CHAPTER THREE: RESULTS AND DISCUSSION

This study examined hardwood use by China's furniture manufacturers on several aspects, such as hardwood usage and opportunities for substitution, perception of hardwood lumber purchase, and sources of hardwood lumber purchase. Data entry errors were first checked and corrected. Non-response bias was then tested by examining the relationships between early and late respondents. The early respondents were assumed to be similar to the respondents, and the late respondents were assumed to be similar to the non-respondents. The early and late respondents were tested for differences among their mean percentages of hardwood materials used. No significant differences were found between the two groups in terms of mean percentages of hardwood lumber and dimension used, and hardwood plywood used. It could be assumed that there were no differences in early versus late respondents. Therefore, it could be concluded that no differences were present between respondents and non-respondents. This indicates that results from this group of respondents reflect the general perceptions of China's furniture manufacturers. Thus, this study should allow us to get important insight into the industry. In order to learn the trends of wood material use and important perceptions of sampled furniture manufacturers, surveyed data was analyzed on spreadsheet.

3.1 Firm Profiles

Data analysis began with descriptive statistics from respondents' demographic data. The data included respondents' titles, firm size (sales and employment), ownership, firm location, and product lines.

3.1.1 Respondents

As the majority of responding firms were small and medium sized manufacturers, half of the respondents were either general managers or presidents. Also because most furniture companies had one established department or division in charge of both

purchasing materials and marketing products, twenty-two percent of the respondents had the titles of marketing directors, sales managers, or exporting directors. The remaining (28%) respondents were chief engineers, production managers, or technical directors.

3.1.2 Ownership Types

The majority (49%) of the responding firms were joint venture or foreign-owned companies. This indicates that foreign-related manufacturers are more cooperative with the survey and interested in receiving such information as material purchasing sources. Twenty-three percent were state-owned furniture manufacturers, and the other 23% were collective-owned firms. Among these state and collective owned firms, five (26%) were interested in forming joint ventures and were looking for foreign partners. This shows that more foreign investment is desirable in China's furniture manufacturing. It offers a good opportunity for U. S. wood producers to enter Chinese market. The remaining 5% were private domestic companies, a small but growing segment.

3.1.3 Locations

Twenty percent of the responding firms were located in the North Central region (North), 29% in the Northeast, 32% in the South, 15% in the East Central regions (East), and the remaining respondents (5%) were from the West (Southwest and Northwest) (See Map of China in Appendix C). Table 17 shows the number and proportion of responses received from each region. As more than 80 percent of Chinese furniture firms are small and medium sized, it is not surprising that most responses in all regions were from small and medium sized firms. Table 17 also indicates that large firms were mostly from the North and the Northeast where they are traditionally located.

In order to examine wood material use on a regional basis and ensure having enough observations from statistical point, two larger regions, the North and the South[3] will be used in the following sections.

3.1.4 Total Sales

Table 18 provides 1996 total sales of the responding companies by region and firm size. Total sales of these firms amounted to slightly over 1.7 billion Yuan in 1996 (about $200 million), which accounted for some 3% of the national total. The mean annual sales value for large firms was 234 million Yuan, while the mean annual sales value for small and medium firms was 21 million Yuan. This indicates that a few large firms accounted for most of the national sales. The mean annual sales per employee was 86,000 Yuan, which is higher than the whole industry average (46,000 Yuan in 1995). This is mainly due to the greater proportion of large companies and joint ventures or foreign owned furniture firms, which run at a higher efficiency than small to medium sized domestic companies.

3.1.5 Employment

The total number of employees in all responding firms amounted to 16,950, which was roughly 4% of total furniture industry employment in 1996, as reported by the Chinese Statistical Bureau (CSC 1997). Table 19 provides the average number of employees in responding companies in 1996. The table reports these numbers by region and firm size.

Large firms in the Northern regions (the Northeast and the North Central) employed more people than those in the Southern regions (the South and the East Central). This confirms the geographic differences in employment distribution. Large firms in the North, where traditional state-owned large firms located, were larger sized in terms of employees. On the other hand, small firms located in the North employed less than in the South. This is probably due to that small firms in the North were most likely solid wood furniture manufacturers, which were run at a relatively small scale.

[3] The North combines the North central, the Northeast, and Northwest, and the South includes the east central, the South, and the Southwest above.

3.1.6 Product Categories

A few responding furniture firms (5 out of 41) claimed that they produced only one type of furniture. The majority of the furniture manufacturers produced more than two types of furniture. For 44% of the responding companies, household furniture accounted for more than 50% of their total production. Similarly, twenty-seven percent of responding firms were considered to be office furniture manufacturers. The remaining companies (29%) were either cabinet manufacturers, commercial furniture manufacturers, upholstered furniture manufacturers, or outdoor furniture manufacturers.

These results confirm a phenomenon common in China's furniture industry. In China, most furniture manufacturers have been attempting to produce a variety of furniture products. This gives them the advantage of having the flexibility to serve different markets. However, the disadvantages are becoming more obvious. Most firms were not operating economically, and those small companies failed to find their niche markets, resulting in a severe environment for survival.

In order to assess differences in material usage between manufacturer types, three categories, household furniture, office furniture, and other furniture, will be used in the following discussions.

3.1.7 Price Level

Of the 41 responding furniture companies, thirty companies reported that average prices for their furniture in 1996 were medium-to-high on a 7-point scale (1 = low, 7 = high). The mean price point for 41 responding firms was 4.4 with a standard deviation of 0.17. This indicates that product lines in these furniture mills were similar to each other, and the majority of furniture made was of mid-high price.

3.1.8 Exports

More than half of the responding furniture firms (23 out of 41) exported their products in 1996. The majority of them (21 out of 23) exported whole furniture pieces instead of furniture parts. This is probably due to the market considerations. As most of

products exported were classical solid wood furniture, and they were made by orders, whole furniture pieces were best meet the customers' needs at this point.

3.1.9 Wood Material Imports

Only 29% of the responding companies reported that they imported wood materials for their furniture manufacturing during the last five years. The amount of wood materials imported, in terms of percentage of total wood material used, ranged from 2.5% to 30%. Many companies thought that price and quality of materials were the most important factors affecting their decision to import. These factors were followed by delivery terms and species availability. U. S. hardwoods were perceived to be high priced by Chinese buyers. That is one of the reasons U. S. hardwoods have not been popular imports.

3.1.10 Business Structure Relationships

Fifty percent of the firms in our study were joint ventures or wholly foreign-owned companies. An examination of differences between these companies and domestic companies in terms of their price level, wood material imported, and market orientation (exports versus domestic retail) revealed differences only in markets. There were no statistical differences between these two groups on price level and wood material imported according to t-tests (p-value is 0.58 and 0.8, respectively). However, there were significant differences between joint venture or foreign-owned firms and domestic firms, in value of exports (p-value is 0.001). Joint ventures or foreign-owned companies exported more furniture (by percentage, 79% versus 32%) than domestic furniture manufacturers. This is consistent with the fact that exports accounted for roughly half of the foreign-related firms' sales.

Most joint ventures were with Asian partners, particularly Taiwan, and included Hong Kong, Singapore, and Japanese partners (Table 20). There were significant differences between these companies in the average amount of wood materials imported (p-value is 0.001). Joint ventures with Asian partners imported more wood materials

than other joint ventures. This is probably due to the dominance of Taiwanese companies which are highly dependent on imported material for production facilities in Taiwan.

3.1.11 Discussion

To learn about China's furniture industry, U. S. wood product manufacturers, need such information about Chinese furniture manufacturers as their capacities, products manufactured, locations, ownership, and the attitude towards imports and exports. This will be the basis for U. S. manufacturers to make their export decisions.

China's furniture manufacturing facilities were geographically diversified. This suggests that U. S. wood exporters may want to firstly focus on one or two regions as their target markets. Joint ventures in China were more open to the outside world than domestic companies. Most of them have imported wood materials and exported their furniture as well. These firms also got priority to use imported materials in their furniture manufacturing. U. S. wood product manufacturers may choose them as their major customers. Nevertheless, domestic firms are also eager to upgrade their products by using imported materials in order to be more competitive in domestic market.

The products that China's furniture manufacturers made were quite diversified. Very few firms produced single furniture category, which meant that a variety of wood materials were used in each firm. This can be an opportunity for not only hardwood producers, but wood-based panel manufacturers as well to export to China.

As most of China's furniture firms were small to medium sized. Presidents or plant managers were in charge of every aspect of their mills. They are decision makers for almost everything related to their firms. U. S. wood product exporters need to have personal contacts to establish business relationships. This is also indicative of current business culture in China.

