

AN ABSTRACT OF THE THESIS OF

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Innovation is considered the ultimate drive for business success. Fast growing furniture imports from China have become a controversial topic within U.S. wood and furniture industries. Low-cost production, which is stereotypically considered as the major competitive advantage of the Chinese-made products, has received considerable attention by a large body of research, while the Chinese furniture industry's innovative side is less studied. This study profiles the industry's recent development and measures its innovativeness via a combination of qualitative and quantitative approaches. Management-level interviews were conducted with 18 Chinese companies recommended as innovative by industry experts. A conceptual innovation model developed using qualitative analysis of interviews was tested by a quantitative survey.

Key findings suggest that Chinese furniture companies are pursuing innovation with three equal focuses on product, process and business systems. In the future, the industry will likely become more innovative in all three aspects, with major focuses on product and process. Company innovativeness was significantly correlated with company competitiveness. Improving sales performance and minimizing costs provide

motivations for Chinese companies to adopt innovation. No relationship was found between profitability and innovativeness. This suggests that the industry's traditional focus on low-cost-low-profit production still has significant influence on industry innovation activities. Company innovativeness and competitiveness also varied with company size and export orientation. Forming strategic alliances with large Chinese manufacturers with moderate export orientation is suggested for U.S. furniture companies wishing to enter into the Chinese market.

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Innovation in China's Furniture Industry

by

Xiaozhi Cao

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Xiaozhi Cao, Author

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INNOVATION IN CHINA'S FURNITURE INDUSTRY

1. INTRODUCTION

1.1 Problem Statement

The furniture industry is exciting because it constantly changes. As part of everyday life, furniture is created with both physical and aesthetic functions to satisfy people's different levels of needs. From a marketing perspective, the evolution of the furniture industry is determined by changing consumer tastes and emerging needs. Innovation, and resulting changes, provide a direct mechanism for industry success.

Today, like many other growing industries, the furniture industry is going global and changing constantly with old players moving out and new ones coming in. In the global furniture market, competition has never been so keen as a result of China's swift rise to become a global leader in furniture manufacturing and exporting. Fast-growing Chinese exports have become a hot topic within the U.S. furniture manufacturing industries, and are widely considered a source of both threat and opportunity.

A large body of industrial research has been conducted with a typical focus on low cost production as the Chinese furniture industry's only cutting edge. Little attention, however, has been paid to the industry's innovative abilities, which might be an existing or potential source of competitiveness. Therefore, this study is devoted to investigating the innovative side of the Chinese furniture industry, based on a combination of qualitative and quantitative research approaches.

1.2 Objectives

Objective 1. Investigate types of innovation activities, if any, being pursued by Chinese furniture companies.

Objective 2. Understand the motivation behind these innovation activities.

Innovation has been widely acknowledged as the ultimate driver of business success by previous research. Understanding real-life innovation practices within the Chinese furniture industry is essential for competitiveness assessment and prediction of the industry's future development. Specifically, the following questions will be discussed during the remainder of this study:

- What is innovation in the context of the Chinese furniture industry?
- What are contributing factors to innovation for Chinese furniture firms?
- Is there any correlation between company innovation and competitiveness?
- What will be the industry's future innovation focus?

2. INDUSTRIAL BACKGROUND

The history of furniture-making dates back to the beginning of human society tens of thousands of years ago, when tools of flint and bones were first being made by hand. Images of ancient furniture forms can still be spotted in mural paintings, sculptures, bamboo scrolls and papyrus across the world. Prior to the Industrial Revolution in the early 1800s, furniture production entirely relied on hand-working and workshop craftsmanship. Today, the manufacturing process has been facilitated by the advent of power-driven machinery and modern construction, which have significantly improved production efficiencies and lowered production costs. Labor skills are still important for furniture manufacturing, especially for high-end and upholstery products.

Some basic, but important industry-related terminology and characteristics are discussed to briefly overview the industry. Detailed introduction of the status quo of the Chinese furniture industry is also provided in this section and serves as a guideline to an in-depth exploration of the industry's innovativeness.

2.1 Furniture Industry—A Brief Overview

2.1.1 Furniture definition

Furniture is defined as “equipment that is necessary, useful, or desirable as a movable article used in readying an area (as a room or patio) for occupancy or use” by the Merriam-Webster Dictionary. From a marketing perspective, furniture is a “functional art form” (Bennington, 2004) with both physical and aesthetic benefits used to satisfy customers' needs. Bennington (2004) also contends that furniture is a

combination of “both tangible and intangible” attributes, including design, material, durability, processing quality, manufacturers and retailers’ reputation, credit and service.

Furniture is replaced more often than other durable consumer products also because it is inexpensive, compared with automobiles and houses. Consumers are the ultimate decision-makers for furniture selection and purchase. Price is one of the most important considerations for furniture shoppers. According to a recent survey by Furniture Today (2004), the key criteria for bedroom furniture selection include durability, quality, comfort and price.

2.1.2. Furniture classifications

Furniture products can be divided into smaller groups by various standards such as function, or material, style, and these divisions vary by country. In the United States, according to North American Industry Classification System (NAICS), furniture and related product manufacturing industries can be classified into three general categories:

- Household and institutional furniture and kitchen cabinet manufacturing;
- Office furniture (including fixtures) manufacturing;
- Other furniture related products.

In China, the industry’s commonly accepted rule for furniture classification is based on furniture materials, which can be divided into: wood furniture, metal furniture, rattan furniture, plastic furniture, and so on.

Understanding furniture classification is important for industry census and international trade purposes. Different classification approaches can result in significant variations in the final census data. One example is the long-existing gap between U.S.

and Chinese customs statistics in terms of Chinese furniture imports. Another example is recent anti-dumping efforts by the U.S., targeting Chinese wood bed imports. By definition, most wood bedroom furniture imported from China will be subject to a certain rate of import tariffs. To avoid the risks of increasing final prices, some U.S. importers are seeking ways to reclassify their Chinese imports into categories other than bedroom furniture, by making design or functional changes (Linville, 2004).

