 Overall policy and planning _____
2 Operations and administration _____
3 Design and development _____
4 Production and engineering _____
5 Finance and accounts _____
6 Sales and marketing _____
7 Research _____
8 Purchasing _____
9 Other *(SPECIFY)* _____ _____

7 Which of these functions would you regard as being your <u>principal</u> function? *(Enter number)* _____

8 How many years have you held your present position? *(Enter number)*

1 Less than 5 years
2 5 -10 years
3 11 - 20 years
4 More than 20 years _____

9 How many years have you worked for the company in total? *(Enter number)*

1 Less than 5 years
2 5 -10 years
3 11 - 20 years
4 More than 20 years _____

10 What was your previous position or occupation?

SECTION II - VALUE OF SOFTWOOD LUMBER PURCHASE CHARACTERISTICS

Your answers to the questions in this section will give us an idea of how much you value certain characteristics associated with the softwood lumber you purchase for millwork manufacture. General rather than specific answers are sought recognizing that commercially sensitive information may be involved. Since the usefulness of your answers depends in large part on your understanding of the description of the basic purchase unit, please familiarize yourself with it thoroughly before proceeding.

1 Description of basic purchase unit

Unless otherwise specified, assume purchased softwood lumber has the following characteristics:

A Price - delivered to plant; sufficiently competitive or negotiable to be attractive
B Grade - D select or better *(ALS specification)*, S2S
C Discounts - none
D Packaging - none
E Guarantee - none
F Credit - none
G Supply contract - none
H Dimensions - specified length, width, and thickness
I Width - 4 inch
J Length - 8 feet
K Thickness - 1 inch

A Do the characteristics of the above basic purchase unit correspond to the characteristics associated with the softwood lumber you presently purchase for millwork manufacture? *(If NOT, then please specify precisely what the differences are)*

B What other characteristics, if any, would you ascribe to the softwood lumber you purchase which are not mentioned above? *(SPECIFY)*

2 Value of specific characteristics

Instructions

Remember, we are interested in your own opinion please do not discuss these questions with other people until you have actually completed and mailed your responses. The following sets of questions relate to the price you would be prepared to pay for softwood lumber for millwork manufacture which conforms in all but one respect to the description of the basic purchase unit above (see Page 6, Description of basic purchase unit). For each question please circle the number from the scale which best indicates how much more or less you think the value of the basic purchase unit to your company changes as a consequence of varying different purchase and softwood lumber characteristics. The meaning of the scale appears at the bottom of each page.

If you do not understand any terms used, then please refer to the accompanying glossary, otherwise write what you have taken the term to mean.

1	More than 50% below	7	1-5% above
2	26-50% below	8	6-15% above
3	16-25% below	9	16-25% above
4	6-15% below	10	26-35% above
5	1-5% below	11	36-50% above
6	No difference	12	More than 50% above

A How much more or less would you be prepared to pay for softwood lumber to be used for millwork manufacture which conformed to the description of the basic purchase unit except that it:

1 Consisted of shop grade lumber, i.e., S2S, 70% or more of length in cuttings 8 feet long, with cuttings being D Select or better grade (ALS specification)? *(Circle number)*

1 2 3 4 5 6 7 8 9 10 11 12 _____

2 Consisted of either fingerjointed or edge-glued lumber corresponding to D Select or better (ALS specification)? *(Circle number)*

1 2 3 4 5 6 7 8 9 10 11 12 _____

B How much more or less would you be prepared to pay for softwood lumber to be used for millwork manufacture which conformed to the description of the basic purchase unit except that it could be purchased under a:

1 Cumulative discount scheme with the available discount increasing as the total quantity purchased increases over a specified time period as measured by cumulative value, volume, or number of units purchased? *(Circle number)*

1 2 3 4 5 6 7 8 9 10 11 12 _____

2 Noncumulative discount scheme based on the size of an individual purchase as measured by value, volume, or number of units? *(Circle number)*

1 2 3 4 5 6 7 8 9 10 11 12 _____

C How much more or less would you be prepared to pay for softwood lumber to be used for millwork manufacture which conformed to the description of the basic purchase unit except that it could be purchased in units wrapped in:

1 Waterproof paper? *(Circle number)*

1 2 3 4 5 6 7 8 9 10 11 12 _____

2 Shrink plastic film? *(Circle number)*

1 2 3 4 5 6 7 8 9 10 11 12 _____

D How much more or less would you be prepared to pay for softwood lumber to be used for millwork manufacture which conformed to the description of the basic purchase unit except that it could be purchased accompanied by a comprehensive, customer satisfaction assured guarantee covering:

1 Species, grade, volume, finishing, moisture content, uniformity of dimensions, preservative treatment, delivery conditions, damage, cleanliness, remedial action, etc.? *(Circle number)*

1 2 3 4 5 6 7 8 9 10 11 12 _____

2 As for 1 above, but embodying the guarantee in a lumber brand name? *(Circle number)*

1 2 3 4 5 6 7 8 9 10 11 12 _____

E How much more or less would you be prepared to pay for softwood lumber to be used for millwork manufacture which conformed to the description of the basic purchase unit except that it could be purchased using credit provided by the vendor? *(Circle number)*

1 2 3 4 5 6 7 8 9 10 11 12 _____

F How much more or less would you be prepared to pay for softwood lumber to be used for millwork manufacture which conformed to the description of the basic purchase unit except that it could be purchased under a supply contract providing an assured supply of softwood lumber at a competitive or negotiated price and conforming with desired purchase conditions? *(Circle number)*

1 2 3 4 5 6 7 8 9 10 11 12 _____

G How much more or less would you be prepared to pay for softwood lumber to be used for millwork manufacture which conformed to the description of the basic purchase unit except that it could be purchased as units:

1 Consisting of random lengths, widths, and thicknesses? *(Circle number)*

1 2 3 4 5 6 7 8 9 10 11 12 _____

2 Consisting of random lengths and widths, and specified thickness? *(Circle number)*

1 2 3 4 5 6 7 8 9 10 11 12 _____

H How much more or less would you be prepared to pay for softwood lumber to be used for millwork manufacture which conformed to the description of the basic purchase unit except that it could be purchased:

1 In 8 inch widths? *(Circle number)*

1 2 3 4 5 6 7 8 9 10 11 12 _____

2 In 14 inch widths? *(Circle number)*

1 2 3 4 5 6 7 8 9 10 11 12 _____

I How much more or less would you be prepared to pay for softwood lumber to be used for millwork manufacture which conformed to the description of the basic purchase unit except that it could be purchased:

1 In 14 foot lengths? *(Circle number)*

1 2 3 4 5 6 7 8 9 10 11 12 _____

2 In 20 foot lengths? *(Circle number)*

1 2 3 4 5 6 7 8 9 10 11 12 _____

J How much more or less would you be prepared to pay for softwood lumber to be used for millwork manufacture which conformed to the description of the basic purchase unit except that it could be purchased:

1 In 2 inch thickness? *(Circle number)*

1 2 3 4 5 6 7 8 9 10 11 12 _____

2 In 4 inch thickness? *(Circle number)*

1 2 3 4 5 6 7 8 9 10 11 12 _____

1	More than 50% below	7	1-5% above
2	26-50% below	8	6-15% above
3	16-25% below	9	16-25% above
4	6-15% below	10	26-35% above
5	1-5% below	11	36-50% above
6	No difference	12	More than 50% above

SECTION III - TRADE-OFF ANALYSIS

1 Instructions - Please read carefully

Remember, we are interested in your own opinion so please do not discuss these questions with other people until you have actually completed and mailed your responses.

What is more important to you and your company? Sometimes one thing must be sacrificed in order to obtain something else. Since different people and companies have different needs, wants and priorities, this questionnaire is designed to determine those things which are most important to you and your company in purchasing softwood lumber for millwork manufacture.

There is a scale which will allow you to state you and your company's preference in certain circumstances - for example, type of discount versus type of packaging. Please read the example below which explains how the scale works - and then state the order of your preference by writing in the numbers corresponding to your ranking for each of the questions which follow the example. Each table will require either 6 or 9 rankings to be made - it is vital that you complete all choices before moving on to the next table otherwise your response will be unusable.

3 Example: Discounts versus packaging

A Procedure

Please be sure you understand what the different types of each characteristic mean before you make your choice. A description of each level of each characteristic is provided under each trade-off table. Also, assume that those characteristics not varied in each of the following tables conform to the description of the basic purchase unit (see Page 6 above for the description of the basic purchase unit if necessary).

Simply write the number 1 in the cell (combination) corresponding to your first choice. Then in one of the remaining blank cells, write the number 2 for your second choice, and so on until all blank cells have been filled. Note that ties are not allowed.

B Step 1 : Explanation

You would most like to obtain a cumulative discount on units of softwood lumber wrapped in waterproof paper. Your first choice (1) is in the cell as shown.

TYPE OF DISCOUNT	TYPE OF PACKAGING		
	None	Waterproof paper	Shrink plastic film
None			
Cumulative		1	
Noncumulative			

A TYPE OF DISCOUNT - 3 levels:
(i) None
(ii) Cumulative type increasing as total quantity purchased increases over a specified time period, as measured by cumulative value, volume, or number of units purchased
(iii) Noncumulative type based on size of an individual order as measured by value, volume, or number of units purchased

B TYPE OF PACKAGING - 3 levels:
(i) None
(ii) Units wrapped in waterproof paper
(iii) Units wrapped in shrink plastic film

THE ABOVE TABLE CONTAINS A TOTAL OF 9 CHOICES. PLEASE PROCEED TO THE NEXT PAGE ONCE YOU HAVE: (A) INDICATED YOUR ORDER OF PREFERENCE FOR EACH OF THE 9 CHOICES IN THE ABOVE TABLE, AND (B) CHECKED THAT EACH NUMBER INDICATING A PREFERENCE RANKING APPEARS ONLY ONCE IN THE TABLE.

C Step 2

Your second choice is that you would like to obtain a cumulative discount on units of softwood lumber which are not wrapped in any packaging material.

TYPE OF DISCOUNT	TYPE OF PACKAGING		
	None	Waterproof paper	Shrink plastic film
None			
Cumulative	2	1	
Noncumulative			

A TYPE OF DISCOUNT - 3 levels:
(i) None
(ii) Cumulative type increasing as total quantity purchased increases over a specified time period, as measured by cumulative value, volume, or number of units purchased
(iii) Noncumulative type based on size of an individual order as measured by value, volume, or number of units purchased

B TYPE OF PACKAGING - 3 levels:
(i) None
(ii) Units wrapped in waterproof paper
(iii) Units wrapped in shrink plastic film

THE ABOVE TABLE CONTAINS A TOTAL OF 9 CHOICES. PLEASE PROCEED TO THE NEXT PAGE ONCE YOU HAVE: (A) INDICATED YOUR ORDER OF PREFERENCE FOR EACH OF THE 9 CHOICES IN THE ABOVE TABLE, AND (B) CHECKED THAT EACH NUMBER INDICATING A PREFERENCE RANKING APPEARS ONLY ONCE IN THE TABLE.