Price and quality were the top two concerns when Chinese furniture firms import wood materials. U. S. hardwoods were perceived to have high quality by Chinese buyers. Therefore, U. S. hardwood producers may need to adjust their marketing mix, especially pricing, to earn more penetrations into Chinese market.

3.2 Wood Materials Used

3.2.1 Current Usage

Wood materials used by the responding companies varied both in volume and material types. In 1996, total wood materials used by responding firms were 138,495 cubic meters (see Table A1 in Appendix D for details). Figure 7 shows the percentage of each kind of wood material used by all responding firms. Hardwood lumber, hardwood dimension, particleboard, medium density fiberboard (MDF), and hardwood plywood are

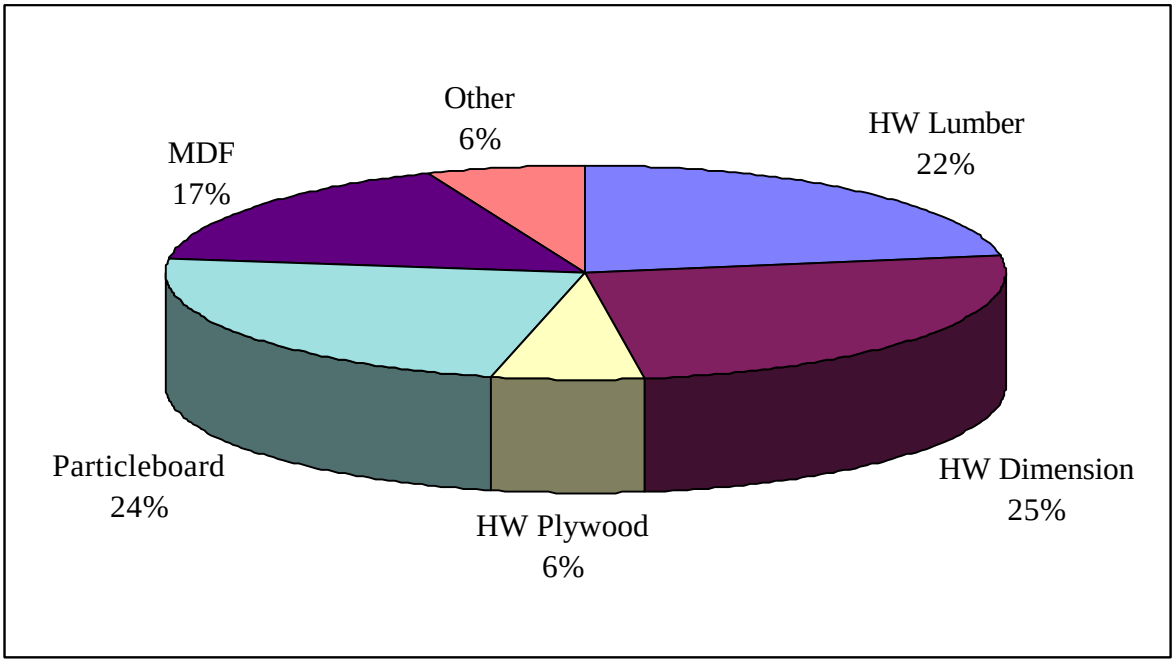

Figure 7. Total Wood Materials Used in 1996 (% by volume)

the major materials used by these firms. Other materials include hardwood veneer (1.1% of the volume), softwood lumber (2.8%), softwood dimension (0.4%), softwood plywood (1.3%), softwood veneer (0.2%), and Orient Strand Board (OSB) (0.2%). Sixty-eight percent of the responding firms used hardwood lumber in 1996 and will continue its use in 1999. Hardwood dimension was purchased by 49% of the responding firms. Fifty-eight percent of all responding companies used some hardwood plywood, and 37% used some hardwood veneer. Thirty-four percent of the respondents indicated that their companies used Medium Density Fiberboard (MDF) and particleboard as the major materials for furniture manufacturing (accounting for more than 50% of the total wood materials used). Six out of 41 companies reported that they did not use any lumber or dimension products. These companies primarily used particleboard and MDF to produce less expensive home, office or institutional furniture. Softwoods were perceived to be inferior in quality to hardwood products, so it was not surprising that softwood products were used to a lesser extent. Oriented Strand Board (OSB) was so new to Chinese furniture industry that only one firm used it in 1996. However, two companies claimed that they would use OSB for structural components in office furniture in 1999. This confirms the study done by Wolcott and others (1997), which showed optimistic estimates about China's OSB development in the near future.

In China's furniture industry, the extensive use of wood-based panel products, such as particleboard, MDF, and OSB (to a lesser extent), was encouraged by the government. It is then believed that these panel products would be good substitutes for hardwood lumber and other solid wood products. In addition, China's forest products industry has been trying to be as much self-sufficient as possible (Wolcott et. Al 1997). Therefore, these panel products will also be considered as a reasonable substitute of some imported hardwood lumber.

3.2.2 Wood Material Use by Firm Size

It was believed that differences in firm size could cause differences in material usage. Sampled firms were tested for differences in their mean percentages of wood

materials used according to their firm size. Significant differences were found among three firm size groups' mean percentages of some types of materials used. Large firms (those with annual sales of 50 million Yuan or more) used more particleboard (21%) and MDF (22%) than did smaller companies (p-value is 0.04 and 0.05, respectively). Small firms (those with annual sales of less than 10 million Yuan) used significantly more hardwood lumber (43%) than did large firms (24%) (P-value is 0.05) (see and Table 21 and Figure 8). Small firms were also the largest users of hardwood veneer (6.3%) (p-

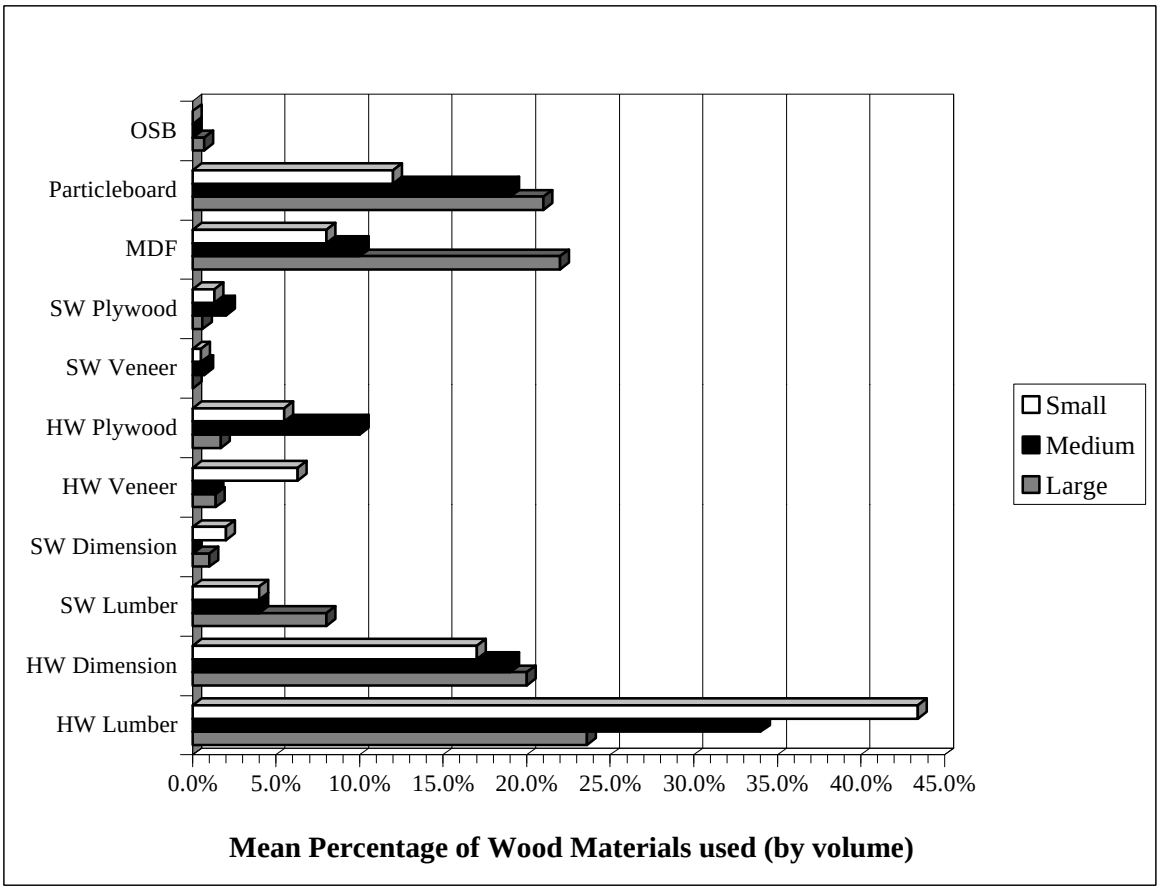

Figure 8. Wood Material Use by Firm Size

Note: Some responding firms failed to separate dimension and lumber. When this is the case, a judgment was made by the researcher. Therefore, it might be more appropriate to consider lumber and dimension together when looking at the differences among several categories.

value is 0.03). Medium sized firms (those with annual sales between 10 million to 50 million Yuan) rated in the middle on most of the material categories.