2.1.3. Manufacturing process

Understanding the normal procedure for furniture making will provide insights into the organization of typical furniture factories and the make-up of basic manufacturing costs.

Figure 1 illustrates the typical process for wood case-goods furniture products (Bennington, 2004).

Along the horizontal line in the middle, the production flow can be divided into two stages of processing. The part above the line can be termed as primary processing,

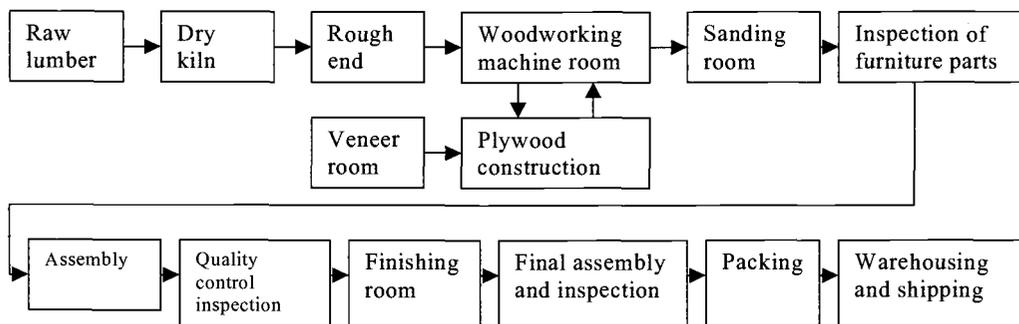


Figure 1. Flow of Wood Furniture Production (Bennington 2004)

which includes all the intermediary steps from “raw lumber” up through to furniture parts inspection; the rest of the production can be called secondary processing, which starts from assembly till packing and shipping.

Under the trend of global outsourcing, an increasing number of U.S. furniture factories are moving primary processing sectors overseas to the regions with easy access to inexpensive raw materials and labor in order to reduce total operational costs. These furniture companies can then better focus on the high value-added secondary processing sector and marketing to achieve competitive advantages, which are difficult for foreign manufacturers to gain.

2.1.4 Cost structure

Furniture manufacturing costs consist of variable and fixed costs. Variable costs include raw materials, labor, and any other production inputs; fixed costs refer to rent, equipment devaluation, and administrative costs. Raw material and labor inputs strongly influence the final costs.

In the furniture industry, it is difficult to determine accurate cost structures, given the industry’s relatively heavy reliance on labor skills. Bennington (2004) contends that the exact costs of a piece of furniture depend on the skill and energy of the worker, which can vary from time to time, as well as from piece to piece of the same type of product. Cost analyses is further complicated when imports and changing exchange rates are considered.

On the U.S. wholesale market level, Bryson *et al* (2003) compared the cost structures of two mid-priced, case-goods pieces, made in the U.S. and in China, respectively (**Table 1**).

**Table 1. Cost Structures of Two Mid-priced Case-goods Pieces
(Bryson et al 2003)**

| | U.S. production costs | % of Revenue | Chinese production costs | % of Revenue |
|-----------------|-----------------------|--------------|--------------------------|--------------|
| Raw materials | \$210-240 | 35-40% | \$210 | 47% |
| Labor | \$90-120 | 15-20% | \$22.50 | 5% |
| Overhead | \$198-222 | 33-37% | \$45 | 10% |
| Freight | 0 | 0% | \$105 | 23% |
| Est. profit | \$60 | 10% | \$67.50 | 15% |
| Wholesale price | \$600 | | \$450+ | |

The authors thus suggest that Chinese savings in labor and production overhead combined outweigh the increased costs associated with shipping, which contribute to the Chinese price advantage in the marketplace. They also report that the average labor rate in China's furniture industry is approximately \$0.5-0.75 per hour, compared with \$15 per hour in the U.S.

Overhead, by definition, "includes all manufacturing costs, excluding direct labor, freight and raw materials" (Bryson et al. 2003). Chinese manufacturers achieve lower overhead mainly because they are subject to lower construction costs, and less governmental and societal restrictions than their U.S. counterparts (Bryson et al. 2003).

2.1.5 Industry supply chain

An industry supply chain, is defined as the system encompassing all activities associated with the flow and transportation of goods from raw materials (extraction) down through to end users, as well as the associated information flow (Monczka et al. 2002). An industry supply chain can also be termed as a value chain, with all the activities contributing to buyer value.

Like many other industries, the furniture industry is made up of five parts: primary manufacturers (e.g. raw material, equipment and accessory suppliers), secondary manufacturers (furniture components, assemblies), market intermediaries (wholesalers, retailers), other supporting industries (such as delivery and warehousing providers), and end-consumers.

Today, the furniture industry and market are becoming global, with supply chains and markets extending beyond country boundaries, and so are the markets. This adds to the complexity of the industry chain, with overseas suppliers and traders incorporated (**Figure 2**). A case in point is IKEA. Developing under the vision of “global design and low price”, the Swedish company has established over 175 stores in at least 31 countries since the early 1940s, with more than 1,800 suppliers across the world (IKEA 2004).

