PRODUCTION FACILITY SITE SELECTION FACTORS FOR TEXAS VALUE-ADDED WOOD PRODUCERS

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ABSTRACT

Value-added wood products manufacturers serve an important role in the economies of many U.S. regions and are therefore sought after by entities such as economic development agencies. The reasons why certain locations for a prospective production facility would be more attractive to secondary wood industry producers are not clearly understood. Therefore, this research attempts to increase our understanding of why a secondary wood producer would choose to place a production facility in one location versus another. All known value-added wood producers in Texas were surveyed to investigate the importance of 31 factors related to the plant location decision. The most important factors were determined to be *property taxes* and *labor costs*. Cost-related factors were ranked as most important when considering a location in a state other than Texas. Significant differences in factor importance were found for respondents who had recently made a location decision versus those planning a future decision. Implications are drawn for policymakers and economic development officials who are seeking to attract more value-added wood producers to a particular area.

The U.S. secondary wood products manufacturing industry is important in terms of its employment, value-added in manufacturing, consumption of a wide variety of forest products, and overall economic impact (2,8,11). This segment of the wood products industry consists of manufacturers of such products as wood household and office furniture, kitchen cabinets, and specialty products such as wood TV cabinets. Manufacturers of these products have the potential to play an important role in state and local economies, and many states have begun to understand the employment and tax potential of secondary wood products manufacturing for their economies.

Understanding the reasons why one location would be more favorable to secondary wood products manufacturers is seemingly critical to a state's ability to cultivate and enhance such an important industry. Previous research has examined plant location decisions made by primary wood producers (e.g., 1), and has included the use of analytical models to determine optimal plant location (9,10). Few studies, however, have been conducted to clarify the factors that would lead a wood products firm to choose one site over another for a secondary manufacturing facility. Therefore, the primary objective of this study was to develop an understanding of the factors that are important to site selection decisions for secondary wood products firms.

STUDIES ON SITE SELECTION DECISIONS

Relatively few studies have examined the site selection decision process for secondary wood products manufacturers. One of the earliest studies (5) found that single-owner firms often selected a site because of personal relationships and community factors. Market and cost considerations were left to be considered after the site was selected. Hagenstein's (5) study also showed that larger firms put more weight on financial criteria and considered far more alternative sites. The larger firms considered wood supply, and labor and transportation costs to be important in site selection.

Cleaves (1) also conducted a study that investigated the plant location decisions for wood products manufacturers. However, this study only examined the location decisions for firms operating plywood plants in 12 southern states. Results indicate that there were significant differences in the decision processes used by different types of firms.

Other studies have found that different types of forest products firms have different location requirements. For the solid wood products industry in Louisiana, it was found that proximity to raw materials was the most important concern for