D Step 3

Your third choice is that you would prefer to forego any discount provided the units of softwood lumber which you purchase are wrapped in waterproof paper.

TYPE OF DISCOUNT	TYPE OF PACKAGING		
	None	Waterproof paper	Shrink plastic film
None		3	
Cumulative	2	1	
Noncumulative			

A TYPE OF DISCOUNT - 3 levels:
(i) None
(ii) Cumulative type increasing as total quantity purchased increases over a specified time period, as measured by cumulative value, volume, or number of units purchased
(iii) Noncumulative type based on size of an individual order as measured by value, volume, or number of units purchased

B TYPE OF PACKAGING - 3 levels:
(i) None
(ii) Units wrapped in waterproof paper
(iii) Units wrapped in shrink plastic film

THE ABOVE TABLE CONTAINS A TOTAL OF 9 CHOICES. PLEASE PROCEED TO THE NEXT PAGE ONCE YOU HAVE: (A) INDICATED YOUR ORDER OF PREFERENCE FOR EACH OF THE 9 CHOICES IN THE ABOVE TABLE, AND (B) CHECKED THAT EACH NUMBER INDICATING A PREFERENCE RANKING APPEARS ONLY ONCE IN THE TABLE.

F Sample

This shows a sample order of preference for all possible combinations. Of course, your preferences could be different. Note that all combinations in this 9 cell table have been assigned a unique preference ranking. Now that you have completed this table you would then proceed to the next table. The same above procedure would be repeated for 6 cell tables also.

TYPE OF DISCOUNT	TYPE OF PACKAGING		
	None	Waterproof paper	Shrink plastic film
None	6	3	9
Cumulative	2	1	7
Noncumulative	4	5	8

A TYPE OF DISCOUNT - 3 levels:
(i) None
(ii) Cumulative type increasing as total quantity purchased increases over a specified time period, as measured by cumulative value, volume, or number of units purchased
(iii) Noncumulative type based on size of an individual order as measured by value, volume, or number of units purchased

B TYPE OF PACKAGING - 3 levels:
(i) None
(ii) Units wrapped in waterproof paper
(iii) Units wrapped in shrink plastic film

THE ABOVE TABLE CONTAINS A TOTAL OF 9 CHOICES. PLEASE PROCEED TO THE NEXT PAGE ONCE YOU HAVE: (A) INDICATED YOUR ORDER OF PREFERENCE FOR EACH OF THE 9 CHOICES IN THE ABOVE TABLE, AND (B) CHECKED THAT EACH NUMBER INDICATING A PREFERENCE RANKING APPEARS ONLY ONCE IN THE TABLE.

4 Trade-off tables

If you think it necessary, then spend some more time now familiarizing yourself with the different levels and types of each characteristic.

The remainder of this section of the questionnaire consists of a set of trade-off tables. What is required is that you carefully consider the choices and write your preferences for each table in the order presented - even if you would not normally consider the characteristics (or their specific levels) provided during purchasing softwood lumber for millwork manufacture. If you feel the choices you are being asked to make are not relevant then write a note of that fact (specifying precisely why) at the appropriate table, and continue to fill out that table as if you were actually faced with the choices involved. The decision process involved in preference determination as reflected by your specific preference ordering is of interest to us also, so your responses will not be misleading as you might otherwise suppose.

Please assume that those characteristics not varied in each of the following tables conform to how you usually buy softwood lumber for millwork manufacture. For each of the following tables, please write the number corresponding to your order of preference for your purchases of softwood lumber.

Before continuing write the time below:

(hour:minute) (:).

PRICE ($/BF)	GRADE		
	D Select or better	Shop	Fingerjointed or edge-glued
0.95			
1.00			
1.05			

A PRICE - 3 levels:
(i) $0.95/bf delivered to plant (i.e., f.o.b. plant)
(ii) $1.00/bf delivered to plant (i.e., f.o.b. plant)
(iii) $1.05/bf delivered to plant (i.e., f.o.b. plant)

B GRADE - 3 levels:
(i) D Select or better, i.e., finishing grades, S2S (ALS specification)
(ii) Shop grade, i.e., S2S, 70% or more of length in 8' cuttings, cuttings D Select or better (ALS specification)
(iii) Reconstituted lumber, i.e., fingerjointed and edge-glued lumber

THE ABOVE TABLE CONTAINS A TOTAL OF 9 CHOICES. PLEASE PROCEED TO THE NEXT PAGE ONCE YOU HAVE: (A) INDICATED YOUR ORDER OF PREFERENCE FOR EACH OF THE 9 CHOICES IN THE ABOVE TABLE, AND (B) CHECKED THAT EACH NUMBER INDICATING A PREFERENCE RANKING APPEARS ONLY ONCE IN THE TABLE.

PRICE ($/BF)	TYPE OF DISCOUNT		
	None	Cumulative	Noncumulative
0.95			
1.00			
1.05			

A PRICE - 3 levels:
(i) $0.95/bf delivered to plant (i.e., f.o.b. plant)
(ii) $1.00/bf delivered to plant (i.e., f.o.b. plant)
(iii) $1.05/bf delivered to plant (i.e., f.o.b. plant)

B TYPE OF DISCOUNT - 3 levels:
(i) None
(ii) Cumulative type increasing as total quantity purchased increases over a specified time period, as measured by cumulative value, volume, or number of units purchased
(iii) Noncumulative type based on size of an individual order as measured by value, volume, or number of units purchased

THE ABOVE TABLE CONTAINS A TOTAL OF 9 CHOICES. PLEASE PROCEED TO THE NEXT PAGE ONCE YOU HAVE: (A) INDICATED YOUR ORDER OF PREFERENCE FOR EACH OF THE 9 CHOICES IN THE ABOVE TABLE, AND (B) CHECKED THAT EACH NUMBER INDICATING A PREFERENCE RANKING APPEARS ONLY ONCE IN THE TABLE.

PRICE ($/BF)	TYPE OF PACKAGING		
	None	Waterproof paper	Shrink plastic film
0.95			
1.00			
1.05			

A PRICE - 3 levels:
(i) $0.95/bf delivered to plant (i.e., f.o.b. plant)
(ii) $1.00/bf delivered to plant (i.e., f.o.b. plant)
(iii) $1.05/bf delivered to plant (i.e., f.o.b. plant)

B TYPE OF PACKAGING - 3 levels:
(i) None
(ii) Units wrapped in waterproof paper
(iii) Units wrapped in shrink plastic film

THE ABOVE TABLE CONTAINS A TOTAL OF 9 CHOICES. PLEASE PROCEED TO THE NEXT PAGE ONCE YOU HAVE: (A) INDICATED YOUR ORDER OF PREFERENCE FOR EACH OF THE 9 CHOICES IN THE ABOVE TABLE, AND (B) CHECKED THAT EACH NUMBER INDICATING A PREFERENCE RANKING APPEARS ONLY ONCE IN THE TABLE.

PRICE ($/BF)	GUARANTEE		
	None	Comprehensive	Brand
0.95			
1.00			
1.05			

A PRICE - 3 levels:
(i) $0.95/bf delivered to plant (i.e., f.o.b. plant)
(ii) $1.00/bf delivered to plant (i.e., f.o.b. plant)
(iii) $1.05/bf delivered to plant (i.e., f.o.b. plant)

B GUARANTEE - 3 levels:
(i) None
(ii) Comprehensive, customer satisfaction assured - covering species, grade, volume, finishing, moisture content, uniformity of dimensions, preservative treatment, delivery conditions, damage, cleanliness, remedial action, etc.
(iii) As for (ii), but embodying the guarantee in a lumber brand name

THE ABOVE TABLE CONTAINS A TOTAL OF 9 CHOICES. PLEASE PROCEED TO THE NEXT PAGE ONCE YOU HAVE: (A) INDICATED YOUR ORDER OF PREFERENCE FOR EACH OF THE 9 CHOICES IN THE ABOVE TABLE, AND (B) CHECKED THAT EACH NUMBER INDICATING A PREFERENCE RANKING APPEARS ONLY ONCE IN THE TABLE.

PRICE ($/BF)	CREDIT FACILITY	
	Unavailable with purchase	Available with purchase
0.95		
1.00		
1.05		

A PRICE - 3 levels:
(i) $0.95/bf delivered to plant (i.e., f.o.b. plant)
(ii) $1.00/bf delivered to plant (i.e., f.o.b. plant)
(iii) $1.05/bf delivered to plant (i.e., f.o.b. plant)

B CREDIT - 2 levels:
(i) No credit facility available with lumber purchase
(ii) Credit facility available with lumber purchase

THE ABOVE TABLE CONTAINS A TOTAL OF 6 CHOICES. PLEASE PROCEED TO THE NEXT PAGE ONCE YOU HAVE: (A) INDICATED YOUR ORDER OF PREFERENCE FOR EACH OF THE 6 CHOICES IN THE ABOVE TABLE, AND (B) CHECKED THAT EACH NUMBER INDICATING A PREFERENCE RANKING APPEARS ONLY ONCE IN THE TABLE.

PRICE ($/BF)	SUPPLY CONTRACT	
	None	Assured supply
0.95		
1.00		
1.05		

A PRICE - 3 levels:
(i) $0.95/bf delivered to plant (i.e., f.o.b. plant)
(ii) $1.00/bf delivered to plant (i.e., f.o.b. plant)
(iii) $1.05/bf delivered to plant (i.e., f.o.b. plant)

B SUPPLY CONTRACT - 2 levels:
(i) None
(ii) Assured supply of a certain proportion of softwood lumber input requirements at competitive or negotiated prices, specifying species, grade, volume, finishing, moisture content, uniformity of dimensions, preservative treatment, delivery conditions, damage, cleanliness, remedial action, penalties, etc.

THE ABOVE TABLE CONTAINS A TOTAL OF 6 CHOICES. PLEASE PROCEED TO THE NEXT PAGE ONCE YOU HAVE: (A) INDICATED YOUR ORDER OF PREFERENCE FOR EACH OF THE 6 CHOICES IN THE ABOVE TABLE, AND (B) CHECKED THAT EACH NUMBER INDICATING A PREFERENCE RANKING APPEARS ONLY ONCE IN THE TABLE.

PRICE ($/BF)	DIMENSIONS		
	Random lengths, widths, and thicknesses	Random lengths, widths, and specified thickness	Specified length, width, and thickness
0.95			
1.00			
1.05			

A PRICE - 3 levels:
(i) $0.95/bf delivered to plant (i.e., f.o.b. plant)
(ii) $1.00/bf delivered to plant (i.e., f.o.b. plant)
(iii) $1.05/bf delivered to plant (i.e., f.o.b. plant)

B DIMENSIONS - 3 levels:
(i) Random assortment of lengths, widths, and thicknesses
(ii) Random assortment of lengths and widths, specified thickness
(iii) Specified length, width, and thickness

THE ABOVE TABLE CONTAINS A TOTAL OF 9 CHOICES. PLEASE PROCEED TO THE NEXT PAGE ONCE YOU HAVE: (A) INDICATED YOUR ORDER OF PREFERENCE FOR EACH OF THE 9 CHOICES IN THE ABOVE TABLE, AND (B) CHECKED THAT EACH NUMBER INDICATING A PREFERENCE RANKING APPEARS ONLY ONCE IN THE TABLE.