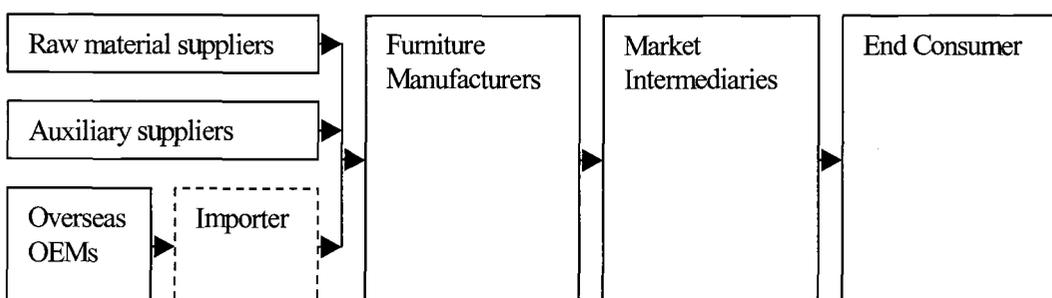


Figure 2. Typical Furniture Industry Supply Chain

2.2 The Chinese furniture industry

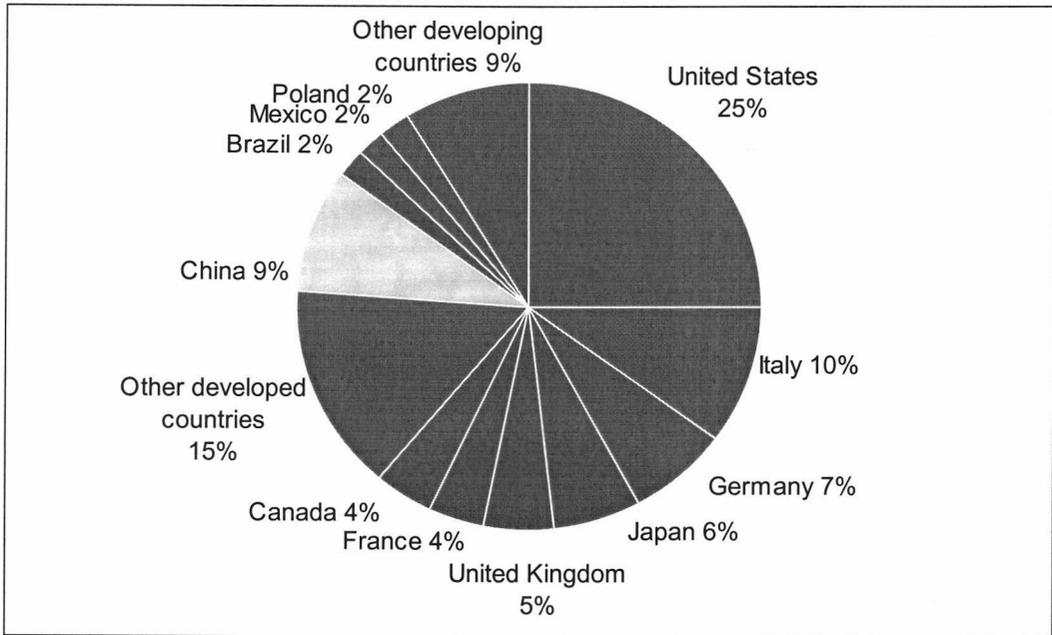


Figure 3. World Furniture Production, 2002 (CSIL 2003)

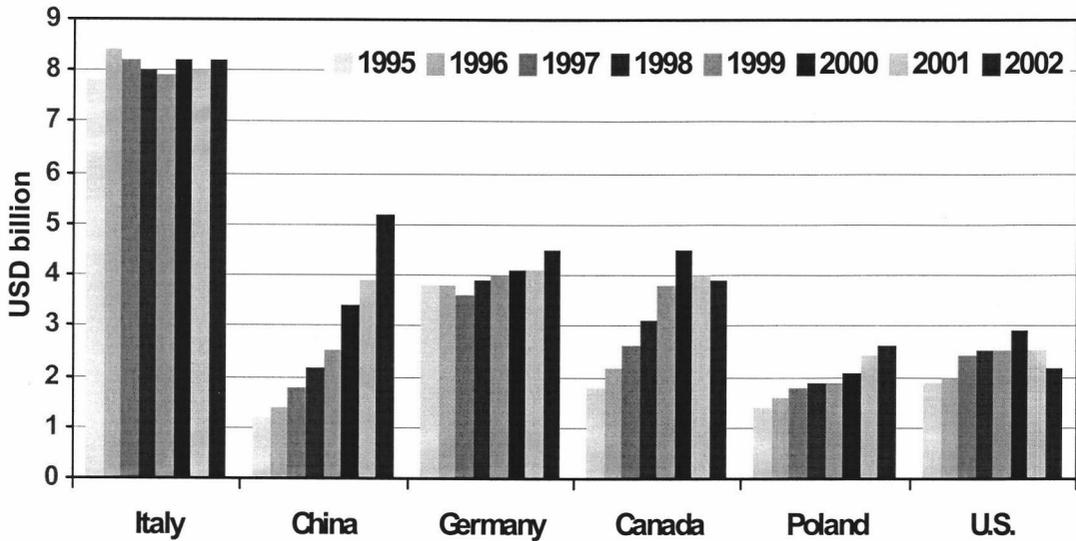


Figure 4. Top Furniture Exporting Countries 1995-2002 (CSIL 2003)

China has become the world's third largest furniture-producer, accounting for 9% of the total global value of shipments (**Figure 3**), and ranks second in terms of value of exports (**Figure 4**) (CSIL 2003). Since the middle 1990s, the furniture industry in China has maintained an averaged 13% annual growth in production value, from \$6.8 billion in 1995 to \$25 billion in 2003; while exports increased at an average annual rate of 24%, from \$1.1 billion in 1995 to \$7.3 billion in 2003 (CNFA 2002, CNFA 2004, CSIL 2002)