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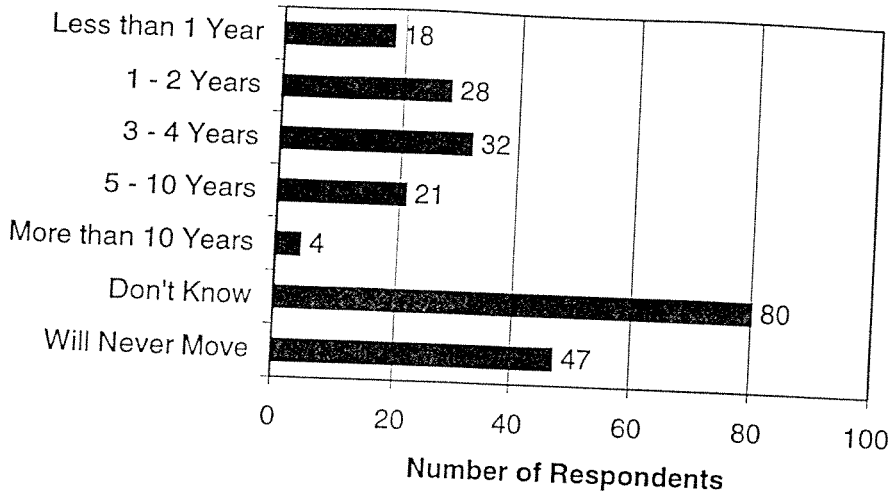
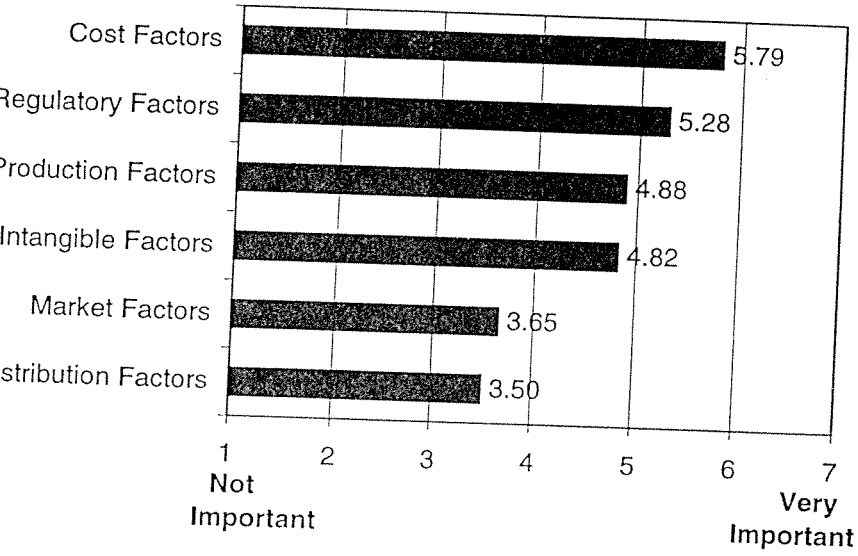


Figure 1. — Number of years to next anticipated move.



ure 2. — Grand mean of factor scores by category.

primary manufacturing sector, while kers' compensation costs were of test concern to secondary producers . In 13 northeastern states, Fraser and de (4) found that three forest indus- ubsectors - furniture, veneer, and pal- had different location requirements, h also changed according to com- ity size; no single factor was com- to all industry subsectors and com- ties but various combinations of , market, and transportation factors prevalent.

dies from outside the wood prod- ndustry indicate that there are sev- asic considerations that a company ook at when choosing a site for an industrial facility (e.g., 6). One very important consideration is the mobility of facilities and people. At the time of the location decision, a production facility is fairly mobile; its machines can be moved or new machines put in place at the new location. The workforce, however, is not so easily relocated. Significant disruptions are caused by either forcing a firm's employees to move or by hiring new employees to staff a facility. Some production processes are characterized by a need for highly technical equipment and highly trained employees. The need for such highly skilled people appears to be a more determinant factor in the site selection decisions for firms that are dependent on them.

Accessibility to the inputs of production has also been found to be an important consideration in site selection decisions (6). A facility that is located far from the source of the raw material inputs will incur greater in-bound shipping costs and have to wait longer for raw materials than competitors who are less removed from input sources. The importance of an adequate wood raw materials supply has been previously noted in site selection decisions for wood manufacturers (7). Lastly, the location of the target market can make a difference in the success of the production facility. If the facility is located too far from the target market, it will incur higher out-bound freight expenses and have difficulty responding to rapid changes in the marketplace.

Methodology

The population of interest for this survey consisted of value-added wood producers in Texas, including cabinet, furniture, specialty product, flooring, fixture, moulding/millwork, window, and door manufacturers. A list of companies was compiled using a mailing list purchased from the Bureau of Business Research at the University of Texas at Austin and lists from the Texas Forest Service and the Texas Department of Commerce. A total of 852 firms comprised the survey population.

Data Collection

The primary data collection method for this project was a mail survey. A prenotification letter was first mailed to all companies in the population, followed approximately 1 week later by the surveys. A second mailing was sent to those who had not responded to the first survey. Reminder postcards were mailed a week after the second mailing to all respondents that had not returned their surveys. Further, follow-up telephone calls were made in an attempt to reach the largest production firms that had not previously responded.