Large firms have been equipped with modern technologies. They preferred to produce those products using panels, which can easily facilitate mass production and reach the economic scale. Small firms, on the other hand, were lacking in equipment associated with high technology. Most of these firms were considered to be handicraft makers. Therefore, small firms tended to produce classical, solid wood furniture, which use more hardwood lumber instead of panels.

3.2.3 Wood Material Use by Geographic Location

Different regions have different cultures, climates, and geography that may cause furniture firms to use different wood raw materials. Comparing material volumes across geographic regions, significant differences became apparent. The South was the largest user of particleboard (26%), hardwood plywood (11%) (p–value is 0.04 and 0.03, respectively) (see Figure 9). This is probably due to the dominance of particleboard production capacity and more access to imported hardwood plywood in this region. Hardwood lumber was more heavily used in the North (46%) (p-value is 0.05). This is consistent with the allocation of the national hardwood capacity. In other words, the North, especially the Northeast, has traditionally been the “center” for hardwood production. This has been geographical advantage for the firms in this region to use hardwood lumber as a major raw material (Table 22).

3.2.4 Wood Material Use by Manufacturer Type

It was assumed that differences in products manufactured could cause differences in wood material use. Responding firms were tested for differences in their mean percentages of wood material usage according to their major products produced. The firms were classified into three categories: household furniture manufacturers, office furniture manufacturers, and other furniture manufacturers. Within the three furniture categories, wood household furniture accounted for some 60 percent of total wood

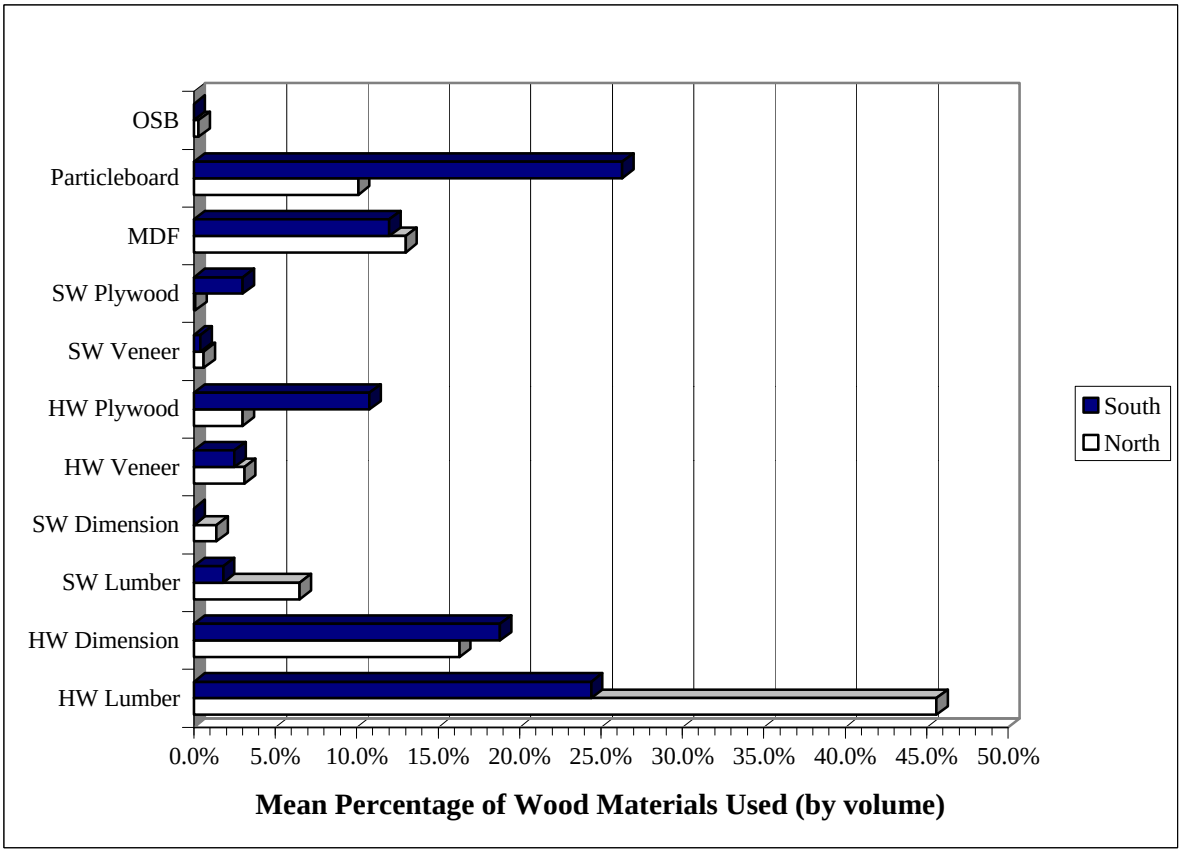

Figure 9. Wood Material Use by Region

Note: Some responding firms failed to separate dimension and lumber. When this is the case, a judgment was made by the researcher. Therefore, it might be more appropriate to consider lumber and dimension together when looking at the differences among several categories.

material use. MDF, particleboard, and hardwood lumber collectively accounted for more than 70 percent of total wood materials used by household furniture manufacturers (see Figure 10 and Table 23).

Office furniture manufacturers used significantly more hardwood dimension products (28%) than others. This may partially be due to the easy access to this material. Another explanation is that China's office furniture were purchased and used by public agencies rather than individuals. Since industrial or government buyers did not pay with their own money, high priced solid wood furniture was a priority choice. This is indicative of Chinese traditional ownership system. Nevertheless, as the economy

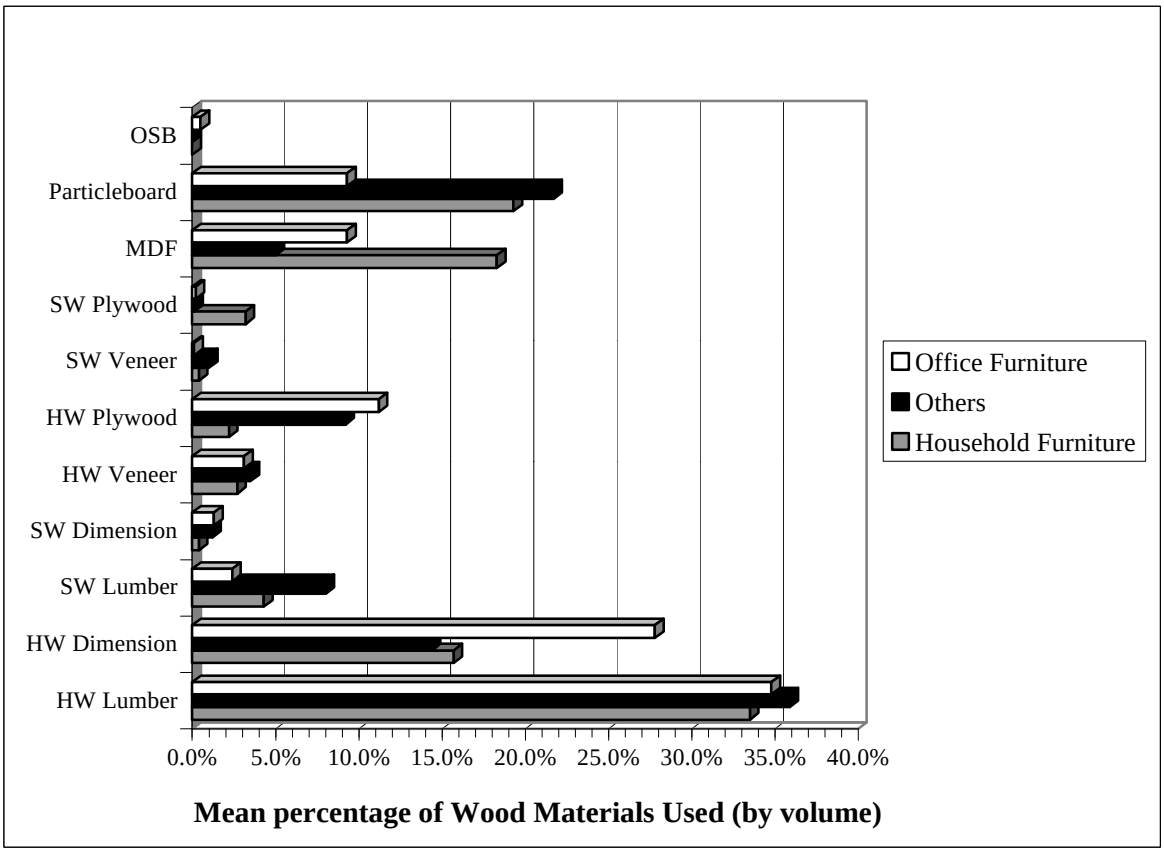

Figure 10. Wood Material Use by Manufacturer Type

Note: Some responding firms failed to separate dimension and lumber. When this is the case, a judgment was made by the researcher. Therefore, it might be more appropriate to consider lumber and dimension together when looking at the differences among several categories.

becomes more market oriented, this situation will change.