PRICE ($/BF)	WIDTH		
	4 inch	8 inch	14 inch
0.95			
1.00			
1.05			

A PRICE - 3 levels:
(i) $0.95/bf delivered to plant (i.e., f.o.b. plant)
(ii) $1.00/bf delivered to plant (i.e., f.o.b. plant)
(iii) $1.05/bf delivered to plant (i.e., f.o.b. plant)

B WIDTH - 3 levels:
(i) 4 inch
(ii) 8 inch
(iii) 14 inch

THE ABOVE TABLE CONTAINS A TOTAL OF 9 CHOICES. PLEASE PROCEED TO THE NEXT PAGE ONCE YOU HAVE: (A) INDICATED YOUR ORDER OF PREFERENCE FOR EACH OF THE 9 CHOICES IN THE ABOVE TABLE, AND (B) CHECKED THAT EACH NUMBER INDICATING A PREFERENCE RANKING APPEARS ONLY ONCE IN THE TABLE.

PRICE ($/BF)	LENGTH		
	8 feet	14 feet	20 feet
0.95			
1.00			
1.05			

A PRICE - 3 levels:
(i) $0.95/bf delivered to plant (i.e., f.o.b. plant)
(ii) $1.00/bf delivered to plant (i.e., f.o.b. plant)
(iii) $1.05/bf delivered to plant (i.e., f.o.b. plant)

B LENGTH - 3 levels:
(i) 8 feet
(ii) 14 feet
(iii) 20 feet

THE ABOVE TABLE CONTAINS A TOTAL OF 9 CHOICES. PLEASE PROCEED TO THE NEXT PAGE ONCE YOU HAVE: (A) INDICATED YOUR ORDER OF PREFERENCE FOR EACH OF THE 9 CHOICES IN THE ABOVE TABLE, AND (B) CHECKED THAT EACH NUMBER INDICATING A PREFERENCE RANKING APPEARS ONLY ONCE IN THE TABLE.

PRICE ($/BF)	THICKNESS		
	1 inch	2 inch	4 inch
0.95			
1.00			
1.05			

A PRICE - 3 levels:
(i) $0.95/bf delivered to plant (i.e., f.o.b. plant)
(ii) $1.00/bf delivered to plant (i.e., f.o.b. plant)
(iii) $1.05/bf delivered to plant (i.e., f.o.b. plant)

B THICKNESS - 3 levels:
(i) 1 inch
(ii) 2 inch
(iii) 4 inch

THE ABOVE TABLE CONTAINS A TOTAL OF 9 CHOICES. PLEASE PROCEED TO THE NEXT PAGE ONCE YOU HAVE: (A) INDICATED YOUR ORDER OF PREFERENCE FOR EACH OF THE 9 CHOICES IN THE ABOVE TABLE, AND (B) CHECKED THAT EACH NUMBER INDICATING A PREFERENCE RANKING APPEARS ONLY ONCE IN THE TABLE.

GRADE	TYPE OF DISCOUNT		
	None	Cumulative	Noncumulative
D Select or better			
Shop			
Fingerjointed or edge-glued			

A GRADE - 3 levels:
(i) D Select or better, i.e., finishing grades, S2S (ALS specification)
(ii) Shop grade, i.e., S2S, 70% or more of length in 8' cuttings, cuttings D Select or better (ALS specification)
(iii) Reconstituted lumber, i.e., fingerjointed and edge-glued lumber

B TYPE OF DISCOUNT - 3 levels:
(i) None
(ii) Cumulative type increasing as total quantity purchased increases over a specified time period, as measured by cumulative value, volume, or number of units purchased
(iii) Noncumulative type based on size of an individual order as measured by value, volume, or number of units purchased

THE ABOVE TABLE CONTAINS A TOTAL OF 9 CHOICES. PLEASE PROCEED TO THE NEXT PAGE ONCE YOU HAVE: (A) INDICATED YOUR ORDER OF PREFERENCE FOR EACH OF THE 9 CHOICES IN THE ABOVE TABLE, AND (B) CHECKED THAT EACH NUMBER INDICATING A PREFERENCE RANKING APPEARS ONLY ONCE IN THE TABLE.

GRADE	GUARANTEE		
	None	Comprehensive	Brand
D Select or better			
Shop			
Fingerjointed or edge-glued			

A GRADE - 3 levels:
(i) D Select or better, i.e., finishing grades, S2S (ALS specification)
(ii) Shop grade, i.e., S2S, 70% or more of length in 8′ cuttings, cuttings D Select or better (ALS specification)
(iii) Reconstituted lumber, i.e., fingerjointed and edge-glued lumber

B GUARANTEE - 3 levels:
(i) None
(ii) Comprehensive, customer satisfaction assured - covering species, grade, volume, finishing, moisture content, uniformity of dimensions, preservative treatment, delivery conditions, damage, cleanliness, remedial action, etc.
(iii) As for (ii), but embodying the guarantee in a lumber brand name

THE ABOVE TABLE CONTAINS A TOTAL OF 9 CHOICES. PLEASE PROCEED TO THE NEXT PAGE ONCE YOU HAVE: (A) INDICATED YOUR ORDER OF PREFERENCE FOR EACH OF THE 9 CHOICES IN THE ABOVE TABLE, AND (B) CHECKED THAT EACH NUMBER INDICATING A PREFERENCE RANKING APPEARS ONLY ONCE IN THE TABLE.

GRADE	SUPPLY CONTRACT	
	None	Assured supply
D Select or better		
Shop		
Fingerjointed or edge-glued		

A GRADE - 3 levels:
(i) D Select or better, i.e., finishing grades, S2S (ALS specification)
(ii) Shop grade, i.e., S2S, 70% or more of length in 8' cuttings, cuttings D Select or better (ALS specification)
(iii) Reconstituted lumber, i.e., fingerjointed and edge-glued lumber

B SUPPLY CONTRACT - 2 levels:
(i) None
(ii) Assured supply of a certain proportion of softwood lumber input requirements at competitive or negotiated prices, specifying species, grade, volume, finishing, moisture content, uniformity of dimensions, preservative treatment, delivery conditions, damage, cleanliness, remedial action, penalties, etc.

THE ABOVE TABLE CONTAINS A TOTAL OF 6 CHOICES. PLEASE PROCEED TO THE NEXT PAGE ONCE YOU HAVE: (A) INDICATED YOUR ORDER OF PREFERENCE FOR EACH OF THE 6 CHOICES IN THE ABOVE TABLE, AND (B) CHECKED THAT EACH NUMBER INDICATING A PREFERENCE RANKING APPEARS ONLY ONCE IN THE TABLE.

GRADE	WIDTH		
	4 inch	8 inch	14 inch
D Select or better			
Shop			
Fingerjointed or edge-glued			

A GRADE - 3 levels:
(i) D Select or better, i.e., finishing grades, S2S (ALS specification)
(ii) Shop grade, i.e., S2S, 70% or more of length in 8' cuttings, cuttings D Select or better (ALS specification)
(iii) Reconstituted lumber, i.e., fingerjointed and edge-glued lumber

B WIDTH - 3 levels:
(i) 4 inch
(ii) 8 inch
(iii) 14 inch

THE ABOVE TABLE CONTAINS A TOTAL OF 9 CHOICES. PLEASE PROCEED TO THE NEXT PAGE ONCE YOU HAVE: (A) INDICATED YOUR ORDER OF PREFERENCE FOR EACH OF THE 9 CHOICES IN THE ABOVE TABLE, AND (B) CHECKED THAT EACH NUMBER INDICATING A PREFERENCE RANKING APPEARS ONLY ONCE IN THE TABLE.

GRADE	LENGTH		
	8 feet	14 feet	20 feet
D Select or better			
Shop			
Fingerjointed or edge-glued			

A GRADE - 3 levels:
(i) D Select or better, i.e., finishing grades, S2S (ALS specification)
(ii) Shop grade, i.e., S2S, 70% or more of length in 8' cuttings, cuttings D Select or better (ALS specification)
(iii) Reconstituted lumber, i.e., fingerjointed and edge-glued lumber

B LENGTH - 3 levels:
(i) 8 feet
(ii) 14 feet
(iii) 20 feet

THE ABOVE TABLE CONTAINS A TOTAL OF 9 CHOICES. PLEASE PROCEED TO THE NEXT PAGE ONCE YOU HAVE: (A) INDICATED YOUR ORDER OF PREFERENCE FOR EACH OF THE 9 CHOICES IN THE ABOVE TABLE, AND (B) CHECKED THAT EACH NUMBER INDICATING A PREFERENCE RANKING APPEARS ONLY ONCE IN THE TABLE.

TYPE OF DISCOUNT	GUARANTEE		
	None	Comprehensive	Brand
None			
Cumulative			
Noncumulative			

A TYPE OF DISCOUNT - 3 levels:
(i) None
(ii) Cumulative type increasing as total quantity purchased increases over a specified time period, as measured by cumulative value, volume, or number of units purchased
(iii) Noncumulative type based on size of an individual order as measured by value, volume, or number of units purchased

B GUARANTEE - 3 levels:
(i) None
(ii) Comprehensive, customer satisfaction assured - covering species, grade, volume, finishing, moisture content, uniformity of dimensions, preservative treatment, delivery conditions, damage, cleanliness, remedial action, etc.
(iii) As for (ii), but embodying the guarantee in a lumber brand name

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TYPE OF DISCOUNT	SUPPLY CONTRACT	
	None	Assured supply
None		
Cumulative		
Noncumulative		

A TYPE OF DISCOUNT - 3 levels:
(i) None
(ii) Cumulative type increasing as total quantity purchased increases over a specified time period, as measured by cumulative value, volume, or number of units purchased
(iii) Noncumulative type based on size of an individual order as measured by value, volume, or number of units purchased

B SUPPLY CONTRACT - 2 levels:
(i) None
(ii) Assured supply of a certain proportion of softwood lumber input requirements at competitive or negotiated prices, specifying species, grade, volume, finishing, moisture content, uniformity of dimensions, preservative treatment, delivery conditions, damage, cleanliness, remedial action, penalties, etc.

THE ABOVE TABLE CONTAINS A TOTAL OF 6 CHOICES. PLEASE PROCEED TO THE NEXT PAGE ONCE YOU HAVE: (A) INDICATED YOUR ORDER OF PREFERENCE FOR EACH OF THE 6 CHOICES IN THE ABOVE TABLE, AND (B) CHECKED THAT EACH NUMBER INDICATING A PREFERENCE RANKING APPEARS ONLY ONCE IN THE TABLE.

GUARANTEE	SUPPLY CONTRACT	
	None	Assured supply
None		
Comprehensive		
Brand		

A GUARANTEE - 3 levels:
(i) None
(ii) Comprehensive, customer satisfaction assured - covering species, grade, volume, finishing, moisture content, uniformity of dimensions, preservative treatment, delivery conditions, damage, cleanliness, remedial action, etc.
(iii) As for (ii), but embodying the guarantee in a lumber brand name

B SUPPLY CONTRACT - 2 levels:
(i) None
(ii) Assured supply of a certain proportion of softwood lumber input requirements at competitive or negotiated prices, specifying species, grade, volume, finishing, moisture content, uniformity of dimensions, preservative treatment, delivery conditions, damage, cleanliness, remedial action, penalties, etc.