These data collection efforts resulted in the return of 263 surveys, of which 237 were used (26 surveys returned by lumber and pallet producers were not used). Further, there were 236 undeliverable or unusable questionnaires returned. This results in an adjusted response rate of 39 percent.

Non-Response Bias

Potential non-response bias was examined by comparing early respondents to respondents who returned surveys af-

ter follow-up efforts. These tests are based on the assumption that respondents who respond to follow-up appeals are more like non-respondents (3). In these tests, the first 25 percent of respondents were compared to those who responded to our follow-up efforts (approximately 25%). Using the Chi-square test (0.05 level of significance), all demographic variables were tested and indicated no significant differences between groups of respondents.

Results

Respondent Profile

Of the 237 respondents, 68 percent were corporations and 27 percent were sole proprietorships, with the remainder being such entities as joint ventures. The average number of years at the current production facility was 12.4, with 54.3 percent of firms being at their original production location. More than 66 percent of respondents reported having the title of owner or president, with another 10.7 percent being vice presidents and 14.9 percent managers. Respondents reported having 280 production facilities in Texas and 65 in other states.

Respondents indicated their primary and secondary products from a list of product categories. A breakdown of the products shows that 18.8 percent listed residential or office furniture as their primary product, with 22.1 percent reporting cabinets as their primary product. Other producers reported primary products such as millwork, fixtures, and wood specialty products.

Respondents reported annual sales levels from $10,000 to more than $500 million for 1996, with average sales (for wood products only) of $9,911,416. Median sales were $628,142, with the total sales reported by respondents being more than $2.13 billion. It is recognized that a number of very large producers skewed the average sales figures. Therefore, a trimmed mean was calculated in which the top and bottom 2 percent of the sales figures were not included in the calculations. This results in a trimmed mean estimate for 1996 average sales of $4,649,061.

Location Circumstances and Intentions

Overall, 8 percent of the respondents indicated that they intend on moving to a new production site in less than 1 year, with another 21.7 percent anticipating a move in the next 2 years. **Figure 1** graphically illustrates the breakdown of anticipated time until respondents' next move. Respondents who say they will never move make up 20.9 percent, and of those, 42.6 percent are still in their original location. A large proportion of the respondents (34.8%) is unsure of their intentions to move, and of those, 9 percent are not satisfied with their current locations.

Most respondents reported being fairly satisfied with their current location. Of the 237 respondents, 31.9 percent feel very satisfied, and 75.1 percent feel at least somewhat satisfied with their current plant location(s). On the other hand, 15.9 percent are unsatisfied with their current location(s). Of respondents who reported sales of over $5,000,000 for 1996, the mean satisfaction rating was 5.5 (on a 7-point scale). However, only 25 percent of these respondents reported being very satisfied with their current production facility location(s).