It is also worthwhile to mention that some responding firms failed to separate dimension and lumber. When this is the case, a judgment was made by the researcher. Therefore, it might be more appropriate to consider lumber and dimension together when looking at the differences among several categories.

3.2.5 Interviews and Insights

To better understand the driving forces behind current wood use in wood furniture manufacturing, 26 interviews were conducted in addition to the mail survey. The interviewees are those persons in charge of wood materials purchasing in their respective

companies. They were divided into two segments based on their companies' geographic location, the North and the South (see Table 24).

In the North, interviewed companies preferred solid wood to panel products. These companies are located in close proximity to domestic hardwood resources and mills. Interviewees in this region perceived that solid wood furniture looks authentic and durable, and the furniture is well accepted by most high-income Chinese consumers. In the Southern regions, interviewees used more panel products (plywood and particleboard). The Southern region does not have the same access to domestic lumber supplies, resulting in an increase in the amount of panel production capacity in the region. For example, between 1990 and 1995, total particleboard and MDF production increased more than eight fold (MOF 1996b). Most furniture makers used more panel products than solid wood products in their furniture manufacturing because of limited domestic supplies, lack of access to lumber imports, lack of financial resources to purchase lumber, and the development of China's panels industry increasing the production of panel products resulting in a lower price for these products. Half of the 16 companies in the South perceived the market demand for their products to be promising but highly competitive. Overall, there appears to be a large domestic market potential for both traditional solid wood furniture and furniture made using panel products. All the interviewees stressed that quality and price of furniture were the customers top two concerns and would determine the success of furniture manufacturers. Some small companies were facing difficulties in marketing their furniture. This has, in part, been caused by their poor quality products and the lack of cost-effectiveness in both manufacturing and marketing processes.

3.2.6 Perceptions of Government Policies

The furniture industry in China is not given consideration in specific policies pertaining to wood use and availability for furniture manufacturing. Nevertheless, policies related to forest resources and primary forest products indirectly affect wood use in furniture making. We attempted to address policy issues by asking respondents which

areas the government should focus its efforts to ensure wood supplies to the furniture industry would continue to be plentiful and cost effective. Policies related to timber production and management were rated the highest among five policy areas (see Table 25). In other words, material supply and related issues were the furniture manufacturers top concerns.

When comparing across the regions, the North was the most concerned about this policy area. As this region, particularly the Northeast, accounted for the most of national hardwood production, furniture manufacturing in the region has been heavily dependent on local resources and impacted by government policies.

Among the three types of furniture makers, office furniture manufacturers were the least worried about all policy areas. One explanation can be that office furniture manufacturing used less domestic hardwood lumber. Therefore, they were more independent of domestic timber production. For this reason, however, these firms may be more sensitive to the policies related to wood product imports.

Comparing the mean importance scores among different firm sizes, large firms were more aware of government policies. Large firms have been playing an important role in the industry. Therefore, the government has an interest in gaining more control and placing regulations over them. This fact shows that large firms have been followers of government policies, and could have paid more attention to those policies as well.

3.2.7 Discussion

U. S. hardwood producers need to know hardwood needs of China's furniture manufacturers so they can better compete in this market. There were some differences between two geographic groups mean percentages of wood materials used. These differences were due to the different economic development level and resource availability across regions. The South has less available hardwood lumber resources, while it has more market oriented economy. These two factors suggest that U. S. hardwood exporters may easily increase their market share in the region.

No obvious patterns show the differences in wood materials used by different manufacturer type, except for differences in hardwood dimension used. Since hardwood lumber and dimension, hardwood plywood, particleboard, and MDF were heavily used by all furniture manufacturers, it may not be necessary for U. S. exporters to get detailed knowledge about furniture types produced by their potential customers when they try to build customer bases in China.

Firm size is an important factor when U. S. wood exporters want to establish or enlarge their market share in China. Smaller firms were large users of solid hardwood products, while large firms used more wood-based panels. So the target customers for U. S. hardwood exporters should be small-to-medium sized firms.

U. S. wood exporters need to keep in mind that government policies affected day to day operations of China's furniture industry to some extent. Large firms were more controlled by the government, therefore, policy changes have the most impact on them. If Chinese government encourage hardwood imports, large firms would benefit from this policy and tend to use more imported products. On the other hand, smaller firms might be more independent of government controls. Their wood imports needs would be highly dependent upon their access and availability of financial resources.

3.3 Hardwood Lumber and/or Dimension Use[4]

3.3.1 Species Used

Respondents were asked to give the percentages of each hardwood species they used in 1996. Table 26 shows the mean percentages of hardwood lumber and/or dimension species used by the companies sampled. Domestic species grown in temperate regions were the dominant types used by all responding firms. More than 10 Chinese species were used by these firms. Among them, Chinese oak, ash, and birch were the

[4] Lumber and dimension are totaled here and in the next section, because many respondents did not separate dimension and lumber in their responses.

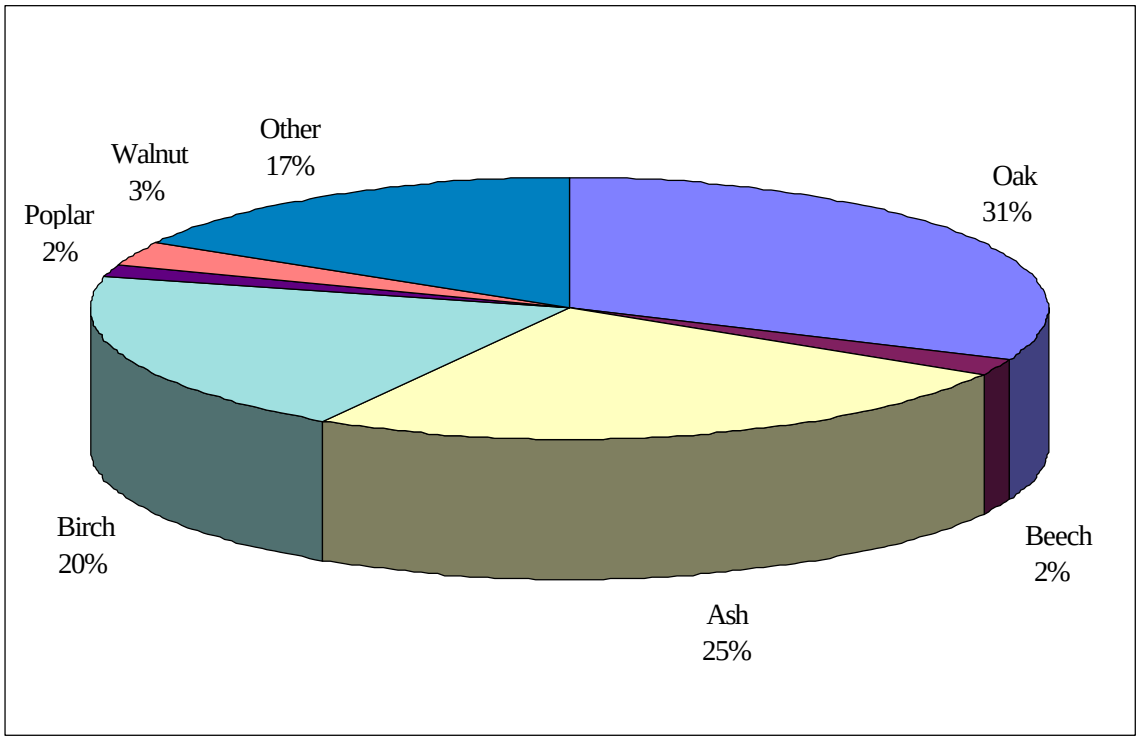

Figure 11. Major Chinese Species Used by Responding Firms in 1996 (% by volume)

major species used in 1996 (see Figure 11), followed distantly by Chinese walnut, poplar, and beech. These species collectively accounted for 83% of all domestic species used. Other species include Chinese alder, elm, maple, paulownia, and some tropical species, such as rosewood and mahogany.