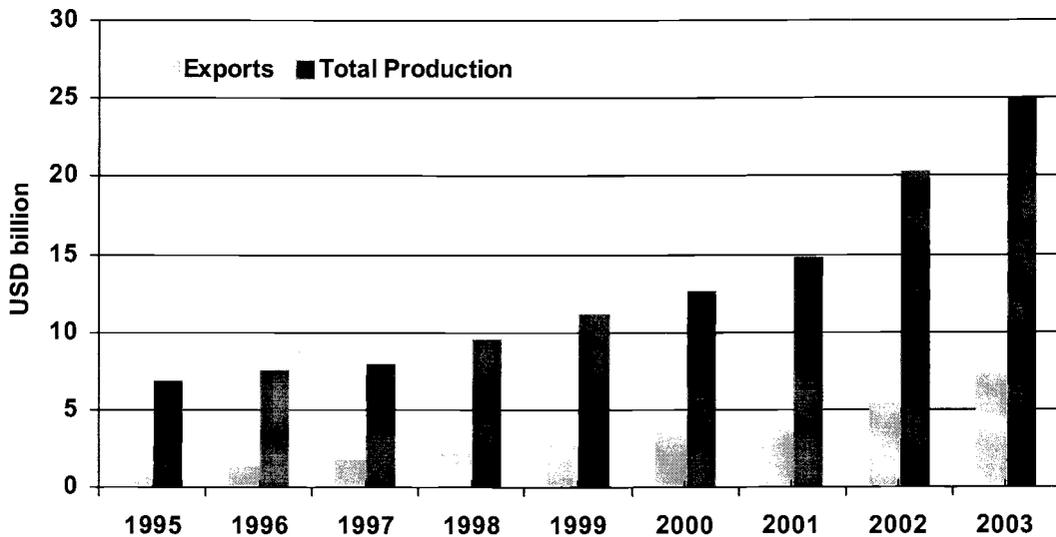


Figure 5. Chinese Total Furniture Production and Exports 1997 – 2003 (CNFA 2002-2004, CSIL 2002)

(**Figure 5**). The development of the Chinese furniture industry has far exceeded the country's average industry growth rate (10%), as well as China's GDP growth (7-9%) over the same period. During the fiscal year 2002–2003, the industry achieved its highest growth rate in ten years, with a 24% increase in gross production and 35% increase in exports, despite the impact of the SARS epidemic (CNFA 2003, 2004). The

domestic Chinese market consumes over 70% of its total furniture production and has grown about 6% annually during recent years (CNFA 2002, CNFA 2004, CSIL 2002).

2.2.1 Industry demographics

The Chinese furniture industry is made up of 50,000 companies and 5 million employees (CNFA 2003). Approximately one third of these companies are joint ventures with foreign investors. Industry insiders estimate that a majority of Chinese furniture companies are small- to medium-sized operations with average annual sales of less than \$36 million (or RMB 300 million). Large-sized companies, which account for only 3% of the total industry population, are producing most of the country's exports. A significant percentage of these large, export-focused companies are Taiwanese-owned (Xu 2004a).

The industry's production facilities are mainly concentrated within four regions from south to north along the eastern coastline (**Figure 6**). Together, these four regions accounted for 90% of total furniture production volume (by piece) and more than 80 % of total export value in 2003.

Guangdong and Fujian, the top two furniture producing regions in the south, combine to make up over half of total production and exports. With a manufacturing base of 6,000 companies, Guangdong claims more than 35% of total production (by piece) and 50% of total exports (value) from China each year. Guangdong's Pearl River delta, in close vicinity to Hong Kong, has heavy concentrations of furniture

manufacturers and suppliers and has become the industry's most important geographic region led by the cities of Dongguan, Shenzhen and Shunde.

Fujian is the second largest furniture manufacturing and exporting region in China. It accounts for almost a quarter of the country's total production and 8% of total exports (by value).

Zhejiang is a key furniture manufacturing and distribution center in the eastern part of China, contributing 16% of total production (by piece) and 10% of total exports (by value) in 2003. The region boasts a centuries-long, furniture-making history with spontaneously developed industry clusters featuring concentrations of smaller companies, compared with those of Guangdong region. Four industrial parks are currently under construction, with a total area of 1,530 acres and over \$120 million in

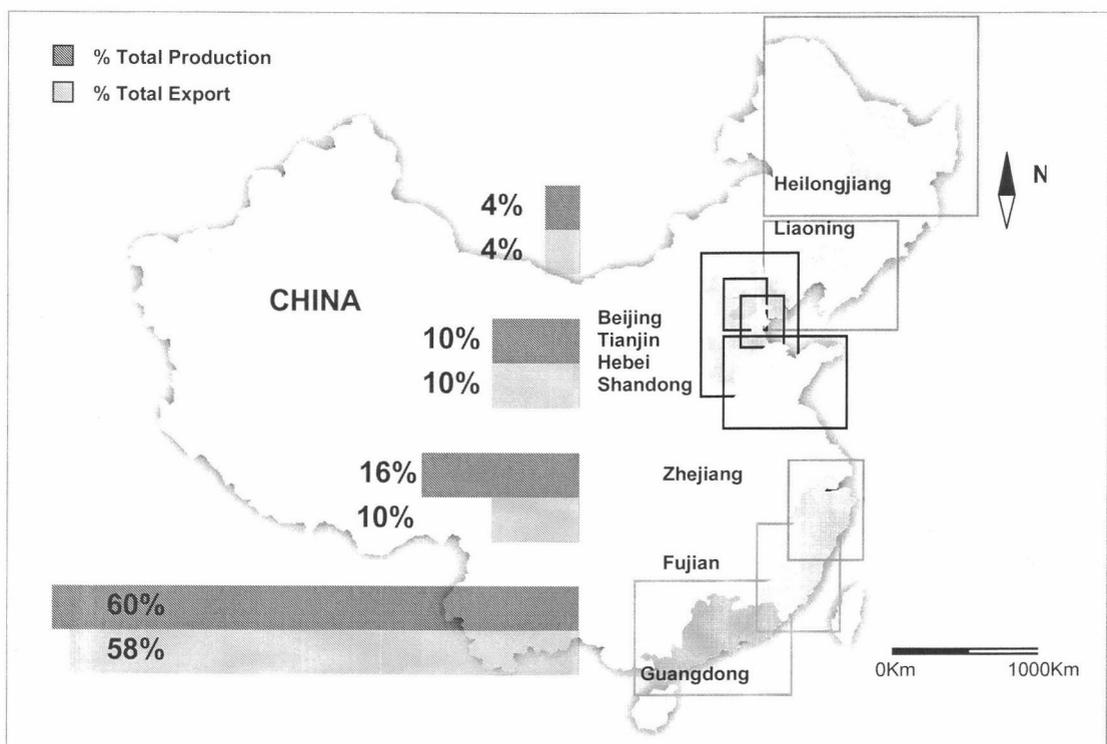


Figure 6. Major Furniture Production and Export Regions in China (CNFA 2004)