THE ABOVE TABLE CONTAINS A TOTAL OF 6 CHOICES. PLEASE PROCEED TO THE NEXT PAGE ONCE YOU HAVE: (A) INDICATED YOUR ORDER OF PREFERENCE FOR EACH OF THE 6 CHOICES IN THE ABOVE TABLE, AND (B) CHECKED THAT EACH NUMBER INDICATING A PREFERENCE RANKING APPEARS ONLY ONCE IN THE TABLE.

GUARANTEE	DIMENSIONS		
	Random lengths, widths, and thicknesses	Random lengths, widths, and specified thickness	Specified length width, and thickness
None			
Comprehensive			
Brand			

A GUARANTEE - 3 levels:
(i) None
(ii) Comprehensive, customer satisfaction assured - covering species, grade, volume, finishing, moisture content, uniformity of dimensions, preservative treatment, delivery conditions, damage, cleanliness, remedial action, etc.
(iii) As for (ii), but embodying the guarantee in a lumber brand name

B DIMENSIONS - 3 levels:
(i) Random assortment of lengths, widths, and thicknesses
(ii) Random assortment of lengths and widths, specified thickness
(iii) Specified length, width, and thickness

THE ABOVE TABLE CONTAINS A TOTAL OF 9 CHOICES. PLEASE PROCEED TO THE NEXT PAGE ONCE YOU HAVE: (A) INDICATED YOUR ORDER OF PREFERENCE FOR EACH OF THE 9 CHOICES IN THE ABOVE TABLE, AND (B) CHECKED THAT EACH NUMBER INDICATING A PREFERENCE RANKING APPEARS ONLY ONCE IN THE TABLE.

SUPPLY CONTRACT	WIDTH		
	4 inch	8 inch	14 inch
None			
Assured supply			

A SUPPLY CONTRACT - 2 levels:
(i) None
(ii) Assured supply of a certain proportion of softwood lumber input requirements at competitive or negotiated prices, specifying species, grade, volume, finishing, moisture content, uniformity of dimensions, preservative treatment, delivery conditions, damage, cleanliness, remedial action, penalties, etc.

B WIDTH - 3 levels:
(i) 4 inch
(ii) 8 inch
(iii) 14 inch

THE ABOVE TABLE CONTAINS A TOTAL OF 6 CHOICES. PLEASE PROCEED TO THE NEXT PAGE ONCE YOU HAVE: (A) INDICATED YOUR ORDER OF PREFERENCE FOR EACH OF THE 6 CHOICES IN THE ABOVE TABLE, AND (B) CHECKED THAT EACH NUMBER INDICATING A PREFERENCE RANKING APPEARS ONLY ONCE IN THE TABLE.

SUPPLY CONTRACT	LENGTH		
	8 feet	14 feet	20 feet
None			
Assured supply			

A SUPPLY CONTRACT - 2 levels:
(i) None
(ii) Assured supply of a certain proportion of softwood lumber input requirements at competitive or negotiated prices, specifying species, grade, volume, finishing, moisture content, uniformity of dimensions, preservative treatment, delivery conditions, damage, cleanliness, remedial action, penalties, etc.

B LENGTH - 3 levels:
(i) 8 feet
(ii) 14 feet
(iii) 20 feet

THE ABOVE TABLE CONTAINS A TOTAL OF 6 CHOICES. PLEASE PROCEED TO THE NEXT PAGE ONCE YOU HAVE: (A) INDICATED YOUR ORDER OF PREFERENCE FOR EACH OF THE 6 CHOICES IN THE ABOVE TABLE, AND (B) CHECKED THAT EACH NUMBER INDICATING A PREFERENCE RANKING APPEARS ONLY ONCE IN THE TABLE.

TIME SECTION III COMPLETED (hour:minute) (:)

SECTION IV - PURCHASING PRACTICES

The questions asked in this section concern the present softwood lumber purchasing practices used by your company. The questions asked are seeking general rather than specific responses, recognizing that commercially sensitive information may be involved. Firstly, some questions concerning the sources from which you obtain softwood lumber and the procedures your company has developed in dealing with its vendors.

1 A Approximately what proportion of softwood lumber is purchased or acquired from company-owned sources? *(Enter number)*

1 None, 0%
2 1-25%
3 26-50%
4 51-75%
5 76-99%
6 All, 100%
7 Don't know _____

B Approximately what proportion of softwood lumber is purchased from sawmills and planing mills? *(Enter number)*

1 None, 0%
2 1-25%
3 26-50%
4 51-75%
5 76-99%
6 All, 100%
7 Don't know _____

C Approximately what proportion of softwood lumber is purchased from wholesale distributors? *(Enter number)*

1 None, 0%
2 1-25%
3 26-50%
4 51-75%
5 76-99%
6 All, 100%
7 Don't know _____

D Approximately what proportion of softwood lumber is purchased from other sources? *(Enter number)*

1 None, 0% *(If NONE, skip to F, Page 42)*
2 1-25%
3 26-50%
4 51-75%
5 76-99%
6 All, 100%
7 Don't know

_____

E What are these other sources? *(SPECIFY)*

F From approximately how many company-owned sources do you acquire softwood lumber for millwork manufacture? *(Enter number)*

1 None
2 Less than 5
3 From 5 to 10
4 From 11 to 20
5 From 21 to 50
6 From 51 to 100
7 More than 100
8 Don't know

_____

G From approximately how many sawmills and planing mills do you purchase softwood lumber for millwork manufacture? *(Enter number)*

1 None
2 Less than 5
3 From 5 to 10
4 From 11 to 20
5 From 21 to 50
6 From 51 to 100
7 More than 100
8 Don't know

_____

H From approximately how many wholesale distributors do you purchase softwood lumber for millwork manufacture? *(Enter number)*

1 None
2 Less than 5
3 From 5 to 10
4 From 11 to 20
5 From 21 to 50
6 From 51 to 100
7 More than 100
8 Don't know

_____

I From approximately how many other sources do you purchase softwood lumber for millwork manufacture? *(Enter number)*

1 None
2 Less than 5
3 From 5 to 10
4 From 11 to 20
5 From 21 to 50
6 From 51 to 100
7 More than 100
8 Don't know _____

2 A We are interested in your purchases of softwood lumber for millwork manufacture from sources outside the company. Of these sources, over the last year has the company purchased approximately equal amounts from each of them - in volume terms? *(Enter number)*

1 Yes
2 No
3 Don't know _____

B Why or why not? *(Please be specific, providing examples if appropriate)*

C Of the softwood lumber supply sources not owned by the company, over the last year has the company purchased approximately equal amounts from each of them - in value terms? *(Enter number)*

1 Yes
2 No
3 Don't know *(If DON'T KNOW, skip to Question 3, Page 44)* _____

D Why or why not? *(Please be specific, providing examples if appropriate)*

3 A Do you regularly and consistently purchase softwood lumber for millwork from the same source or sources? *(Enter number)*

1 Yes
2 No *(If NO, skip to Question 4, Page 46)*
3 Don't know *(If DON'T KNOW, skip to Question 4, Page 46)* _____

B For how many years has the company been purchasing softwood lumber for millwork from the regular supply source with which it has been dealing longest? *(Enter number)*

1 Less than 5 years
2 From 5 to 10 years
3 From 11 to 15 years
4 From 16 to 25 years
5 More than 25 years
6 Don't know

_____

C For how many years has the company been purchasing softwood lumber for millwork from the regular supply source with which it has been dealing shortest? *(Enter number)*

1 Less than 5 years
2 From 5 to 10 years
3 From 11 to 15 years
4 From 16 to 25 years
5 More than 25 years
6 Don't know

_____

D Is it either the preference or policy of the company to limit the number of vendors from whom you regularly purchase softwood lumber for millwork manufacture? *(Enter number)*

1 Yes
2 No

_____

E Why or why not? *(Please be specific)*

F What do these regular supply sources provide which encourages you to make repeat purchases? *(Please be specific, providing examples if appropriate)* _____

G From your perspective as a buyer, are there any reasons other than vendor services and company preference and policy which encourages you to make repeat purchases? *(Enter number)*

1 Yes
2 No *(If NO, skip to I, Page 46)*

_____

H What are these reasons? *(Please be specific, providing examples if appropriate)*

I How could these regular vendors improve the service they presently offer so that you might be tempted to make more purchases from them? *(Please be specific, providing examples if appropriate)* _____

J What problems do you currently face as a buyer in dealing with these regular vendors? *(Please be specific, providing examples if appropriate)* _____

4 A Do you purchase softwood lumber for millwork manufacture from one or more regular vendors and from other vendors? *(Enter number)*
1 Yes
2 No *(If NO, skip to Question 5, Page 48)* _____

B Is it either the preference or policy of the company to maintain regular and other vendors from whom you purchase softwood lumber for millwork manufacture? *(Enter number)*
1 Yes
2 No _____

C Why or why not? *(Please be specific, providing examples if appropriate)*

D What can these other softwood lumber vendors provide which encourages you to seek them out? *(Please be specific, providing examples if appropriate)* _____

E Are there reasons other than vendor service or company policy which encourages you to seek out these other vendors? *(Enter number)*
1 Yes
2 No *(If NO, skip to G, Page 47)* _____

F What are these reasons? *(Please be specific, providing examples if appropriate)*

G How do you think these other vendors could improve the service they presently offer so that you might be tempted to make more purchases from them? *(Please be specific, providing examples if appropriate)* _____

H What problems do you currently face as a buyer in dealing with these other lumber vendors? *(Please be specific, providing examples if appropriate)*

I Do these other lumber vendors sometimes become your regular millwork lumber vendors? *(Enter number)*
1 Yes
2 No *(If NO, skip to Question 5, Page 48)*
3 Not yet *(If NOT YET, skip to Question 5, Page 48)*
4 Don't know *(If DON'T KNOW, skip to Question 5, Page 48)* _____

J Under what circumstances? *(Please be specific, providing examples of <u>how</u> this has happened)*

5 A Is it either the preference or policy of the company <u>not</u> to maintain one or more regular and consistent lumber vendors from whom you purchase softwood lumber for millwork manufacture? *(Enter number)*

1 Yes
2 No *(If NO, skip to Question 6, Page 50)* _____

B Why? *(Please be specific, providing examples if appropriate)*

C What can these <u>nonregular</u> softwood lumber vendors provide which encourages you to seek them out? *(Please be specific, providing examples if appropriate)*

D Are there reasons other than vendor service and company preference and policy which discourages you from establishing either one or more regular vendors? *(Enter number)*

1 Yes
2 No *(If NO, skip to F, Page 49)* _____

E What are these reasons? *(Please be specific, providing examples if appropriate)*

F How do you think these <u>other</u> vendors could improve the service they presently offer, so that you might be tempted to make more purchases from them? *(Please be specific, providing examples if appropriate)* _____

G What problems do you currently face as a buyer in dealing with these <u>nonregular</u> lumber vendors? *(Please be specific, providing examples if appropriate)*

Now I'd like to ask some questions about the specific softwood lumber purchasing practices which your company has adopted both deliberately as part of the lumber procurement process and in response to interactions with your vendors. As before, I'd like to remind you that your answers to these questions will be treated in the strictest confidence, with the data being used in a supportive capacity to test for hypothesized relationships.