Tropical species imported from Southeast Asia, particularly Indonesia and Malaysia, accounted for the majority of the imported hardwood lumber. These species include rubberwood, rosewood, Teak, padank, and mahogany. However, since Southeast Asian countries have set control over their primary wood products exports due to the forest resources consideration, the use of imported tropical hardwood lumber by China's furniture industry should be adjusted accordingly. The severe economic situation in the region further supports this belief. U. S. red oak, cherry, and beech were imported by five companies in 1996. Although very small volumes were imported, U. S. species were perceived to be high quality and would be good substitution for domestic species. Interviewees also reported they prefer temperate over tropical hardwood species because

they are predominantly light colored, and have consistent and stable wood properties associated with slow growth, fine grain, and the uniform of colors.

Table 26 also shows hardwood lumber species use by different firm size, region, and manufacturing type. The majority of the hardwood lumber species used by large firms were domestic temperate (92% of the volume). Smaller companies used more tropical species (14%), such as rosewood and mahogany, than did the large firms. This is most likely because the majority of the classical solid wood furniture was produced by smaller companies.

There were significant differences in species use between the Northern and the Southern regions. Furniture companies in the North used much more domestic temperate species (92%) than their counterparts in the South (62%) (p-value is 0.004). In the South, where more tropical species grow, furniture firms used more domestic tropical species (20%) than did companies in the North (4%) (p-value is 0.02). Furthermore, those firms in the South are in closer proximity to Southeast Asian hardwood suppliers, such as Indonesia and Malaysia, which give them comparative advantage in importing tropical hardwood products (13%).

The difference in species use among the three furniture categories was significant in their tropical species used. Household furniture used significantly more imported tropical species (13%) (p-value is 0.02). This is probably due to the fact that the high priced solid wood furniture, such as rosewood furniture for living rooms and bedrooms, are manufactured primarily from these species. On the other hand, office furniture and other furniture categories used more domestic tropical hardwoods (21% and 12%, respectively) than household furniture manufacturers (3%) (p-value is 0.03). This suggests that tropical hardwoods (both imported and domestic) were collectively used to a similar extent by all furniture categories.

3.3.2 Hardwood Lumber Type

On a volume basis, the hardwood lumber purchased in 1996 was evenly split between green and kiln dried (Table 27). Significant differences were found among three

firm size groups' mean percentages of hardwood lumber type used (p-value is 0.04). Large firms purchased significantly more green lumber (67%) than small and medium sized firms (47% and 48%, respectively). There were no significant differences in hardwood lumber type used between the two regions or among the three furniture categories.

3.3.3 Discussion of Hardwood Lumber Use

If a U. S. hardwood lumber manufacturer wishes to expand its hardwood lumber market in China, it will need to know decision makers preferences of hardwood lumber species. It was determined that the majority of hardwood species used by China's furniture manufacturers were domestic temperate hardwoods. Nevertheless, U. S. hardwoods could be good substitutes for them. More extensive promotion by U. S. hardwood producers will be needed to increase the awareness of U. S. hardwood lumber.

U. S. hardwood lumber manufacturers should also know that significant differences were found in hardwood lumber used by species among different groups of firm size, and firm location. These differences were highly due to the differences in access to wood materials. No significant differences were found among three manufacturer groups mean percentages of temperate species used. Therefore, different manufacturer types may not need to be emphasized in hardwood lumber exporters marketing strategy.

Both green and dry lumber were purchased by Chinese furniture manufacturers. U. S. hardwood lumber producers may export their products in either condition. However, special considerations might be needed when they deal with furniture firms in different size. Large firms preferred to purchase green lumber because they owned drying facilities. Smaller firms, on the other hand, bought more dried lumber due to the lack of drying facilities.

3.4 Hardwood Lumber and/or Dimension Purchases

3.4.1 Sources – Supply Channels

Direct dealings with sawmills and wholesalers provided the largest proportion (over 77% of the volume) of responding furniture manufacturers lumber and/or dimension needs (Table 28). Retailers were also key providers of furniture manufacturing materials (13.6%). Importing, which includes importing directly and importing through trade companies, was used only minimally (2%). Other sources of wood materials mentioned by respondents include forest farms, state owned forest bureaus (mainly for purchasing logs), and individual merchants.

Significant differences were found among different sized firms for the mean percentages of lumber purchasing channels used. The dominant supply channel used by large firms was direct purchasing from sawmills (60% of the volume) (p-value is 0.03). Wholesalers were the primary source of lumber and dimension for medium and small sized firms (42% and 50% of the volume, respectively) (p-value is 0.05).

There were significant differences among three manufacturer types for the mean percentages of lumber purchasing sources used. Household furniture manufacturers purchased most of their lumber directly from sawmills with a total of 56% of the volume (p-value is 0.04). Other furniture firms, including upholstered furniture makers, cabinet manufacturers, commercial furniture producers, and outdoor furniture firms, were heavily dependent upon wholesalers with a total of 63% of the volume (p-value is 0.02).

Significant differences were found between firms in different regions for the mean percentages of lumber purchasing channels used. Firms in the North, where most sawmills were located, purchased most lumber and/or dimension from sawmills (48%) (p-value is 0.03), while companies in the South purchased their materials generally through wholesalers (50%) (p-value is 0.003).

3.4.2 Discussion of Hardwood Lumber Purchasing Sources

U.S. hardwood lumber manufacturers need to know the primary supply channels used by their potential Chinese buyers so they can adjust their promotion strategy accordingly. Large companies with their own sawmills, purchased logs directly from forest farms. They may prefer to import logs instead of lumber. Most interviewees also indicated that long-term relationships with lumber and/or dimension suppliers were important and helped to ensure the sustainable supply of wood materials.

Wholesalers include both national and provincial wood trading centers, and various provincial timber companies. Because wholesalers are important to small and medium size firms, they could benefit from promotional information and education about U. S. hardwood. The differences of channel selections between these two regions may also be due to the different availability of local resources. As mentioned earlier, the North has easier access to local production bases, while many wholesalers have emerged in the South to work on the distribution of wood materials produced both in the North and in the South.

3.4.3 Perception of Hardwood Lumber and/or Dimension Purchases

Respondents were asked to rank the following ten attributes of hardwood lumber and/or dimension in terms of importance: *color, uniform of color, ease of staining, ease of machining, moisture content, straightness of grain, grain direction, slow growth/tight grain, price, and whether or not the lumber was from sustainable managed forests (Growth > Harvest).* Price was ranked the most important when purchasing hardwood lumber and/or dimension, followed distantly by the color and straightness of the grain, which is directly related to species (see Table 29). This result is consistent with that price and quality of wood materials were the most important factors for the Chinese furniture firms importing decisions. It supports that U. S. hardwood exporters need to change pricing to enter or enlarge market share into Chinese market.

It was assumed that different firm groups in terms of firm size, firm location, and manufacturer type would have different perceptions on the attributes of hardwood

lumber. This was tested using percentages of the highest scores received by each attribute. Some differences become apparent among the three firm sizes. Since small companies were most likely to lack in strong financial sources and reserves, these firms were the most price-sensitive. They gave the highest rate on the attribute of price. Most respondents reported that they did not care about whether the lumber was from sustainable forests or not, and they gave the lowest ranking to the sustainability issue among all ten attributes. This result is consistent with the fact that the Chinese public is not aware of sustainable forest development issues. However, since large firms had more direct contacts and concerns with forest farms than smaller firms, they showed more awareness of sustainable forest issues.

When comparing across regions, companies in the North, which are traditionally closed to most of domestic timer resources, were more concerned about sustainable forest issues. Concerning the importance ranking of ten attributes of hardwood lumber/dimension purchases, there were no definite patterns showing differences among three types of furniture producers.