investment (CNFA 2003). An increasing number of furniture exporters are shifting production to the region with ambitions to enter the domestic Chinese market. A recent example is the establishment of a 490-acre industrial zone by a giant Taiwanese furniture company in Jiashan, which is less than 60 miles from metropolitan Shanghai, as the company's East China operation division. The former 100% exporter opened its first Chinese furniture store in Shanghai in early 2004.

The northern region includes Shandong Province, the metropolitan Beijing-Tianjin area and Hebei Province, representing 10% of the country's total production (by piece) and 10% of total exports (by value). Together with Shanghai in East China and Guangzhou in South China, Beijing is one of the three largest furniture markets and has the largest middle-class population. China now has approximately 30 million people with incomes ranging from \$10,000 to \$50,000 per year.

The northeastern region is composed of Liaoning and Heilongjiang. With convenient access to both domestic Chinese and Russian forest lands, the industry is adept in making solid wood products. The region produced 4% of the country's total furniture production (by piece) and 4% of total exports (by value) in 2003 (CNFA 2004).

2.2.2 Wood supply and wood consumption

The industry is facing a shrinking domestic supply of wood raw material and is increasingly dependent on imports. China is the world's second largest timber importer after the U.S. From 1997 to 2002, China doubled the volume of forest product imports

from 40.2 million cubic meters to 95 million cubic meters in round wood equivalent (RWE) volume. In terms of dollar value, imports grew by 75 % to \$11.2 billion from \$6.4 billion during the same period (Figure 7). Logs and sawn wood are the major segments of timber imports (Figure 8) (Sun et al. 2004). Russia, Malaysia, Indonesia, New Zealand and Thailand are the top five timber suppliers to the Chinese market. Russia is by far the largest softwood supplier and Indonesia ranks first in hardwoods

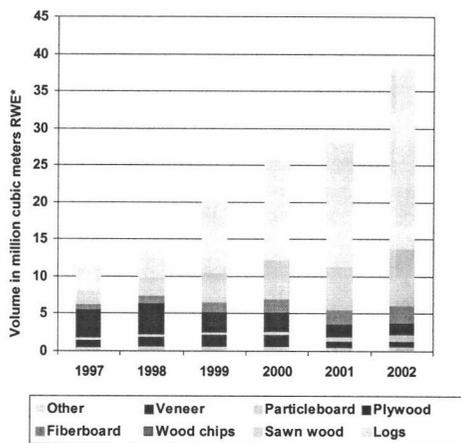


Figure 7. Chinese Wood Imports by Product Type 1997-2002 (Sun et al. 2004)

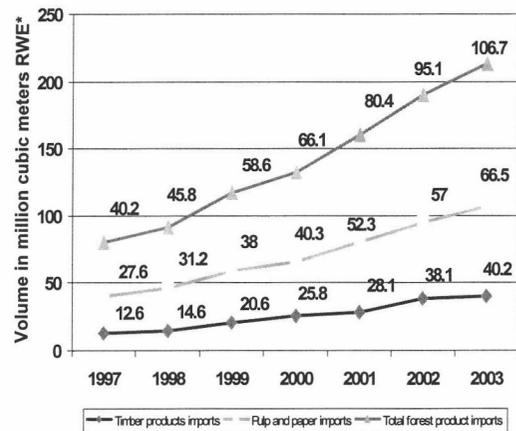


Figure 8. Chinese Forest Products Imports 1997-2003 (Sun et al. 2004)

(Sun et al. 2004, SFA 2003). U.S. timber exports to China are growing steadily, with hardwood lumber and logs contributing much of the growth. In 2003, the U.S. sold \$197 million worth of hardwood products to China, which increased 30% more than in 2002 (Everyday Furniture Web 2004). More than 30 American hardwood species have been widely used by furniture-making and interior decoration companies. Red oak, cherry, hard maple and walnut are among most desired species. Marketing under the title “diversity, variety and quality”, the American Hardwood Export Council (AHEC)

predicted double-digit growth in 2004 based on pent-up demand in construction and housing markets (Everyday Furniture 2004). U.S. softwood exports to China are growing to a lesser extent than hardwoods, mostly in the form of logs (USDA 2003). Cedars, ponderosa pine, southern yellow pine, Alaska (yellow) cedar, and Sitka spruce are commonly used softwood species in China (SEC 2002).

According to Xu (2003), by 2010, China will need 240 million cubic meters in round wood equivalent (RWE) volume of forest products, 20% of which will go to the furniture-making sector. Currently, there is a shortage of 80 million cubic meters in forest product supplies. This gap will expand to 120-160 million cubic meters by 2010, which must be met by imports and domestic plantations (Xu 2003). Plantations in China are developing quickly and are expected to be able to supply 40% of domestic needs by 2015. Major species groups include eucalyptus, acacia, Chinese fir, poplar and paulownia (SFA 2003).

2.2.3 Domestic market

Apparent consumption is a reliable economic indicator of market prosperity, which is the sum of the value of imports and the difference between value of gross production and exports. During 1995 to 2001, apparent consumption in the domestic Chinese furniture market increased 11% annually, from \$5.8 billion to \$11 billion. In 2002 and 2003, the market was expected to achieve 6% growth on a year-by-year basis (CSIL 2002) (**Figure 9**).