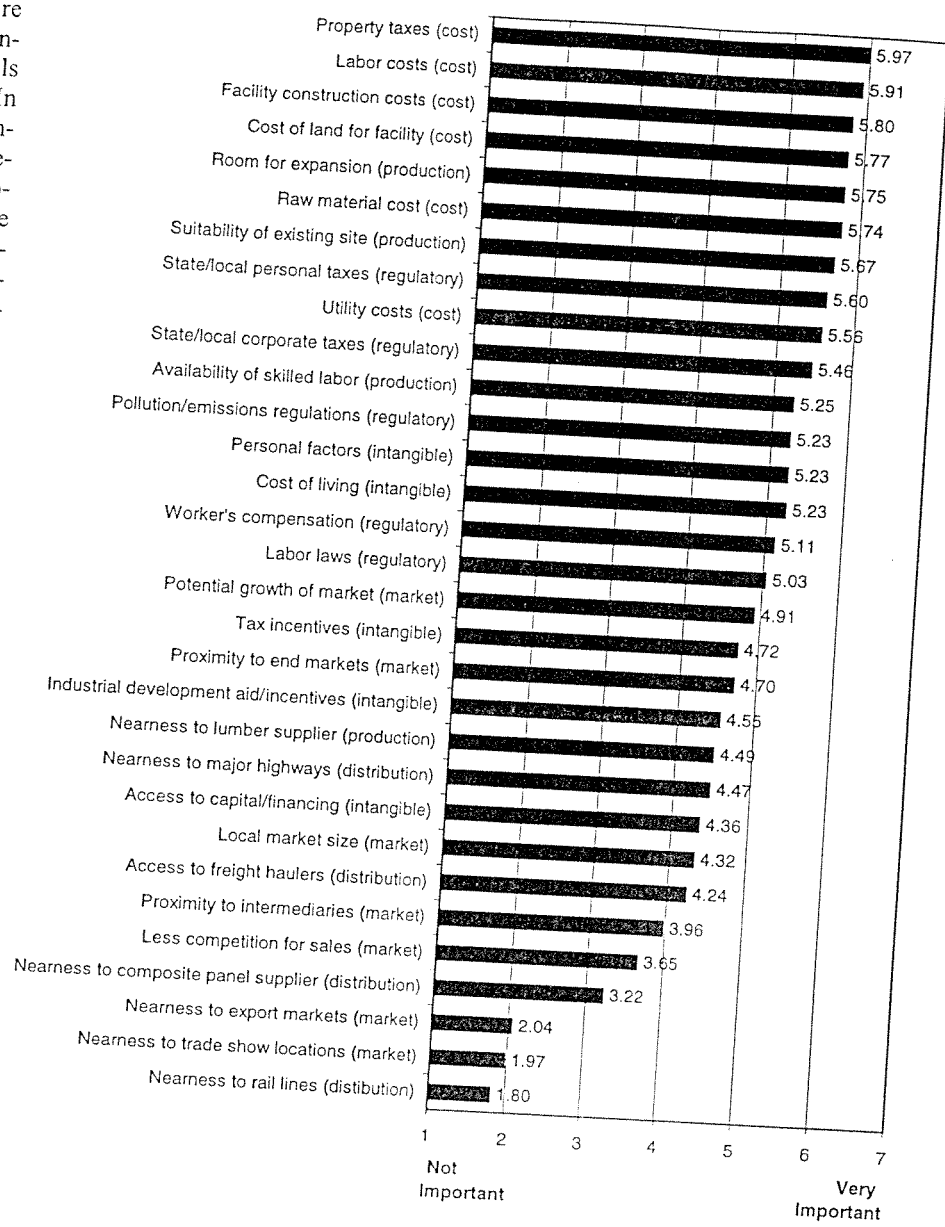


Figure 3. — Grand means for individual factors.

Analysis of General Decision Factors

In order to study which factors are perceived by producers to be the most important in choosing a site location, 31 factors were chosen and placed into 6 major categories. The categories were: market, cost, distribution, production, regulatory, and intangible factors.

ABLE 1. — Comparison of mean factor scores based on site selection situation.