6 A In purchasing softwood lumber for millwork manufacture have you found price fluctuations to cause procurement problems? *(Enter number)*

1 Yes
2 No *(If NO, skip to E, Page 51)* _____

B Please describe the procurement problems which these price fluctuations have caused. *(Please be specific, providing examples if appropriate)*

C Has the company attempted to offset these problems?

1 Yes
2 No *(If NO, skip to F, Page 51)*
3 Don't know *(If DON"T KNOW, skip to F, Page 51)* _____

D How? *(Please be specific, providing examples if appropriate)*

(Skip to Question 7, Page 51)

E Why not? *(Please be specific, providing examples if appropriate)*

(Skip to Question 7, Page 51)

F Why not? *(Please be specific, providing examples if appropriate)*

7 A Do any of your lumber vendors emphasize price and price-related characteristics (e.g., quantity discounts) in selling softwood lumber for millwork manufacture, rather than other lumber and vendor service characteristics? *(Enter number)*

1 Yes
2 No *(If NO, skip to Question 8, Page 52)* _____

B Do these price and price-related characteristics have a greater impact on purchases of softwood lumber for millwork manufacture by your company, than other lumber and vendor service characteristics? *(Enter number)*

1 Yes
2 No *(If NO, skip to Question 8, Page 52)* _____

C Why? *(Please be specific, providing examples if appropriate)* _____

8 A In selling softwood lumber for millwork manufacture, do any of your vendors actively attempt to make their lumber and associated services appear unique compared to those of competing vendors? *(Enter number)*

1 Yes
2 No *(If NO, skip to E, Page 53)* _____

B How do they seek to accomplish this differentiation? *(Please be specific, providing examples if appropriate)*

C Do you regard the means these vendors use to distinguish themselves from competing vendors as having a greater effect on your purchases of softwood lumber for millwork manufacture than price and price-related characteristics? *(Enter number)*

1 Yes
2 No (If NO, skip to Question 9, *Page 53*) _____

D Why? *(Please be specific, providing examples if appropriate)* _____

(Skip to Question 9, Page 53)

E Why not? *(Please be specific, providing examples if appropriate)*

9 A Sometimes a company finds, for various reasons, that it is desirable to add new vendors and to discontinue buying from present vendors. Has your company switched between vendors in purchasing softwood lumber for millwork manufacture in the past? *(Enter number)*

1 Yes
2 No *(If NO, skip to Question 10, Page 54)*
3 Not applicable - completely vertically integrated company *(If NOT APPLICABLE, skip to Question 10, Page 54)*
4 Don't know *(If DON'T KNOW, skip to Question 10, Page 54)* _____

B What prompted such switches? *(Please be specific, providing examples if appropriate)*

C Please describe how you went about making such switches. *(Please be specific)*

D What did you find were the major drawbacks associated with switching between different vendors? *(Please be specific)*

10 **A** Market information comes in various forms - for example, as prices, or as expected supply and demand conditions, or simply from whom a certain product or input could be purchased. With this description in mind, what sources of market information do you use in buying softwood lumber for millwork manufacture? *(Enter numbers)*

1	Verbal price quotes	_____
2	Vendor price lists	_____
3	Other buyers in the same company	_____
4	Other persons in the same company *(SPECIFY position)*	_____
5	Buyers in other companies	_____
6	Your customers or their representatives (SPECIFY which)	_____
7	Other persons in other companies *(SPECIFY position)*	_____
8	Extension specialists	_____
9	University personnel	_____
10	Non-university research consultants	_____
11	Trade associations *(SPECIFY which)*	_____
12	Advertisements - trade magazines and other media	_____
13	Other sources *(SPECIFY)*	_____

B Do you face any problems obtaining market information? *(Enter number)*

1	Yes	
2	No *(If NO, skip to D, Page 55)*	_____

C Please describe the problems you face with regard to obtaining market information. *(Please be specific, providing examples if appropriate)*

D Do you use the market information available to you as a bargaining tool in either selecting or negotiating with vendors during the process of purchasing softwood lumber for millwork manufacture (including, for example, informing competing vendors of each others' prices)? *(Enter number)*

1	Yes	
2	No *(If NO, skip to Question 11, Page 55)*	_____

E How often do you use market information as a bargaining tool in dealing with vendors for softwood lumber for millwork manufacture? *(Enter number)*

1 Always? (100%)
2 Frequently? (50 - 99%)
3 Occasionally? (20 - 49%)
4 Rarely? (1 - 19%)
5 Never? (0%)

_____

11 A Are the prices you pay for softwood lumber most often determined by: *(Enter number)*

1 Your offered price?
2 The vendor's price?
3 Negotiation? *(If 3, skip to C, Page 56)*
4 Other? *(If 4, skip to C, Page 56)*
(SPECIFY) _____ _____

B Why do you think no price bargaining occurs? *(Please be specific, providing examples if appropriate)* _____

(Skip to Question 12, Page 56)

C What do you view as your major sources of leverage in negotiating or otherwise determining price? *(Please be specific, providing examples if appropriate)*

12 A Lumber vendors will usually designate their customers with a credit rating depending on how the vendors assesses their customers' credit worthiness. Do you know the credit rating of your company in the eyes of either one or more of your softwood lumber vendors? *(Enter number)*

1 Yes
2 No

_____

B Do you use their credit ratings of your company as a bargaining tool in either selecting or negotiating with vendors in the process of purchasing softwood lumber for millwork manufacture? *(Enter number)*

1 Yes
2 No
3 Don't know

_____

13 A Does any person or agency check to see whether actual characteristics of purchased softwood lumber conform to either specified or expected characteristics? *(Enter number)*

1 Yes
2 No *(If NO, skip to Question 14, Page 57)*
3 Don't know *(If DON'T KNOW, skip to Question 14, Page 57)* _____

B Who checks to see whether actual characteristics of purchased softwood lumber conform to contractually specified characteristics? *(Enter numbers)*

1 Lumber vendor _____
2 Lumber buyer _____
3 Non-buyer personnel of purchasing company *(SPECIFY)* _____
4 Independent agency *(SPECIFY)* _____
5 Other *(SPECIFY)* _____

14 A Occasionally companies will enter or leave an industry. On such occasions the competitive environment of the industry may change. Often companies entering an industry will have had a previous association with that industry, perhaps as a vendor. Consider the people and companies who are presently your company's softwood lumber vendors. Do you view any of them as potential entrants to the millwork manufacturing industry? *(Enter number)*

1 Yes
2 No
3 Don't know *(If DON'T KNOW, skip to Page 58)* _____

B Why or why not? *(Please be specific, providing examples if appropriate)*

TIME RESPONSE ENDED : (HOUR/MINUTE) /

A.M./P.M.

END OF QUESTIONNAIRE

Respondent's comments:

_____

You have now completed the questionnaire. Before you do anything else please check to see all the pages are present. Then seal the questionnaire in the postage-paid envelope provided and mail it to us. You might hear from us shortly should we wish to check some of your answers. If you have any other comments you wish to offer, please do so in the space provided above. Thank you once again for your time, patience, and perseverance in participating and cooperating in this survey; we assure you it was greatly appreciated. We shall forward a report of the results as soon as they become available.

Bruce Glass
Department of Forestry
Michigan State University
East Lansing
MI 48824
Ph. (517) 482-3530

Professor Robert J. Marty
Department of Forestry
Michigan State University
East Lansing
MI 48824

Professor David K. Smith
Department of Marketing and Transportation
Michigan State University
East Lansing
MI 48824

GLOSSARY OF TERMS

The following glossary is arranged in alphabetic order.

ALS (American Lumber Standards) specifications - lumber grading rules published by the American Lumber Standards Association under the auspices of the U.S. Department of Commerce

bf - board foot/feet; measure of lumber volume : 1 bf is 12" long, 12" wide, and 1" thick

Blinds and shutters - wood frame assemblies designed to cover sash or window openings

Company-owned - a unit of the business which is more than 50% controlled by the parent company

Components - relatively small pieces of surfaced lumber of specified sizes ready for assembly into finished millwork products then ready for installation

Consistent - marked by steady continuity and lack of variation

D Select or better - grouping of lumber grades intended to apply to lumber suitable for either natural or painted finishes; includes all select lumber grades, i.e., A, B, C, and D

Differentiation - the process or acts which an individual or organization takes to make the products they manufacture or handle and the functional and ancillary services they provide to their customers appear unique compared to their competitors

Door - a wooden hinged or sliding barrier between adjacent rooms (interior) or between the inside and the outside of a structure (exterior)

Door frames and entrances - groups of wood parts machined and/or assembled to enclose and support a door

Fingerjointing - end-gluing short lengths of lumber to form a single long length of lumber

f.o.b. - "free on board", i.e., all expenses paid up at a specified place

Function - concerned with what some person or thing does, i.e., the action for which a person or thing is specially fitted or used

Independent agency - an organization neither partially nor completely owned by a company in the millwork manufacturing industry or the associated wholesale distribution or retail trade

Inventory - the total or separate amounts of goods being stored for subsequent processing or sales

Irregular - no discernible conformity to a pattern exists

Lumber - the product of a sawmill not being further manufactured than by sawing, resawing, crosscutting to length, or planing

Millwork - products manufactured from lumber in a planing mill or a woodworking plant, including sash and window components or sets, door frames and entrances, blinds and shutters, interior and exterior doors.mouldings and stairwork

Moisture content - amount of water contained in wood expressed as a percentage of its oven-dry weight

Moulding - a strip of wood shaped to a specific profile throughout its length

Preservative treatment - chemical modification of wood to confer resistance to both biological and nonbiological decay and deterioration processes and agents and moisture uptake and loss

Regular - conformity to a pattern exists

Rough-sawn lumber - lumber which has not been surfaced with a planing machine

Sash and window components and/or sets - groups of wood parts machined and/or assembled to frame and fill a given opening

Shop grade - lumber intended primarily for the recovery of cuttings to be subsequently used in the further manufacturing of wood products; 70% or more of the length of an individual piece of lumber must yield cuttings 8′ or longer in length, each being of D Select or better grade

Softwood - wood of evergreen or cone-bearing tree species

Stairwork - the building and erection of stairs

Surfaced (planed, dressed) lumber - lumber which has been surfaced with a planing machine; hence : S2S=surfaced on two sides, S2E=surfaced on two edges, etc.

Technical specifications - those standards to which some or all basic characteristics of lumber must conform on account of how that lumber is expected to perform in the end uses for which it is intended, and including how that lumber is to be processed into a final product (e.g., 12% moisture content, greater than 25 pounds per cubic foot, less than 4 rings per inch, etc.)