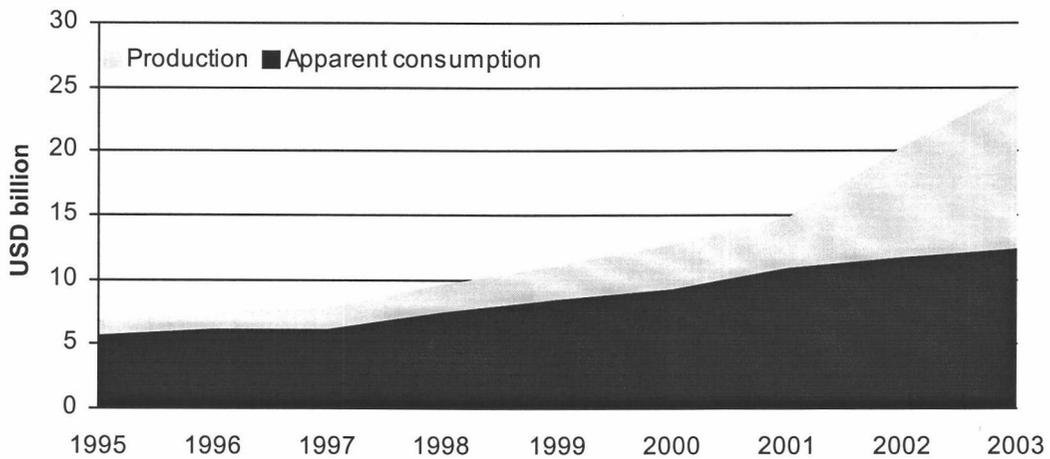


Figure 9. Domestic Chinese Furniture Production and Apparent Consumption 1995-2003 (CNFA 2004, CSIL 2002)

Competition in domestic markets is both high and complex. Floor area of furniture selling outlets in China reached 23 million cubic meters in 2002, most of which were developed in the last 10 years. These include furniture marts, department stores, category shops and brand stores (CNFA 2003). There are approximately 900 large furniture stores with floor areas greater than 10,000 square meters and 30 larger stores with over 50,000 square meters of floor area. They are all located in major Chinese cities (Xu 2003).

Trade shows are flourishing with domestic market liberation. Some trade shows are catching up with top world furniture shows, such as the Milan Furniture Fair and the International Furnishings Market (in High Point, North Carolina.), in terms of attendance and exhibition area. Guangdong again dominates the industry, hosting several furniture shows every spring and summer. Shenzhen International Furniture

Expo., Interzum Guangzhou Furniture Fair and Dongguan Famous Furniture Fair are among the largest furniture fairs in China, with an average attendance of 70,000 from 50 countries. Beijing, Shanghai, Dalian (Northeast China), and Zhejiang Province are also major show-hosting locales.

Competition from imports is growing, although imported furniture currently remains a small proportion of the Chinese market compared with domestically made products. As part of joining the World Trade Organization, China will completely remove tariffs from furniture imports by 2005 and open up domestic distribution and logistics markets to foreign operations in 2004. In 2003, Chinese furniture imports increased by 26% to \$180 million from \$142 million in 2002. During the first four months of 2004, furniture imports to China jumped to \$190 million, 67% higher over the same period of 2003 (CNFA 2004). U.S. furniture sales to Chinese Mainland and Hong Kong markets hit \$30 million in 2003, a 20% increase from \$25 million in 2002. Hong Kong was the second fastest growing overseas market for U.S. furniture exports behind Mexico in 2003, which increased 50%

to \$16 million from the previous year (Carroll 2004) (**Figure 10**).

IKEA is one of the most successful foreign-owned furniture retailers in China. The Swedish company started its first Chinese store in Beijing in 1998, with a floor area of

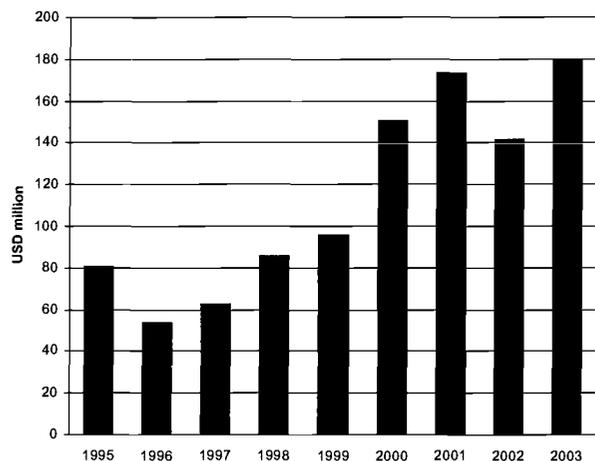


Figure 10. Chinese Furniture Imports 1995-2003 (CSIL 2002, Carroll 2004)

15,400 square meters, and opened a second store in Shanghai in 2003, with more than double the floor area in Beijing (32,000 square meters). IKEA realized \$713 million in sales in China in 2003, 24% more than in 2002. By 2010, the company plans to establish 10 standard stores and 5 national distribution centers in China (AFPA China 2004).

IKEA's successful model has already been emulated by Chinese manufacturers. Today, many Chinese companies have extended business scopes down the value chain and gradually developed marketing orientations as a means of competing both domestically and globally. From 2002 to 2004, Markor Furniture Co., a giant Chinese softwood furniture producer and exporter, opened four home accent stores in major Chinese cities, as joint ventures with U.S.-based Ethan Allan. Both companies' branded products are displayed under the same roof and marketed with one image in China. The joint venture was designed to pool strengths of both parties, including local production and distribution of the Chinese manufacturer, as well as international business experience that can be provided by its U.S. partner.