Factor	Factor type	Group 1	Group 2	Group 3
Property taxes	Cost	5.60	6.14	5.99
Labor costs	Cost	5.81	5.96	5.95
Cost of land for facility	Cost	5.69	6.22	5.59
Room for expansion	Production	6.02	5.94	5.60
Raw materials costs	Cost	5.44	5.86	5.73
Facility construction costs	Cost	5.53	6.08	5.57
Suitability of existing site	Production	5.89	5.86	5.55
Utilities costs	Cost	5.08	5.84	5.62
State/local personal taxes	Regulatory	5.21	5.90	5.56
State/local corporate taxes	Regulatory	5.13	5.98	5.36
Availability of skilled labor	Production	5.11	5.59	5.19
Personal factors	Intangible	5.24	5.49	5.16
Pollution/emissions regulations	Regulatory	4.49	5.58	5.31
Cost of living	Intangible	4.97	5.49	5.19
Worker's compensation	Regulatory	4.54	5.35	5.15
Labor laws	Regulatory	4.81	5.31	5.01
Potential growth of market	Market	4.97	5.22	4.76
Tax incentives	Intangible	4.08	5.27	4.67
Proximity to end markets	Market	5.08	4.71	4.57
Industrial development aid/incentives	Intangible	3.92	5.14	4.51
Nearness to major highways	Distribution	4.54	4.81	4.37
Nearness to lumber supplier	Production	4.48	4.27	4.56
Access to capital/financing	Intangible	4.13	4.85	4.23
Local market size	Market	4.53	4.89	4.06
Access to freight haulers	Distribution	4.05	4.81	4.15
Proximity to intermediaries	Market	4.00	4.14	3.88
Competition for sales	Market	3.61	3.49	3.71
Nearness to composite panel supplier	Production	2.89	3.67	3.21
Nearness to export markets	Market	2.00	2.28	2.01
Nearness to trade show locations	Market	2.13	2.02	1.95
Nearness to rail lines	Distribution	1.73	1.81	1.83

spondents were asked to rank the ctors on a scale from 1 to 7 accord- importance (1 = not important; 7 = important). Grand means for each ory were calculated by averaging sponses for each factor within the tegories (**Fig. 2**). It was found that factors are the most important to ndents; distribution factors are the mportant.

ure 3 provides the mean scores cal- d for the 31 individual factors. The mportant of all factors was *prop- xes*, with a score of 5.97. The next mportant factor was *labor costs* followed by *facility construction* 5.80). The three least important were *nearness to rail lines*, *near- trade show locations*, and *near- export markets*.

R IMPORTANCE BY SITE TION SITUATION

s assumed that the data would differences in factor importance n respondents' stage in their site selection decision making. Therefore, the survey was designed to categorize respondents based on three different selection situations. Following are the three groups, including the number of respondents falling in each category:

- Group 1: Those who have made a site selection decision in the last 3 years (38 respondents, 17%);
- Group 2: Those who are planning to make a site selection decision in the next 3 years (50 respondents, 22%);
- Group 3: Those who do not fit into either Group 1 or 2; these persons were instructed to base their answers on their perception of the importance of the factors for a potential future site selection (138 respondents, 61%).

Comparison of the factor importance scores for each group shows that the highest ranking factors are mostly cost-related concerns (**Table 1**). All three groups consider *property taxes* and *labor costs* very important; *cost of land for facility* is one of the five most important for Groups 1 and 2. *Room for expansion* is one of the five most important for Groups 1 and 3.

There were statistically significant differences on only two factors when comparing those who have made a location decision in the last 3 years and those who are making a location decision in the next 3 years. Those who were planning to make a site selection decision in the next 3 years considered *industrial development aid/incentives* and *tax incentives* to be significantly more important than those who had recently made a selection decision. In addition, there is a noticeable shift in factor importance once a site decision has been made. Production factors (*room for expansion* and *suitability of existing site*) were paramount for those who have made a recent site decision, although cost-related factors were still important.

FACTOR IMPORTANCE BY SALES CATEGORY

Comparing answers for factor questions across 1996 sales shows many differences in opinion of importance. Three groups of respondents were created to examine these differences:

- Group A: 1996 sales less than $1 million;
- Group B: 1996 sales between $1 million and $10 million;
- Group C: 1996 sales greater than $10 million.

All three groups indicated that *labor costs* were important, with each ranking it in its top 5 most important of the 31 factors (**Table 2**). The largest firms, those with 1996 sales over $10 million, felt that *room for expansion* was the most important factor, while those with 1996 sales between $1 million and $10 million ranked it third most important and respondents with 1996 sales of less than $1 million ranked it seventh. The remaining top four concerns for the largest firms were all labor-related. Respondents with 1996 sales less than $1 million and those with 1996 sales between $1 million and $10 million found *property taxes* highly important, ranking it in their top 5; however, the largest respondents ranked this factor only 13th.