APPENDIX VI

Letter of introduction

October 23, 1987

Dear Sir:

This is a letter of introduction. Mr. Bruce Glass is a doctoral student in the Department of Forestry at Michigan State University. In cooperation with myself (Professor Robert Marty) and a faculty member of the Department of Marketing and Transportation Administration, he will be conducting a summer survey of softwood lumber purchasing by firms in the Michigan millwork industry.

The objectives of the survey are to document how Michigan millwork manufacturers buy their softwood lumber, and to examine underlying reasons for different observed and hypothesized patterns. The survey which Mr. Glass will be conducting is a critical component for a comprehensive research framework designed to fulfill these objectives. Each participating firm will be asked to contribute a description of their existing softwood lumber purchasing practices, to explain possible origins of such practices and to suggest how improvements might be achieved. The data gathered are to be used in a supportive capacity in testing for hypothesized relationships.

The survey will consist of two parts of approximately equal duration, i.e., 60 minutes for each part. The first part will take the form of a personal interview with Mr. Glass. The second part will be distributed to persons in the firm identified during the personal interview, with the request that respondents return the questionnaire by mail once completed. A stamped addressed envelope will be provided for this purpose.

The information gathered by Mr. Glass will be treated in the strictest confidence. Participants and firms will be identified by number and name only. Firms may decline to participate without penalty. Also, participants may ignore any question if they so choose, again without penalty. We hope that you and your firm will cooperate by participating in this survey. If you so desire, a summary of the results obtained from this survey will be provided for your records.

Should you have any further queries regarding this survey, do not hesitate to contact me (Professor Robert Marty, 517/355-7735). Mr. Glass will contact you in approximately 10-14 days to ascertain your firm's willingness to participate and hopefully set up an appointment for a subsequent interview. Thank you very much.

Yours Faithfully,

Professor Robert J. Marty
Department of Forestry

RJM/bc

APPENDIX VII

Choice of conjoint analysis

Products, regardless of whether they are commodities or differentiated, elicit and reinforce a specific (hopefully desired) response in a consumer. This response is conceptualized as the utility of the product to the consumer. A consumer reacts to a multi-characteristic product and decides whether to purchase, consume, and possibly repurchase that product using the perceived utility of the product as a partial guide.

Two approaches to using utility to model the choice process have developed (Green *et al.*, 1978). Compositional approaches build up the overall utility for the product as a weighted sum of the products of perceived characteristic levels and their associated utilities. The prospective consumer evaluates utilities for each characteristic separately and explicitly. The compositional approach is primarily used for explaining rather than predicting consumer choice.

The opposite approach to utility modeling choice is termed decompositional. A consumer is asked to react to products whose characteristics are presented jointly. The analyst seeks to determine the 'part-worths' of individual characteristics which are most consistent with the consumer's preferences. A composition rule is required under this approach (e.g., additivity of part-worths). The composition approach emphasizes predictive validity over explaining consumer choice. Conjoint analysis is an example of this approach to utility modeling.

Conjoint analysis enables a consumer's preference structure to be determined given an overall evaluation of a set of prespecified levels of certain characteristics. It involves measurement of the joint effects of two or more independent variables on how a dependent variable is ordered by consumer choice. Conjoint analysis is especially useful when difficulties measuring dependent and independent variables are encountered (Green *et al.*, 1973). This was the case for some of the variables in this study. Since its procedures require only rank order data, it is quite easy to apply. For these reasons, and because of the large number of product characteristics to be examined (10), conjoint analysis was the analytic technique chosen.

APPENDIX VIII

Miscellaneous results

Table A.VIII.1 : Position of respondent within participating millwork manufacturing companies by questionnaire part, Michigan, 1987.

Position	Part 1: (#)	Part 2: (#)
Owner	2	1
President	3	1
Manager	1	2
Purchasing agent	1	2
Plant superintendent	0	1
Director	1	0
Vice-president	0	1
TOTAL	8	8

Table A.VIII.2 : Maximum board width capacity of machinery operated by millwork manufacturing companies, Questionnaire Part 1, Michigan, 1987.

Maximum width range	Frequency:				
	Remanufacturing mill (#)	Face-planer (#)	Moulder (#)	Finger-joiner (#)	Edge-gluer (#)
Less than 4 inches	0	0	0	0	0
4 to 8 inches	0	2	5	2	0
9 to 13 inches	1	0	2	1	0
14 inches or more	3	5	0	0	3
TOTAL	4	8[1]	8[1]	3	3

Note
1 : Includes a single 'Don't know' response.

Table A.VIII.3 : Maximum board length capacity of machinery operated by millwork manufacturing companies, Questionnaire Part 1, Michigan, 1987.

Maximum length range	Frequency:				
	Remanufacturing mill	Face-planer	Moulder	Finger-joiner	Edge-gluer
	(#)	(#)	(#)	(#)	(#)
Less than 8 feet	0	0	1	0	0
8 to 15 feet	2	1	2	1	1
16 to 20 feet	2	4	4	1	1
21 feet or more	0	3	1	1	0
TOTAL	4	8	8	3	3[1]

Note
1 : Includes a single 'Don't know' response.

Table A.VIII.4 : Maximum board thickness capacity of machinery operated by millwork manufacturing companies, Questionnaire Part 1, Michigan, 1987.

Maximum thickness range	Frequency:				
	Remanufacturing mill (#)	Face-planer (#)	Moulder (#)	Finger-joiner (#)	Edge-gluer (#)
Less than 4/4 inches	0	0	0	0	0
4/4 to 7/4 inches	0	1	2	1	1
8/4 to 15/4 inches	4	2	4	2	2
16/4 inches or more	0	3	1	0	0
TOTAL	4	8[1]	8[2]	3	3

Notes
1 : Includes two 'Don't know' responses.
2 : Includes a single 'Don't know' response.

Table A.VIII.5 : Problems encountered in purchasing softwood lumber for millwork manufacture by type of vendor relationship, Questionnaire Part 2, Michigan, 1987.

Problem type	Frequency for regular vendors (#)	Frequency for irregular vendors (#)
None	3	1
Service	3	1
Quality	1	2
Price	1	1
Location	0	1
Finding and developing new sources	0	1
Other	1	1
TOTAL[1]	8	5[2]

Notes
1 : Totals do not add vertically because of multiple responses to individual questions.
2 : Excludes a single 'Don't know' response, and two responses based on instructions to skip questions.

Table A.VIII.6 : Minimum and mean monthly inventories of softwood lumber and millwork, Questionnaire Part 1, Michigan, 1987.

Inventory type Minimum: and range	Mean: Frequency (#)	Frequency (#)
Softwood lumber (bf[1]):		
Less than 10,000	1	1
10,000 to 50,000	1	1
50,001 to 100,000	2	1
100,001 or more	3	4
TOTAL	7	7
Finished millwork (value):		
Less than $50,000	1	1
$50,001 or more	4	4
TOTAL	5	5

Note
1 : bf = board foot.

Table A.VIII.7 : Means of sharing the softwood lumber and millwork inventory functions with vendors and customers, Questionnaire Part 1, Michigan, 1987.

Method of sharing inventory function by inventory type	Frequency (#)
Softwood lumber[1,2]:	
Contract	1
Stock frequently used lines	1
Priority for company orders	1
Finished millwork[1]:	
Inventory special lines and/or customers	1
Feedback information	1

Notes
1 : Total number of firms acknowledging sharing inventory function: one for softwood lumber, two for finished millwork.
2 : Two 'Unclear response' responses were also received.

Table A.VIII.8 : Reasons for teying deliberately or not trying to influence the customer types to whom millwork is sold, Questionnaire Part 1, Michigan, 1987.

Offered reason	Frequency[1] of active selection of customer types: (#)	Frequency[1] of passive acceptance of customer types: (#)
Strategy approach:		
Identified market	3	0
Business definition	2	0
Other[1]	3	1
Nature of the business	0	3
TOTAL[2,3]	4	3

Notes
1 : Includes approaches aimed at matching existing capabilities, meeting turnover targets, and pursuing the most profitable manufacturing option.
2 : Excludes a single 'Don't know' response.
3 : Totals may not add vertically because of multiple responses to individual questions.

Table A.VIII.9 : Sources of market information used in purchasing softwood lumber, Questionnaire Part 2, Michigan, 1987.

Information source	Frequency of use (#)
Verbal quotes	5
Price lists	4
Advertisements	2
Other buyers-same company	2
Buyers-other companies	2
Customers	1
Other	2

Table A.VIII.10 : Conformity of softwood lumber to purchase specifications - loci for checking, Questionnaire Part 2, Michigan, 1987.

Locus	Frequency (#)
Nonbuyer in millwork company	6
Vendor	3
Buyer	3
Independent agency	2

APPENDIX IX

Estimated part-worth models

Table A.IX.1 : Estimated part-worth models for individual respondents.

Respondent #	Product characteristic level						Importance rating	Stress
	a	b	c	a	b	c		
	Price			Grade				
1	0.20	0.00	-0.20	0.00	0.60	-0.60	1.50	0.00
2	0.27	0.00	-0.27	0.07	0.53	-0.60	1.36	0.00
3	0.20	0.00	-0.20	0.00	0.60	-0.60	1.50	0.00
4	0.20	0.00	-0.20	0.60	0.00	-0.60	1.50	0.00
5	0.47	-0.13	-0.33	0.00	-0.47	0.47	1.08	0.00
6	0.20	0.00	-0.20	0.00	-0.60	0.60	1.50	0.00
7	0.20	0.00	-0.20	0.60	-0.60	0.00	1.50	0.00
8	2.20	0.18	-2.37	-0.06	0.03	0.03	0.04	0.34
	Price			Discount scheme				
1	0.20	0.00	-0.20	-0.60	0.00	0.60	1.50	0.00
2	0.47	0.00	-0.47	-0.47	0.33	0.13	0.92	0.00
3	0.20	0.00	-0.20	-0.60	0.60	0.00	1.50	0.00
4	0.20	0.00	-0.20	-0.60	0.60	0.00	1.50	0.00
5	0.60	0.00	-0.60	-0.20	0.20	0.00	0.50	0.00
6	0.33	0.00	-0.33	-0.60	0.40	0.20	1.20	0.00
7	0.20	0.00	-0.20	-0.60	0.00	0.60	1.50	0.00
8	0.20	0.00	-0.20	-0.60	0.60	0.00	1.50	0.00
	Price			Type of packaging				
1	0.20	0.00	-0.20	0.60	0.00	-0.60	1.50	0.00
2	0.60	0.00	-0.60	0.00	0.20	-0.20	0.50	0.00
3	0.20	0.00	-0.20	0.60	-0.60	0.00	1.50	0.00
4	0.20	0.00	-0.20	-0.60	0.00	0.60	1.50	0.00
5	0.60	0.00	-0.60	-0.20	0.00	0.20	0.50	0.00
6	0.33	0.00	-0.33	-0.60	0.40	0.20	1.20	0.00
7	0.27	0.00	-0.27	-0.60	0.53	0.07	1.36	0.00
8	0.20	0.00	-0.20	-0.60	0.60	0.00	1.50	0.00

Respondent #	Product characteristic level						Importance rating	Stress
	a	b	c	a	b	c		

Table A.IX.1 (Cont'd.).