2.2.4 Global development and competitiveness

Since 2000, China has grown into the world's second largest furniture exporter behind Italy (Figure 4) (CSIL 2003). In terms of value of shipments, furniture

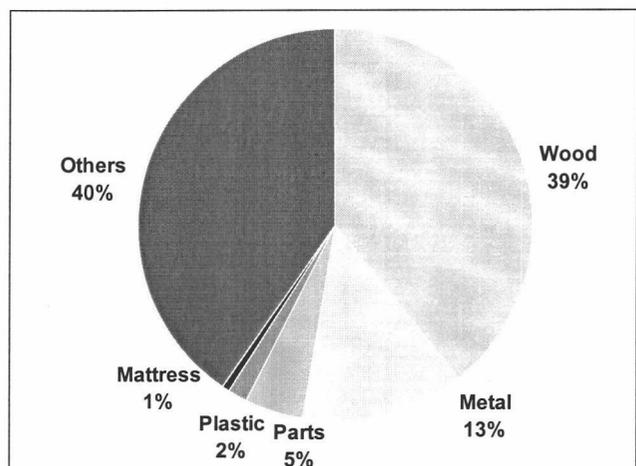


Figure 11. Chinese Furniture Exports by Product Types (CNFA 2004)

exports from China are growing rapidly with an average 30% annual rate during recent years. From 1997 to 2003, the proportion of exports of total production increased from 20% to 30% (**Figure 6**). Wood products are the largest single type of furniture exported, accounting for 39% of total exports (CNFA 2004), followed by metal furniture (13%) and furniture parts/components (5%) (**Figure 11**).

China-based, Taiwanese companies are playing a fundamental role in the Chinese furniture industry as aggressive automation adopters and as exporters. Lei and McGowin (2002) suggest that these Taiwanese factories are pursuing “tech-labor intensive” manufacturing, which enables manufacturers to capitalize on both inexpensive skilled labor and efficiency from mass-production. It is estimated that these Taiwanese manufacturers account for 75% of China’s total furniture exports by value (CNFA 2003). Taiwanese companies have a long-entrenched exporting history, dating back to the early 1960s, and became leading furniture exporters to the U.S. market during the 1980s. Since the early 1990s, Taiwanese companies began migrating production across the straight to Mainland China, largely driven by skyrocketing domestic labor costs, as well as favorable investment policies by the Chinese government. Established overseas market channels and world-class equipment, coupled with even cheaper labor costs found in China allowed these Taiwanese companies to achieve swift growth in exporting from China and to become the dominant force in the sector.

Chinese furniture products in the global market are sold for lower prices with competitive qualities, while increasingly targeted at middle to higher-end markets and competing directly with local manufacturers. Houston (2003) compared retail prices of

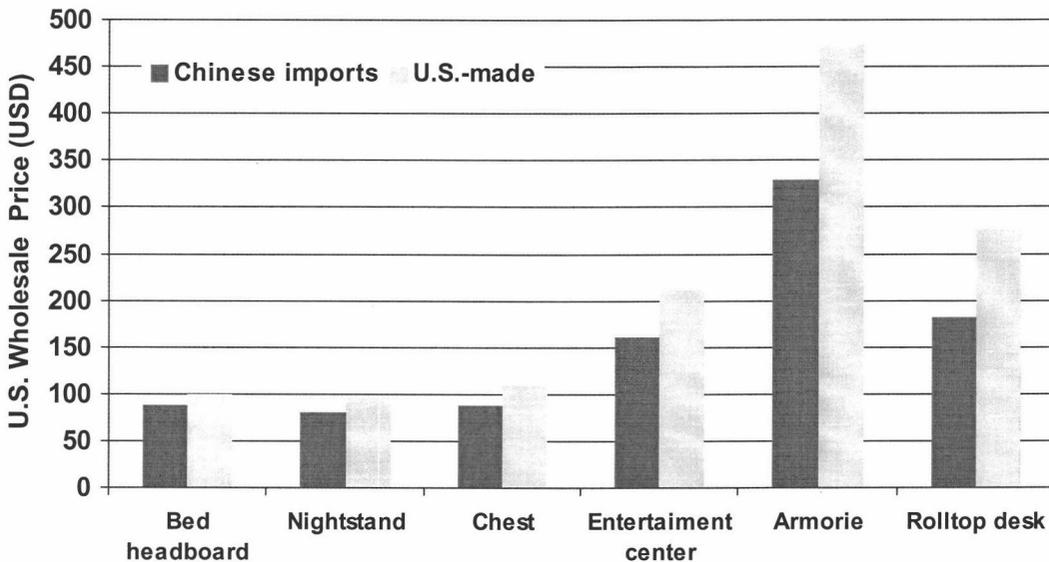


Figure 12. Price Advantages of Chinese-made Furniture Imports in the U.S. Market (Houston 2003)

imported Chinese wood household furniture with those of domestically made products selling in the U.S. market, and found that the Chinese prices are 10-40% lower than those of local products (**Figure 12**). Besides a much lower labor rate, which ranges from 5 to 10% of the U.S. labor rate, low operational costs (overhead) are another important contributor to the Chinese price advantage (**Table 1**) (Bryson et al. 2003).

The U.S. is the most important overseas market for Chinese furniture exports, taking more than half of the furniture products exported from China. According to statistics from the U.S. Department of Commerce, China has been the largest overseas supplier since 2000. In 2003, Chinese furniture shipments made up 44% of U.S. imports reaching \$6.8 billion, compared with \$5.8 billion in 2002 and \$4.2 billion in 2001 (Carroll 2004). Wood bedroom furniture, the largest segment exported to the U.S., is

faced with potential anti-dumping tariffs imposed by the end of 2004, which could add as much as \$60 million to the costs of these imported products. This would severely impact the ability of Chinese products to compete in the U.S. market.