RANKING OF CATEGORIES: SITE SELECTION OUTSIDE OF TEXAS

Respondents were also asked to provide a rank ordering of the six major categories in terms of importance when considering a site outside of Texas. For

example, respondents would write the number one next to cost factors if they perceived them to be the most important factors to be considered when selecting a site in another state. The number two would be written next to the second most important factor, and so on. **Figure 4** illustrates graphically the ranking of the six categories against each other. In this case, the figures are averages of all rankings provided by respondents, and lower scores indicate a higher ranking in terms of importance.

The results show that cost factors are the most important to respondents, with an average relative ranking of 2.32. Next most important are market factors, followed by production factors. Least important in the ranking are intangible factors, with an average rank of 4.81. The high ranking of market and distribution factors, versus the results shown earlier in **Figure 2**, indicates that out-of-state site selection decisions are viewed differently than the within-Texas decisions. This could be due to out-of-state decisions being associated more with expansion than relocation.

Discussion and Suggestions

This study was designed to determine which factors are most important to Texas value-added wood products manufacturers when choosing a new plant location. A total of 31 factors were rated to determine which are most important in relation to a location decision. The findings provide a better understanding of how site selection decisions are made, and should prove useful to organizations seeking to attract value-added producers to a given location. The cost-related factors of *property taxes, labor costs*, and *cost of land for facility* are the most important to secondary wood producers. Production-related costs (*facility construction costs, raw material costs, utility costs*) were also highly rated by respondents.

Overall responses indicate that *nearness to lumber supplier* is only somewhat important, with *nearness to composite panel supplier* (e.g., particleboard, MDF) being even less important. This result bodes well for those locales outside areas with commercial forestlands, where the majority of primary wood producers are located, that are attempting to attract a value-added production facility.

Cost factors would be the most important consideration when moving to another state. If wood producers in other states are similar to those in Texas then it could be assumed that any producer looking to move outside its home state will first consider sites that offer the lowest cost combination of productive factors. Also, market-related factors became more important when expansion across state borders was being considered. Although much has been made of the regulatory differences from state to state, re-

TABLE 2. — Comparison of mean factor scores by 1996 sales.

Factor	Factor type	Group A (n = 137)	Group B (n = 59)	Group C (n = 19)
Property taxes	Cost	5.91	6.29	5.45
Labor costs	Cost	5.72	6.33	6.14
Cost of land for facility	Cost	5.80	5.81	5.50
Room for expansion	Production	5.56	6.09	6.19
Raw material cost	Cost	5.73	5.76	5.77
Suitability of existing site	Production	5.61	5.86	5.62
Facility construction costs	Cost	5.62	5.90	5.41
State/local personal taxes	Regulatory	5.44	5.97	5.73
Utility costs	Cost	5.55	5.69	5.36
State/local corporate taxes	Regulatory	5.22	5.98	5.73
Availability of skilled labor	Production	4.99	5.72	5.77
Cost of living	Intangible	5.33	5.16	4.86
Pollution/emissions regulations	Regulatory	4.94	5.81	5.64
Personal factors	Intangible	5.35	5.14	4.68
Worker's compensation	Regulatory	4.73	5.72	6.05
Labor laws	Regulatory	4.75	5.45	5.82
Potential growth of market	Market	5.21	4.47	4.05
Tax incentives	Intangible	4.44	5.39	4.95
Proximity to end markets	Market	4.69	4.86	4.32
Industrial development aid/incentives	Intangible	4.19	5.32	5.09
Nearness to lumber supplier	Production	4.73	3.98	4.23
Nearness to major highways	Distribution	4.09	5.17	5.23
Access to capital/financing	Intangible	4.29	4.84	3.64
Local market size	Market	4.61	3.78	3.68
Access to freight haulers	Distribution	3.89	4.78	5.36
Proximity to intermediaries	Market	4.01	3.84	3.86
Less competition for sales	Market	3.95	3.24	2.64
Nearness to panel supplier	Production	3.13	3.41	3.32
Nearness to export markets	Market	1.97	2.00	2.59
Nearness to trade show locations	Market	2.15	1.62	1.73
Nearness to rail lines	Distribution	1.75	1.75	2.18