3.5 Future Wood Use

About half the responding firms reported that their material demand would increase 5 to 10% annually through 1999. This was based upon their optimistic perceptions about the wood furniture market in the near future. However, some small companies were unsure how large their market segments would be, which led to conservative estimation about their wood material uses in 1999. It is worthwhile to note that the increases predicted in most material categories were probably a result of predicted increase in furniture production, rather than in changes to the volume of materials used in a piece of furniture. Also, changes in wood material use can result from the substitution of one wood-based material for another. Percentages of wood material used in 1999 are shown in Figure 12. By comparing it with Figure 7 which shows wood material used in 1996, we can conclude that there are no significant changes for the

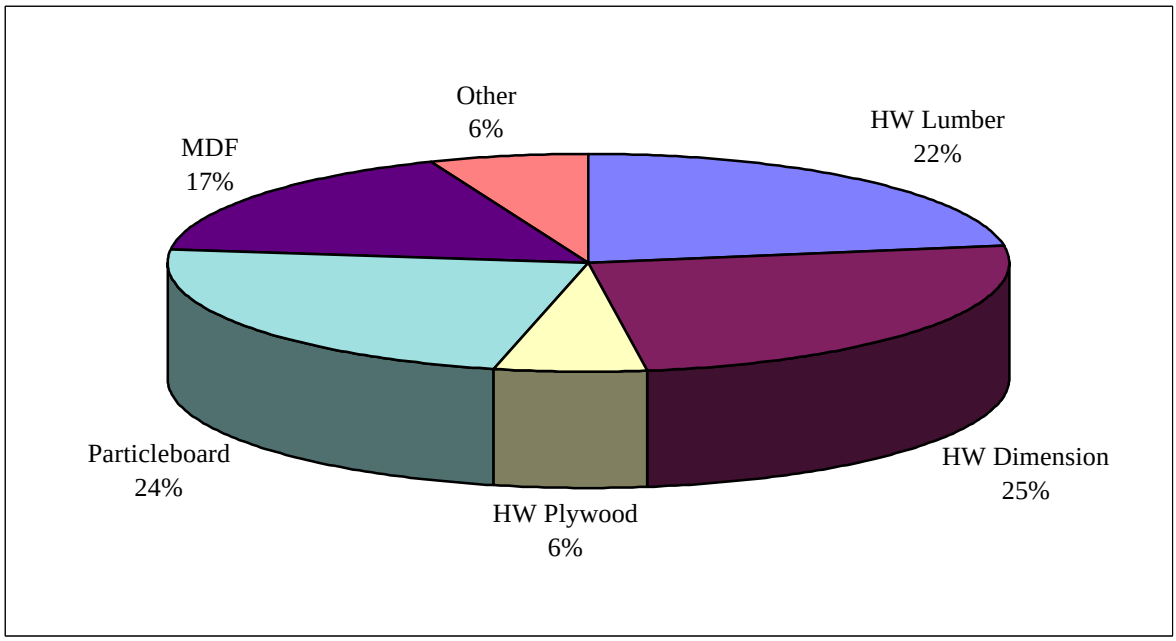

Figure 12. Total Wood Material Use in 1999 (% by volume)

proportion of each material type. Nevertheless, as mentioned earlier, it shows a slight increase in the use of OSB (form 0.2% to 0.8%). Table A2 in Appendix D provides additional details. Total wood material usage will amount to 177,000 cubic meters in 1999.

Figure 13 indicates the predicted hardwood lumber species use in 1999. Chinese temperate woods will still be the major hardwood species used by Chinese furniture manufacturers, although its share decreases. While the share of tropical species imported from Southeast shows decreasing, temperate species imported from U. S. increase. This further confirms that current situation and forest policies in Southeast Asia will have some impacts on China's imports. It also indicates that more Chinese manufacturers are aware of and interested in U. S. hardwoods.

Customers with higher incomes prefer solid or veneer laminated hardwood furniture (especially for household furniture) over furniture made of wood-based panels. Since the numbers of high-income customers have been increasing greatly in recent

years, the demand for hardwood lumber, dimension, and veneer will continue to increase in

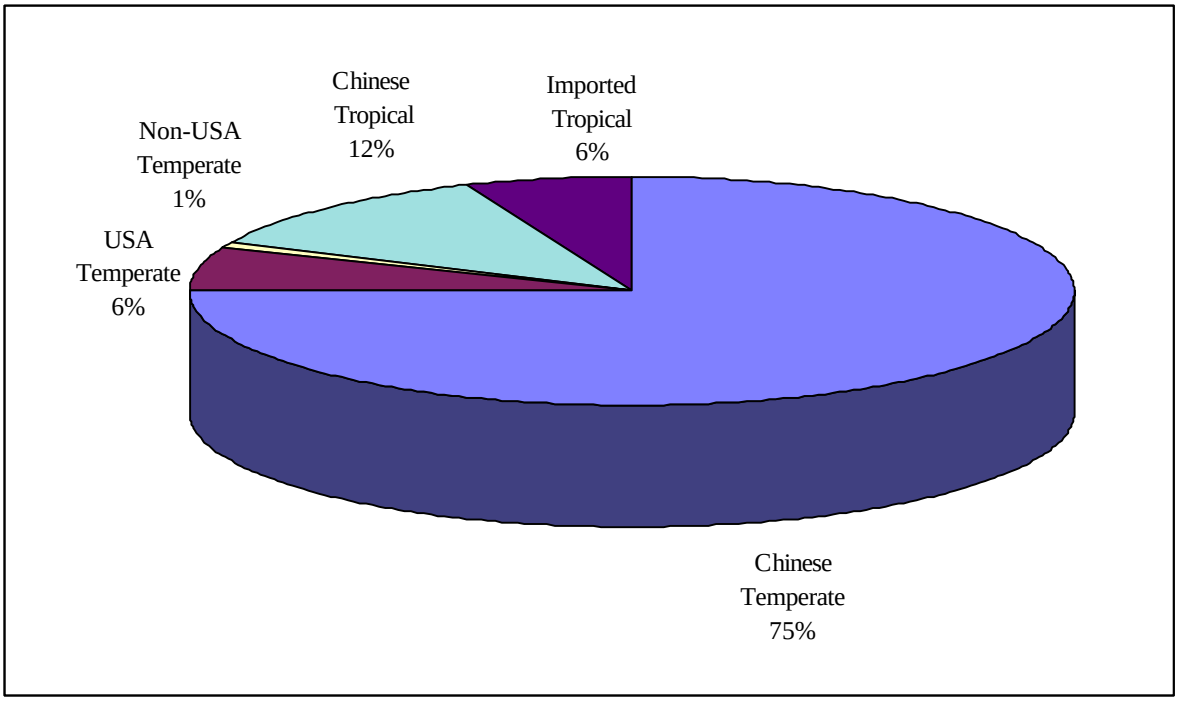

Figure 13. Predicted Hardwood Lumber Species Use in 1999
(% of total hardwood lumber volume used)

furniture manufacturing. Most interviewees thought that wood veneer would be used more because of consumer demand for authentic looking furniture, and limited domestic solid wood supplies. However, as technology develops, paper printed with wood grain will be laminated over particleboard and MDF on lower priced furniture due to lower cost than wood veneer.

Imported high quality hardwood lumber, dimension, and wood veneer will be needed for upper-ended solid furniture manufacturing. Panel products, such as MDF and particleboard, will retain their dominant positions meeting the needs of consumers with low to middle incomes.

3.6 Perception of China's Wood Furniture Market

Interviewees were asked to give their perceptions on the China's wood furniture market segment. According to interviewees, the wood furniture market in China was prosperous in 1996, and will continue to have great potential in the near future. Nineteen interviewees indicated that there is a stronger market future for solid wood furniture with high quality as a result of increasing numbers of newly married couples, housing starts, and consumers with higher incomes. Furniture made from plastic and glass components is emerging with new technologies, but its scale will not be comparable to the wood furniture industry in the near future. Nevertheless, these two types of furniture are replacing wood furniture in such applications as dinner tables and book shelves. Other competing types of furniture include metal furniture, bamboo furniture, and Rattan furniture. The consumption for these furniture types collectively accounts for less than 20% annually (Wu and Wang 1997). Therefore, wood furniture is and will continue to be dominant to meet the domestic demand. If we take exports of China's furniture into consideration, the demand for China's wood furniture would be even higher.

Competitions in China's wood furniture market continue to be much more extensive as more high quality furniture has recently been imported. The further reduction of China's tariffs on importing furniture, which was effective on October 1, 1997 (Wang 1997), will increase the furniture imports. This will bring about a highly competitive furniture market in China.