	Price			Product guarantee				
1	0.20	0.00	-0.20	-0.60	0.60	0.00	1.50	0.00
2	0.47	0.00	-0.47	-0.47	0.13	0.33	0.92	0.00
3	0.20	0.00	-0.20	-0.60	0.00	0.60	1.50	0.00
4	0.20	0.00	-0.20	-0.60	0.00	0.60	1.50	0.00
5	0.53	-0.07	-0.47	-0.40	0.33	0.07	0.85	0.00
6	0.33	0.00	-0.33	-0.60	0.40	0.20	1.20	0.00
7	0.33	0.00	-0.33	-0.60	0.20	0.40	1.20	0.00
8	0.20	0.00	-0.20	-0.60	0.60	0.00	1.50	0.00
	Price			Vendor credit				
1	0.29	0.00	-0.29	-0.43	0.43	n.a.	1.20	0.00
2	0.29	0.00	-0.29	-0.43	0.43	n.a.	1.20	0.00
3	0.29	0.00	-0.29	-0.43	0.43	n.a.	1.20	0.00
4	0.29	0.00	-0.29	-0.43	0.43	n.a.	1.20	0.00
5	0.29	0.00	-0.29	-0.43	0.43	n.a.	1.20	0.00
6	0.29	0.00	-0.29	-0.43	0.43	n.a.	1.20	0.00
7	0.29	0.00	-0.29	-0.43	0.43	n.a.	1.20	0.00
8	0.29	0.00	-0.29	-0.43	0.43	n.a.	1.20	0.00
	Price			Supply assurance				
1	0.29	0.00	-0.29	-0.43	0.43	n.a.	1.20	0.00
2	0.43	0.00	-0.43	-0.33	0.33	n.a.	0.88	0.00
3	0.29	0.00	-0.29	-0.43	0.43	n.a.	1.20	0.00
4	0.29	0.00	-0.29	-0.43	0.43	n.a.	1.20	0.00
5	0.29	0.00	-0.29	-0.43	0.43	n.a.	1.20	0.00
6	0.29	0.00	-0.29	-0.43	0.43	n.a.	1.20	0.00
7	0.57	0.00	-0.57	0.14	-0.14	n.a.	0.40	0.00
8	0.29	0.00	-0.29	-0.43	0.43	n.a.	1.20	0.00
	Price			Dimensional assortment				
1	0.20	0.00	-0.20	-0.60	0.00	0.60	1.50	0.00
2	0.27	0.07	-0.33	-0.60	0.47	0.13	1.28	0.00
3	0.20	0.00	-0.20	0.00	0.60	-0.60	1.50	0.00
4	0.20	0.00	-0.20	-0.60	0.00	0.60	1.50	0.00
5	0.20	0.00	-0.20	-0.60	0.00	0.60	1.50	0.00
6	0.20	0.00	-0.20	-0.60	0.00	0.60	1.50	0.00
7	0.20	0.00	-0.20	-0.60	0.00	0.60	1.50	0.00
8	0.20	0.00	-0.20	-0.60	0.60	0.00	1.50	0.00

Respondent #	Product characteristic level						Importance rating	Stress
	a	b	c	a	b	c		
	Table A.IX.1 (Cont'd.).							
	Price			Width				
1	0.20	0.00	-0.20	-0.60	0.00	0.60	1.50	0.00
2	0.33	0.07	-0.40	-0.53	0.07	0.47	1.15	0.00
3	0.20	0.00	-0.20	-0.60	0.00	0.60	1.50	0.00
4	0.60	0.00	-0.60	0.20	0.00	-0.20	0.50	0.00
5	0.47	0.13	-0.60	0.27	0.07	-0.33	0.72	0.00
6	0.60	0.00	-0.60	0.20	0.00	-0.20	0.50	0.00
7	0.20	0.00	-0.20	-0.60	0.00	0.60	1.50	0.00
8	0.20	0.00	-0.20	-0.60	0.00	0.60	1.50	0.00
	Price			Length				
1	0.20	0.00	-0.20	-0.60	0.60	0.00	1.50	0.00
2	0.60	0.00	-0.60	-0.20	0.20	0.00	0.50	0.00
3	0.20	0.00	-0.20	-0.60	0.00	0.60	1.50	0.00
4	0.33	0.00	-0.33	0.40	0.20	-0.60	1.20	0.00
5	0.01	-0.02	0.02	0.33	0.26	-0.60	1.91	0.06
6	0.60	0.00	-0.60	0.20	0.00	-0.20	0.50	0.00
7	0.57	0.00	-0.57	-0.14	0.14	0.00	0.40	0.00
8	0.20	0.00	-0.20	-0.60	0.60	0.00	1.50	0.00
	Price			Thickness				
1	0.20	0.00	-0.20	0.00	0.60	-0.60	1.50	0.00
2	0.20	0.00	-0.20	0.00	0.60	-0.60	1.50	0.00
3	0.20	0.00	-0.20	-0.60	0.00	0.60	1.50	0.00
4	0.20	0.00	-0.20	0.60	0.00	-0.60	1.50	0.00
5	0.20	0.00	-0.20	0.00	0.60	-0.60	1.50	0.00
6	0.60	0.00	-0.60	0.20	0.00	-0.20	0.50	0.00
7	0.20	0.00	-0.20	-0.60	0.00	0.60	1.50	0.00
8	0.20	0.00	-0.20	0.60	0.00	-0.60	1.50	0.00
	Grade			Discount scheme				
1	0.13	0.47	-0.60	-0.33	0.27	0.07	0.72	0.00
2	0.13	0.47	-0.60	-0.33	0.27	0.07	0.72	0.00
3	-0.07	0.20	-0.13	-0.60	0.60	0.00	1.57	0.00
4	0.20	0.00	-0.20	-0.60	0.60	0.00	1.50	0.00
5	0.20	-0.20	0.00	-0.60	0.00	0.60	1.50	0.00
6	-0.13	-0.47	0.60	-0.33	0.27	0.07	0.72	0.00
7	0.20	-0.20	0.00	-0.60	0.00	0.60	0.75	0.00
8	0.56	-0.28	-0.28	-0.07	0.07	0.00	0.28	0.39

Respondent #	Product characteristic level						Importance rating	Stress
	a	b	c	a	b	c		
				Table A.IX.1 (Cont'd.).				
	Grade			Product guarantee				
1	0.00	0.60	-0.60	-0.20	0.20	0.00	0.50	0.00
2	0.13	0.47	-0.60	-0.33	0.07	0.27	0.72	0.00
3	0.00	0.20	-0.20	-0.60	0.00	0.60	0.75	0.00
4	0.60	0.00	-0.60	-0.20	0.00	0.20	0.50	0.00
5	-0.60	0.00	0.60	-0.20	0.12	0.08	0.42	0.02
6	-0.13	-0.47	0.60	-0.33	0.27	0.07	0.72	0.00
7	0.33	-0.27	0.07	-0.60	0.13	0.47	1.28	0.00
8	0.56	-0.28	-0.28	-0.07	0.07	0.00	0.28	0.39
	Grade			Supply assurance				
1	0.00	0.57	-0.57	-0.14	0.14	n.a.	0.40	0.00
2	0.14	0.43	-0.57	-0.24	0.24	n.a.	0.65	0.00
3	0.00	0.29	-0.29	-0.43	0.43	n.a.	1.20	0.00
4	0.43	0.14	-0.57	-0.24	0.24	n.a.	0.65	0.00
5	-0.57	0.00	0.57	-0.14	0.14	n.a.	0.40	0.00
6	-0.14	-0.43	0.57	-0.24	0.24	n.a.	0.65	0.00
7	0.57	-0.57	0.00	0.14	-0.14	n.a.	0.40	0.00
8	--	--	--	--	--	--	--	--
	Grade			Width				
1	0.00	0.60	-0.60	-0.01	-0.03	0.04	0.11	0.05
2	0.33	0.30	-0.63	-0.60	0.00	0.60	0.06	0.04
3	0.00	0.20	-0.20	-0.02	0.02	0.00	1.50	0.00
4	0.60	0.00	-0.60	0.20	0.00	-0.20	0.50	0.00
5	-0.20	0.00	0.20	0.60	0.00	-0.60	1.50	0.00
6	0.00	-0.60	0.60	0.20	0.00	-0.20	0.50	0.00
7	0.20	-0.20	0.00	-0.60	0.00	0.60	1.50	0.00
8	0.56	-0.28	-0.28	-0.07	0.00	0.07	0.28	0.39
	Grade			Length				
1	0.31	0.33	-0.64	-0.01	0.02	0.00	0.06	0.01
2	0.13	0.47	-0.60	-0.33	0.27	0.07	0.72	0.00
3	0.00	0.20	-0.20	-0.60	0.00	0.60	1.50	0.00
4	0.60	0.00	-0.60	0.20	0.00	-0.20	0.50	0.00
5	-0.33	0.00	0.33	0.40	0.20	-0.60	1.20	0.00
6	0.00	-0.60	0.60	0.20	0.00	-0.20	0.50	0.00
7	0.07	-0.05	-0.03	-0.59	0.27	0.32	1.77	0.04
8	0.56	-0.28	-0.28	-0.07	0.00	0.07	0.28	0.39

Respondent #	Product characteristic level						Importance rating	Stress
	a	b	c	a	b	c		

Table A.IX.1 (Cont'd.).

	Discount scheme			Product guarantee				
1	-0.20	0.20	0.00	-0.60	0.60	0.00	1.50	0.00
2	-0.60	0.47	0.13	-0.33	0.07	0.27	0.72	0.00
3	-0.13	0.20	-0.07	0.00	-0.60	0.60	1.57	0.00
4	-0.33	0.33	0.00	-0.60	0.20	0.40	1.20	0.00
5	-0.54	0.26	0.28	-0.55	0.29	0.26	1.01	0.02
6	-0.33	0.33	0.00	-0.60	0.40	0.20	1.20	0.00
7	-0.60	0.13	0.47	-0.33	0.07	0.27	0.72	0.00
8	-0.07	0.13	-0.07	-0.61	0.61	0.00	1.72	0.05
	Discount scheme			Supply assurance				
1	-0.29	0.29	0.00	-0.43	0.43	n.a.	1.20	0.00
2	-0.57	0.43	0.14	-0.24	0.24	n.a.	0.65	0.00
3	-0.29	0.29	0.00	-0.43	0.43	n.a.	1.20	0.00
4	-0.29	0.29	0.00	-0.43	0.43	n.a.	1.20	0.00
5	-0.14	0.29	-0.14	-0.43	0.43	n.a.	1.33	0.00
6	-0.57	0.43	0.14	-0.24	0.24	n.a.	0.65	0.00
7	-0.57	0.14	0.43	0.14	-0.14	n.a.	0.44	0.00
8	-0.29	0.14	0.14	-0.43	0.43	n.a.	1.33	0.00
	Product guarantee			Supply assurance				
1	-0.29	0.29	0.00	-0.43	0.43	n.a.	1.20	0.00
2	-0.29	0.00	0.29	-0.43	0.43	n.a.	1.20	0.00
3	-0.57	0.00	0.57	-0.14	0.14	n.a.	0.40	0.00
4	-0.57	0.57	0.00	-0.14	0.14	n.a.	0.40	0.00
5	-0.43	0.43	0.00	-0.33	0.33	n.a.	0.88	0.00
6	-0.57	0.43	0.14	-0.24	0.24	n.a.	0.65	0.00
7	-0.57	0.14	0.43	0.14	-0.14	n.a.	0.44	0.00
8	-0.29	0.29	0.00	-0.43	0.43	n.a.	1.20	0.00

Respondent #	Product characteristic level						Importance rating	Stress
	a	b	c	a	b	c		

Table A.IX.1 (Cont'd.).