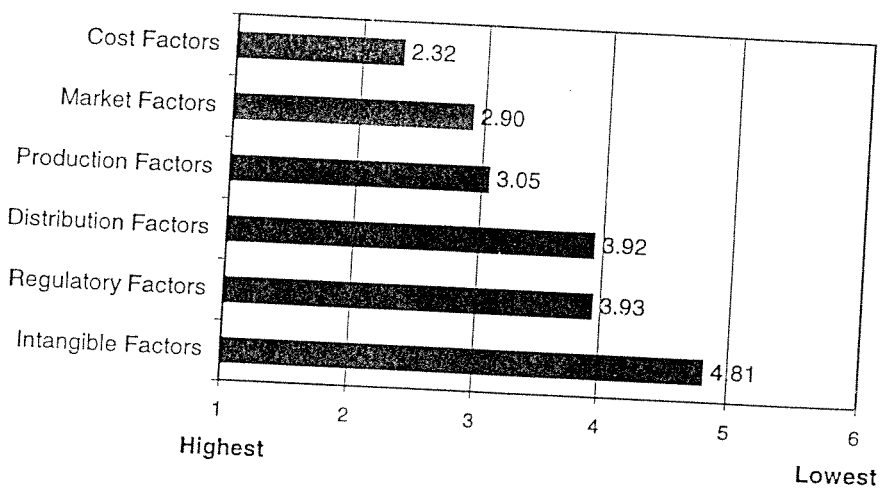


Figure 4. — Factor importance ranking for facility outside of Texas.

sults here indicate that regulatory factors do not rate highly when moving to another state, unless they perhaps affect costs related to land and labor.

SUGGESTIONS BY RESPONDENT CATEGORY

Selection situation. — Efforts to increase a location's attractiveness to prospective secondary wood products manufacturers should include emphasis on low costs regarding purchasing the land and building the facility. Those respondents who are in the category of making a site location decision in the next 3 years indicated that these factors were very important to them. Furthermore, it was noted that the availability of a skilled labor force is a major concern, along with lower property tax rates. Thus, efforts to recruit these companies should focus on these issues in order to create interest in the area.

It is interesting to note the significant differences in importance ratings for the Group 1 (recently made a decision) and Group 2 (making a decision within 3 years) respondents. The numbers indicated a large rise in importance for *tax incentives* and *industrial development aid/incentives* from Group 1 to Group 2. This provides some indication that the importance of these two factors has increased over time and may take on an even greater role for future decisions.

Firm size. — Large firms (over $10 million in annual sales) consider *room for expansion* and *labor costs* most important. They also perceive the regulatory factors of *worker's compensation* and *labor laws* as being integral to production facility location. *Labor costs* and *property taxes* are most important to medium-sized companies, but they are also concerned with *room for expansion* and *state/local corporate taxes* and *personal taxes*. Smaller companies (under $1 million in annual sales) are most interested in *property taxes, labor costs*, and *cost of land for new facility*.

Product type. — There appear to be minor differences in factor importance between producers of different product types. However, most of these differences were not statistically significant and caution must therefore be used when making statements of the importance of one factor versus another. What may be most noteworthy is the general agreement among the various product types regarding the importance of cost-related factors. Four cost-related factors were consistently ranked in the top six factors for the cabinet, furniture, and specialty wood products producers. These results indicate that officials seeking to attract these firms may not need to devise specific strategies for each individual product type.

Value-added wood producers can be a valuable asset to a community. These producers take commodity products and add value through specialized labor and production methods. They may be more attractive than their primary product counterparts due to reasons such as less waste and pollution, a more highly skilled workforce, and substantial contributions to local tax bases. As more states and localities become aware of the economic potentials of the secondary wood products industry, there should be an increasing interest in the location factors that are most important to a producer's decision-making.

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