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Tables

Table 17. Number of Responses by Region and Firm Size

Region	Number of Responses		
	Large Firms	Small/Medium Firms	Total
North Central	1	7	8
Northeast	2	10	12
East Central	0	6	6
South	1	12	13
West	0	2	2
All Regions	4	37	41

Table 18. Total Sales of Responding Firms in 1996 (in 10,000 Yuan)

Region	Large Firms	Small/Medium Firms	Total
North Central	48,000	8,531	56,531
South	12,000	33,482	45,482
East Central	-	8,916	8,916
Northeast	33,733	23,558	57,291
West	-	2,453	2,453
Total	93,733	76,940	170,673

Table 19. Average Employment of Responding Firms in 1996

Region	Number of Employees	
	Large Firms	Small/Medium Firms
North Central	3,900	224
South	800	286
East Central	-	320
Northeast	1,103	232
West	-	399
All Regions	1,451	271

Table 20. Wood Material Imports by Foreign Joint Ventures

Foreign Investment Sources	Wood Material Imported	Number of Firms
Asian	13.3%	13
U. S.	5.0%	5
New Zealand	2.5%	2
Total		20

Table 21. Mean Percentages of Wood Materials Used by Firm Size (By volume)

Firm Size	Large	Medium	Small	P-value Among Groups*
HW Lumber	23.0%	34.0%	43.0%	0.05
HW Dimension	20.0%	19.0%	17.0%	0.90
SW Lumber	2.0%	0.8%	0.6%	0.50
SW Dimension	0.6%	0.0%	2.0%	0.16
HW Veneer	1.4%	1.3%	6.3%	0.03
HW Plywood	2.0%	10.0%	6.0%	0.03
SW Veneer	0.0%	0.7%	0.5%	0.70
SW Plywood	0.6%	2.0%	1.0%	0.80
MDF	22.0%	10.0%	8.0%	0.04
Particleboard	21.0%	19.0%	12.0%	0.05
OSB	0.7%	0.0%	0.0%	0.17

***** P-value was obtained by using single-factor ANOVA procedure.
Note: Some responding firms failed to separate dimension and lumber. When this is the case, a judgment was made by the researcher. Therefore, it might be more appropriate to consider lumber and dimension together when looking at the differences among several categories.

Table 22. Mean Percentages of Wood Materials Used by Region (By volume)

Region	North	South	P-value Among Groups*
HW Lumber	45.6%	24.4%	0.03
HW Dimension	16.3%	18.8%	0.75
SW Lumber	6.5%	1.8%	0.08
SW Dimension	1.4%	-	0.11
HW Veneer	3.1%	2.5%	0.73
HW Plywood	3.0%	10.8%	0.02
SW Veneer	0.6%	0.4%	0.72
SW Plywood	0.1%	3.0%	0.13
MDF	13.0%	12.0%	0.80
Particleboard	10.1%	26.3%	0.04
OSB	0.3%	-	0.33

* P-value was obtained by running t-test assuming unequal variances for two-sample.
Note: Some responding firms failed to separate dimension and lumber. When this is the case, a judgment was made by the researcher. Therefore, it might be more appropriate to consider lumber and dimension together when looking at the differences among several categories.

Table 23. Mean Percentages of Wood Materials Used by Manufacturer Type (By volume)

	Household Furniture	Office Furniture	Other Furniture	P-value Among Groups*
HW Lumber	33.5%	35.9%	34.8%	0.78
HW Dimension	15.7%	14.5%	27.7%	0.05
SW Lumber	4.3%	8.0%	2.4%	0.68
SW Dimension	0.4%	1.2%	1.3%	0.86
HW Veneer	2.7%	3.5%	3.1%	0.90
HW Plywood	2.2%	9.2%	11.2%	0.04
SW Veneer	0.4%	1.0%	0.1%	0.45
SW Plywood	3.2%	0.1%	0.2%	0.22
MDF	18.3%	5.0%	9.3%	0.08
Particleboard	19.3%	21.7%	9.3%	0.15
OSB	-	-	0.5%	0.26

***** P-value was obtained by using single-factor ANOVA procedure.
Note: Some responding firms failed to separate dimension and lumber. When this is the case, a judgment was made by the researcher. Therefore, it might be more appropriate to consider lumber and dimension together when looking at the differences among several categories.

Table 24. Geographic Location of Furniture Firms Interviewed

	Total	Number of JV/Foreign Owned Firms	Number of Wholly Domestic Firms
North	10	5	5
South	16	8	8
Total	26	13	13

Table 25. Mean Importance Scores on Government Policies[1]

Mean Scores	Timber Production & Management	Transportation	Infrastructure	Monetary Policy	Marketing Research
Total (n=35)[2]	5.5	4.5	4.0	4.7	4.5
By Region					
North (n=20)	5.9	4.9	4.4	5.1	4.7
South (n=15)	4.1	4.1	3.7	4.2	4.3
P-value Among Groups*	0.04	0.24	.22	.11	0.46
By Manufacturer Type					
Household Furniture (n=14)	5.8	4.4	4.9	5.1	4.8
Office Furniture (n=9)	4.6	3.7	2.9	4.4	4.1
Other Furniture (n=12)	5.8	5.2	3.8	4.3	4.3
P-value Among Groups*	0.26	0.28	0.06	0.54	0.06
By Firm Size					
Large Firms (n=8)	5.7	5.6	5.1	4.4	5.1
Medium Firms (n=14)	5.1	3.9	3.5	4.4	4.2
Small Firms (n=13)	5.8	4.5	4.1	5.1	4.5
P-value Among Groups*	0.05	0.17	0.15	0.54	0.52

[1] Seven point likert scale, 1=to be perceived not important at all, 7= to be perceived as extremely important policy areas.
***** P-value was obtained by using single-factor ANOVA procedure.
[2] Of 41 responding firms, six did not use hardwood lumber/dimension.

Table 26. Hardwood Lumber/Dimension Species Used

% by volume	Chinese Temperate	Chinese Tropical	US Temperate	Non-US Temperate	Imported Tropical
Total (n=35)[1]	79.0	10.8	2.4	0.7	7.1
By Region					
North (n=20)	91.8	4.3	1.3	0.1	2.7
South (n=15)	61.9	19.6	3.8	1.7	13.0
P-value Among Groups*	0.004	0.02	0.28	0.27	0.09
By Firm Size					
Large Firms (n=8)	73.1	18.1	3.3	0.1	5.4
Medium Firms (n=14)	81.4	11.7	4.1	0.0	2.9
Small Firms (n=13)	80.0	5.4	0.0	1.9	12.7
P-value Among Groups*	0.05	0.05	0.16	0.48	0.23
By Manufacturer Type					
Household Furniture (n=14)	81.3	3.2	1.2	1.8	12.5
Office Furniture (n=9)	75.0	20.6	3.9	0.0	0.6
Other Furniture (n=12)	79.3	12.4	2.6	0.1	5.7
P-value Among Groups*	0.16	0.02	0.50	0.06	0.03

***** P-value was obtained by using single-factor ANOVA procedure.
[1] Of 41 responding firms, six did not use hardwood lumber/dimension.

Table 27. Hardwood Lumber Types Used in 1996 (% by volume)

Type	Green	Kiln Dried
Total (n=35)[1]	51.8	48.2
By Firm Size		
Large Firms (n=8)	67.3	32.8
Medium Firms (n=14)	47.9	52.1
Small Firms (n=13)	46.5	53.5
P-value Among Groups*	0.04	0.04
By Region		
North (n=20)	50.2	49.8
South (n=15)	54.0	46.0
P-value Among Groups*	0.8	0.8
By Manufacturer Type		
Household Furniture (n=14)	43.2	56.8
Office Furniture (n=9)	65.6	34.4
Other Furniture (n=12)	51.5	48.5
P-value Among Groups*	0.5	0.5

***** P-value was obtained by using single-factor ANOVA procedure.
[1] Of 41 responding firms, six did not use hardwood lumber/dimension.

Table 28. Hardwood Lumber Purchasing Sources in 1996

Sources (% by volume)	Direct From Sawmills	From Wholesalers	From Retailers	Import	Other Sources
Total (n=35)[1]	37.3	38.5	13.6	2.0	8.6
By Region					
North (n=20)	48.3	21.0	15.4	3.0	12.5
South (n=15)	22.6	62.0	11.3	0.7	3.3
P-value Among Groups*	0.03	0.003	0.67	0.35	0.29
By Manufacturer Type					
Household Furniture (n=14)	56.4	17.9	16.4	0.7	8.6
Office Furniture (n=9)	28.3	37.8	18.4	1.0	14.4
Other Furniture (n=12)	21.7	63.2	6.8	4.2	4.2
P-value Among Groups*	0.05	0.02	0.57	0.42	0.66
By Firms Size					
Large Firms (n=8)	60	14.8	0.3	6.3	18.8
Medium Firms (n=14)	41.8	41.8	12.9	1.4	2.1
Small Firms (n=13)	18.5	49.6	22.7	0.0	9.2
P-value Among Groups*	0.03	0.17	0.19	0.14	0.33

***** P-value was obtained by using single-factor ANOVA procedure.
[1] Of 41 responding firms, six did not use hardwood lumber/dimension.