	Product guarantee			Dimensional assortment				
1	-0.20	0.20	0.00	-0.60	0.00	0.60	1.50	0.00
2	-0.33	0.07	0.27	-0.60	0.47	0.13	1.28	0.00
3	-0.20	0.00	0.20	-0.60	0.60	0.00	1.50	0.00
4	-0.20	0.00	0.20	-0.60	0.00	0.60	1.50	0.00
5	-0.33	0.19	0.15	-0.60	0.13	0.47	1.34	0.01
6	-0.20	0.20	0.00	-0.60	0.00	0.60	1.50	0.00
7	-0.33	0.07	0.27	-0.60	0.13	0.47	1.28	0.00
8	-0.47	0.26	0.21	-0.47	0.00	0.47	1.13	0.01
	Supply assurance			Width				
1	-0.14	0.14	n.a.	-0.57	0.00	0.57	1.60	0.00
2	-0.24	0.24	n.a.	-0.57	0.14	0.43	1.35	0.00
3	-0.43	0.43	n.a.	-0.29	0.00	0.29	0.80	0.00
4	-0.43	0.43	n.a.	0.29	0.00	-0.29	0.80	0.00
5	-0.24	0.24	n.a.	0.43	0.14	-0.57	1.35	0.00
6	-0.43	0.43	n.a.	0.29	0.00	-0.29	0.80	0.00
7	0.14	-0.14	n.a.	-0.57	0.00	0.57	1.60	0.00
8	-0.43	0.43	n.a.	-0.29	0.00	0.29	0.80	0.00
	Supply assurance			Length				
1	-0.14	0.14	n.a.	-0.57	0.57	0.00	1.60	0.00
2	-0.24	0.24	n.a.	-0.57	0.43	0.14	1.35	0.00
3	-0.43	0.43	n.a.	-0.29	0.00	0.29	0.80	0.00
4	-0.43	0.43	n.a.	0.29	0.00	-0.29	0.80	0.00
5	-0.24	0.24	n.a.	0.43	0.14	-0.57	1.35	0.00
6	-0.43	0.43	n.a.	0.29	0.00	-0.29	0.80	0.00
7	0.24	-0.24	n.a.	-0.57	0.14	0.43	1.35	0.00
8	-0.43	0.43	n.a.	-0.29	0.29	0.00	0.80	0.00

Key
n.a. = not applicable.
-- = Respnse not received.

Note
1 : Some sets of part-worth coefficients may not sum to zero because of rounding errors.

APPENDIX X

On quality and customer service

Both quality and customer service have been used in this study to describe groups of product characteristics. Quality consisted of four subsets of these characteristics, and customer service five[1]. The distinction between quality and customer service was based on whether or not a particular characteristic could be regarded as tangible or intangible.

Both customer service and quality (i.e., service-quality) can be broadly defined as the perceived degree to which a product conforms to a set of predetermined intangible and tangible standards. Several important features are implicit in this definition:

1. Service-quality is a relative concept, dependent upon not only perceptions but also how well a product performs in use and the satisfaction delivered in consumption.
2. Service-quality is a normative concept since it depends on an assessment of value, and value ultimately involves a normative appraisal by one or more individuals.

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1 More specifically, quality consisted of solid wood characteristics (grade, species, geographic source, grain and figure, color, and moisture content), finishing characteristics (smoothness, cleanliness, and paintability), workmanship and manufacturing standard (conformity to pattern, consistency in meeting specifications, straightness, flatness, and design simplicity), and yield (outturn obtained, and rejects per shipment). The service characteristics were: design expertise (availability, matching of materials and patterns, and providing special or obsolete patterns), delivery (availability, reliability, timeliness, speed, and consistency), customer orientation (personalized, friendly, courteous, speedy, after-sales service, and credit provision), inventory (rapid turnaround time, meet short notice orders, sort for desired material, and carry the desired variety of stock), and order placement (ease, special ordering).

3. Service-quality can be described in terms of specific product characteristics - both relative and absolute quantities. It is therefore inherent in any product, for a product would not be regarded as a product in the absence of any utility (or disutility) conferring characteristics.
4. The utility (or disutility) conferring characteristics contributing to service-quality are extrinsically determined by the act or process of consumption. They can be regarded therefore as being instrumental in determining overall product utility.

Considerable empirical work has been undertaken to develop a conceptual model of quality and customer service (i.e., service-quality). Parasuraman *et al* (1985) have identified nine intangible determinants of service-quality. They include: reliability, responsiveness, competence, access, courtesy, communication, credibility, security, and understanding and knowing the customer. They describe the single tangible determinant as the physical evidence of the product itself.

The distinction between tangible and intangible determinants of service-quality holds interesting research possibilities with respect to differentiating a commodity. The tangible characteristics of a commodity are usually similar and straightforward to evaluate. However, the importance of intangible characteristics tends to increase with increases in the similarity of products within a commodity group, as vendors seek ways to distinguish their

product from others like it, and buyers focus on price as the principal buying criterion.

A conceptual model of service-quality is presented in Figure A.VI.1[2]. The model indicates that both the consumer and marketer play a role in service-quality. Further, it emphasizes the importance of perceptions in service-quality. The marketer (cf. firm in Figure A.VII.1) has her own perceptions of consumer expectations and product performance requirements, and likewise, the consumer has her own perceptions of expectations and product performance requirements.

The consumer portion of Figure A.VI.1 is based on a so-called "disconfirmation paradigm" (Churchill *et al*, 1982, p. 491). The notion of disconfirmation recognizes consumer perceptions in evaluating the service-quality content of a product. Perceived expectations reflect anticipated performance. The difference between anticipated performance and perceived performance measures disconfirmation, and ultimately consumer satisfaction. A consumer's expectations are said to be confirmed when a product performs as expected, positively disconfirmed when the product performs better than expected, and negatively disconfirmed when the product does not perform to expectations.

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2 For sake of simplicity, feedback linkages have been omitted from the diagram. Details of these linkages are provided in the references listed.

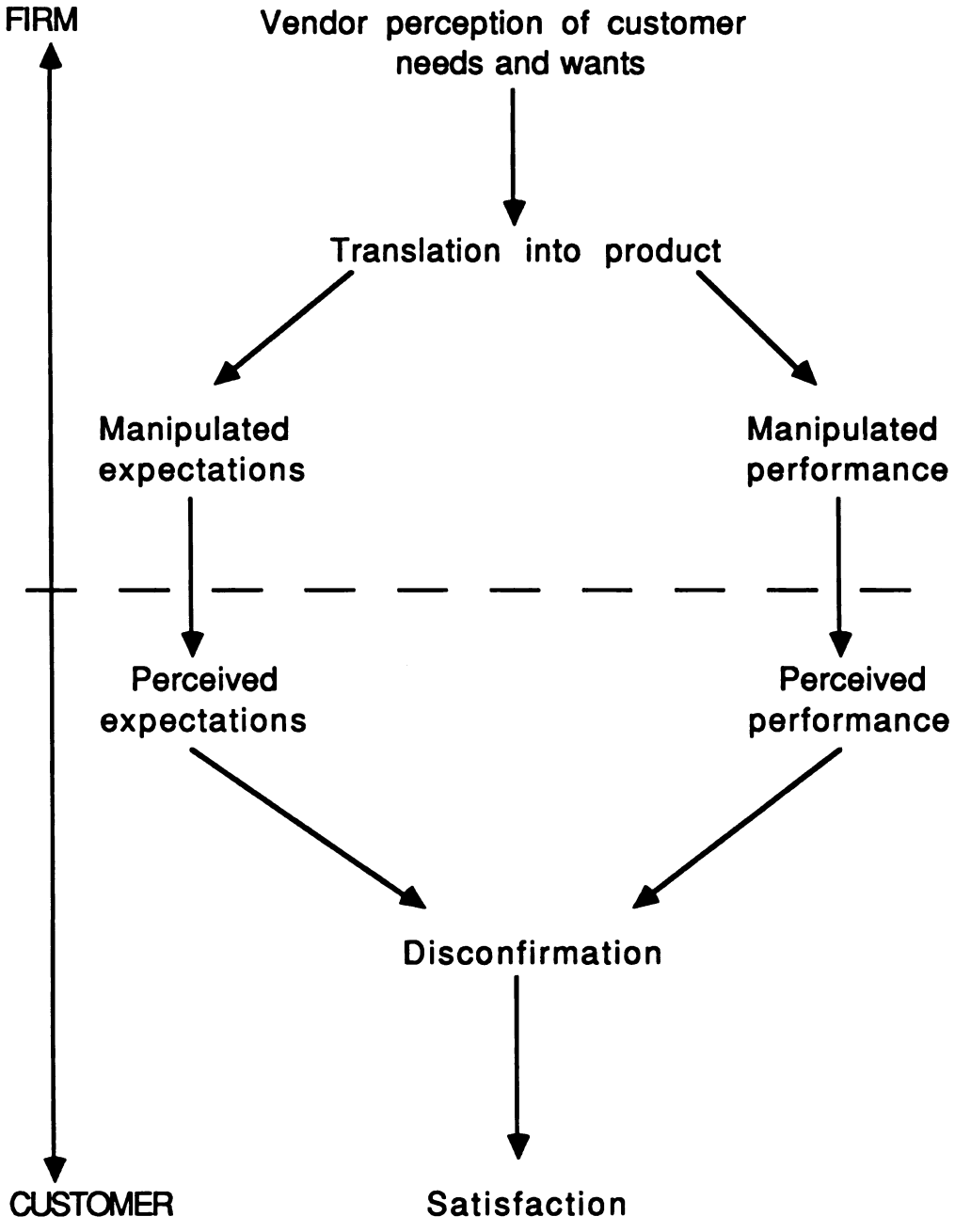

Figure A.X.1 : A conceptual model of service-quality (Churchill et al., 1982; Parasuraman et al., 1985).

APPENDIX XI

U.S. retail sales of millwork

Table A.XI.1: Value of U.S. retail sales of metal and wood millwork (SIC 521), 1972-82.

Year	SIC 521 (1967 10^6)	Metal millwork (1967 10^6)	Other millwork[1] (1967 10^6)
1982	11047.1	527.6	601.8
1977	10363.6	396.5	662.6
1972	9373.9	378.9	579.6

Key
SIC 521: Lumber and building material retailers.

Note
1 : Includes wood millwork.

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U.S. Bureau of the Census, ca 1976c, ca 1981c, 1982, 1983, 1984b, ca 1985c, 1985e.

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