Table 29. Importance of Hardwood Lumber/Dimension Attributes [1]

	Color	Uniformity of Color	Ease of Machining	Ease of Staining	Moisture Content	Straight ness	Slow Growth	Grain Direction	Price	Sustainable Forests
Total (n=35)[2]	9% (6)	3% (7)	0% (6)	9%(7)	6% (5)	9% (2)	3% (3)	3% (8)	57% (1)	3% (10)
By Firm Size										
Large Firms (n=8)	3% (2)	- (7)	- (6)	6% (5)	- (9)	3% (1)	- (8)	3% (8)	6% (1)	3% (10)
Medium Firms (n=14)	3% (6)	3% (7)	- (3)	3% (7)	3% (4)	6% (5)	3% (3)	- (9)	17% (1)	- (10)
Small Firms (n=13)	6% (7)	- (2)	- (3)	- (7)	3% (5)	- (2)	- (4)	- (8)	29% (1)	- (10)
By Region										
North (n=20)	9% (6)	- (7)	- (3)	9% (7)	- (5)	6% (6)	- (3)	- (8)	31% (1)	3% (10)
South (n=15)	- (2)	3% (4)	- (6)	- (7)	6% (9)	3% (8)	3% (3)	3% (9)	26% (1)	- (10)
By Manufacturer Type										
Household Furniture (n=14)	3% (6)	- (7)	- (6)	3% (7)	3% (4)	3% (5)	- (8)	- (6)	29% (1)	- (10)
Office Furniture (n=9)	6% (7)	- (2)	- (3)	3% (8)	- (5)	3% (9)	- (6)	3% (8)	9% (1)	3% (10)
Other Furniture (n=12)	- (2)	3% (7)	- (6)	3% (7)	3% (3)	3% (1)	3% (3)	- (9)	20% (1)	- (10)

[1] Respondents were asked to rank each of ten attributes of hardwood lumber and/or dimension from 1 to 10, 1 = most important in lumber purchasing decision. The number in each column represents the percentage of the firms designating an attribute score as one(1). e.g., 9% under the attribute *color* means that 9% (3 out of 35) firms considered the color of lumber as the most important factor.
The number in each column with ( ) is the mode of rankings for each attribute.
[2] Of 41 responding firms, six did not use hardwood lumber/dimension.

CHAPTER FOUR: CONCLUSIONS AND RECOMMENDATIONS

4.1 Conclusions

This study was designed to help gather information about China's furniture industry, its current and future development, and wood raw material requirements. The information presented in this paper reflects the perceptions of China's furniture manufacturers. Thus, it offers some important insights into China's furniture industry.

China has huge market potential with a population of 1.2 billion. There is a growing demand for many types of furniture to meet consumers needs at various income levels. Even with the recent economic crisis in Asia, the opportunities for wood product suppliers to enter or enlarge their markets in China are great. However, as logging in natural forests is strictly controlled by the government, unemployment in the regions where most state-owned enterprises are located becomes a big concern. Thus, the affordability of higher priced furniture for people in these areas might be low, and furniture sales may not increase dramatically in the near future.

In total, the sampled furniture firms used 138,495 cubic meters of wood materials. The survey indicated that this figure was expected to increase to 177,000 cubic meters in 1999. The increase stems from the increase in furniture production and preferences of Chinese furniture consumers. Assuming the wood material usage is in proportion to the firms sales level, total wood material used by China's furniture industry would be about 4.6 million cubic meters in 1996, and 5.9 million cubic meters in 1999. If the distribution of various types of materials used by the sampled firms hold for the entire industry, in 1999, China's furniture industry will need some 1.3 million cubic meters hardwood lumber, 1.5 million cubic meters hardwood dimension, 1.4 million cubic meters particleboard, 0.9 million cubic meters MDF, 0.4 million cubic meters hardwood plywood, and some other materials. These are comparable to the estimates made by the Ministry and industry experts (MLI 1997, Li 1996, and MOF 1993).

Of all materials used, hardwood products (hardwood lumber, hardwood dimension, hardwood veneer, and hardwood plywood) accounted for some 55 percent. Hardwood lumber, hardwood dimension, particleboard, MDF, and hardwood plywood were the major wood materials used by Chinese furniture manufacturers in 1996. Based on resources availability and customers preferences, there is reason to believe that this trend might not change very much in the near future.

There were differences on wood material use by firm size, manufacturer type, and geographic location category. All these differences are affected by one or more of the following factors: (1) resource availability or relative costs of purchasing and using wood products, (2) furniture products produced, and (3) the desires and preferences of furniture consumers. The heavy use of panel products is primarily due to the cost consideration. Nevertheless, since China is considered to be short of forest resources, domestic timber supply constraints are the major forces driving stronger demand for panel products by China's furniture industry.

The differences in material use among three manufacturer types were significant in only a few categories, while differences between regions or among three firm size groups were significant in almost all the categories interested. This indicates that the manufacturer type is not an important factor in differentiating firms wood material needs. Differences between regions reveal significant regional differences in China's economic development, resource availability, and culture. Firms in Southern China were more global minded than the firms in the North. Therefore, it is much easier for U. S. wood products suppliers to access Southern China. This also means that wood product markets in the region are more market-driven, and hence more highly competitive. Wood products markets in the North, on the other hand, have more potential for U. S. wood exporters, due to the dramatic reduction in allowable logging in natural forests of the region.

Solid or veneer laminated hardwood furniture is well accepted by high-income consumers in China. Furniture using panel technology is expected to retain its dominant position since the majority of Chinese consumers have low-to-middle incomes. More

high quality hardwood products will be needed for upper-ended solid furniture manufacturing. As the national economy grows and household incomes increase, Chinese consumers may be willing to pay a higher price for better quality U. S. hardwood products. This will be a good opportunity for U. S. hardwood suppliers to enlarge their market penetration. There are also opportunities for other hardwood products for this growing furniture market, including RTA (Ready to Assemble) furniture, and furniture parts.

Sampled furniture manufacturers purchased hardwood lumber/dimension directly from sawmills or from wholesalers. Neither direct importing nor indirect importing played an important role in these firms hardwood lumber/dimension purchases. These results indicate that sampled firms did not have enough access to import hardwood lumber/dimension, or they have little or no knowledge of imported hardwood products. More marketing promotion by U. S. hardwood product manufacturers may be helpful.

Wholesalers were the primary source of lumber and dimension for small and medium sized firms. Because of this, small and medium furniture manufacturers could benefit from promotional information and technical educational programs about U. S. hardwood.

Chinese oak, ash, and birch were the most popular species used by China's furniture manufacturers. This may be due to the domestic availability of these species. U. S. hardwood species were perceived to be high quality and high priced by Chinese buyers. Although they were not yet widely accepted by Chinese furniture manufacturers, they could be good substitutes for domestic species.

China will be a huge potential market for U. S. hardwood products in the long run. As China continue to be short of timber supply in next century, it will seek for wood products imports. In order to access Chinese markets, U. S. hardwood exporters may consider the following:

- to establish contacts with potential buyers, including furniture manufacturers, wood products wholesalers, and wood importing companies;
- to form joint ventures with Chinese counterparts;

- to cooperate with Chinese counterparts through technical exchanges, investment, and trade missions; and
- to involve more promotional activities.

4.2 Recommendations for Future Research

To better understand China's furniture industry as a whole, we suggest a survey of a larger sample of China's furniture manufacturers using the survey instruments developed and refined in 1997. In order to get high response rate, providing incentives to respondents, such as promotional products, information about U. S. hardwood products, or other information of interest to Chinese furniture firms may be helpful.

In order to best serve the wood material needs of Chinese furniture industry, further research is needed to better understand: market channels and key players in the Chinese furniture market; other uses of hardwood products (i.e., interior decorations, flooring, etc.) which compete for raw material needed by the furniture industry; the potential for China's furniture industry to import hardwood products; and policy issues pertaining to domestic wood products supply and demand.

4.3 Limitations of the Study

Due to the difficulties in conducting mail survey in China, only a small sample of furniture firms were chosen and surveyed. It may not be appropriate to make estimates of hardwood needs for whole industry from this small sample. Nevertheless, some important trends becoming evident in the industry were revealed by sampled firms. Also, personal interviews were performed in only four large cities across the nation to gather information and clarify the quantitative findings from the survey. Therefore, information gathered from interviews may not be representative of decision makers' perceptions in other regions.