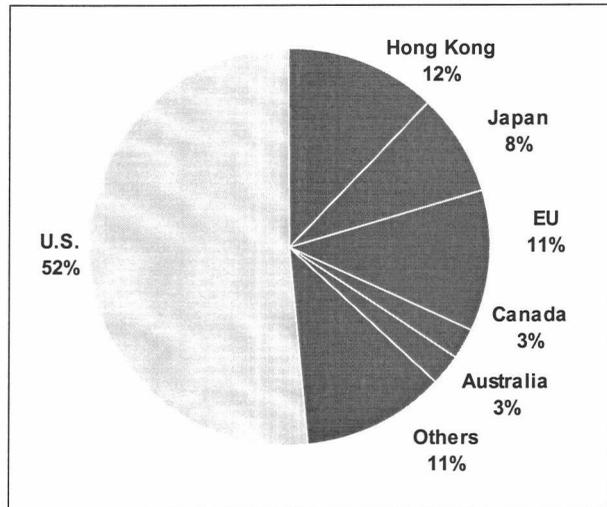


Figure 13. Chinese Furniture Exports by Destinations (CNFA 2004)

In terms of shipment value,

European Union countries are the second most important overseas markets for Chinese furniture exports, accounting for 11% of total exports in 2003. Japan ranks third with an 8% share (**Figure 13**). Saudi Arabia and Korea represent emerging markets for Chinese exporters and exports to these countries have increased 70% annually over the past three years (CNFA 2003, 2004). In the Canadian market, China replaced the U.S. as the largest source of imported household furniture in 2003 (Kneill 2004).

3. THEORETICAL BACKGROUND

3.1 Innovation

Innovation has a broad array of definitions. In earlier times, it was defined as “an idea, practice, or object that is perceived as new to an individual or another unit of adoption” (Dewar and Dutton, 1986), or as “a product perceived as new” (Iwamuar and Jog, 1991).

Recently, a cross-functional perspective on innovation has been increasingly employed by researchers. Boer and During (2001) suggest that innovation is “the creation of a new product-market-technology-organization-combination (PMTO-combination)”. The definition is comprised of three key elements:

“Innovation is an adaptive process: from goal formulation thru designing to product commercialization; innovation requires a series of adaptations in the PMTO-combinations.”

“The result is at least one new element in the company’s PMTO-combinations: for example, it could be product innovation, technological innovation or organizational innovation.”

“There are two aspects of the concept of [new]: the extent to which and the subject to whom the innovation is new. In the first aspect, innovation can be ranging from incremental, small step innovation thru synthetic innovation to discontinuous, radical innovation; while the other one suggests that innovation may range from new to the world, a country/society, an industry, a company or an individual.”

In the Generic Product Development model (**Table 2**) developed by Ulrich and Eppinger (2000), the authors advocate that “marketing”, “design” and “manufacturing” are the three key functional groups involved in the product development process, and

their roles vary with each stage during the process from “planning” to “product ramp-up”. In a later study, Krishnan and Ulrich (2001) identified four common perspectives existing within the design and development research community, they are: “marketing”, “operations management”, “organizations” and “engineering design” (Table 3).

Hovgaard and Hansen (2004) followed a similar cross-functional approach and suggested that product (new product development), process (adoption of new or improved processing technologies) and business systems (management and marketing) be the three types of innovation.

Table 2. Generic Product Development Process (Ulrich and Eppinger 2001)

| Stage 1 | Stage2 | Stage 3 | Stage 4 | Stage 5 | Stage 6 |
|--|--|--|---|---|---|
| Planning | Concept Development | System-Level Design | Detail Design | Testing and Refinement | Production Ramp-Up |
| Function1. Marketing | | | | | |
| Articulate market | Collect customer needs | Develop plan for product options and extended product family | Develop marketing plan | Develop promotion and launch materials | Place early production with key customers |
| Define market segments | Identify lead users Identify competitiveness | | | Facilitate field test | |
| Function 2. Design | | | | | |
| Consider product platform and architecture | Investigate feasibility of product concepts | Generate alternative product architecture | Define part geometry | Reliability testing | Evaluate early production output |
| Assess new technologies | Develop industrial design concepts Build and test experimental prototypes | Define major sub-system and interfaces Refine industrial design | Choose materials Assign tolerances | Life testing Performance testing | |

Table 2. Generic Product Development Process (Ulrich and Eppinger 2001)
(Continued)

| Stage 1 | Stage 2 | Stage 3 | Stage 4 | Stage 5 | Stage 6 |
|--|---------------------------------------|--|--|---|---|
| Planning | Concept Development | System-Level Design | Detail Design | Testing and Refinement | Production Ramp-Up |
| | | | Complete industrial design control documentation | Obtain regulatory approvals | |
| | | | | Implement design changes | |
| Function 3. Manufacturing | | | | | |
| Identify production constraints | Estimate manufacturing costs | Identify suppliers for key components | Define piece-part production processes | Facilitate supplier ramp-up | Begin operation of entire production system |
| Set supply chain strategy | Assess production feasibility | Perform make-buy analysis | Design tooling | Refine fabrication and assembly processes | |
| | | Define final assembly scheme | Define quality assurance processes | Train work force | |
| | | | Begin procurement of long-lead tooling | Refine quality assurance processes | |
| Other functions | | | | | |
| Research: Demonstrate available technologies | Finance: Facilitate economic analysis | Finance: Facilitate make-buy decisions | | Sales: Develop sales plan | |
| Finance: Provide planning goals | Legal: Investigate patent issues | Service: Identify service issues | | | |
| General Management: Allocate project resources | | | | | |

Table 3. Common Perspectives of the Product Development (Krishnan and Ulrich 2001)

| | Marketing (business systems) | Operations Management (business systems) | Organization (business systems) | Engineering Design (product and process) |
|------------------------------------|---|---|---|---|
| Perspectives on Product | A product is a bundle of attributes | A product is a sequence of development and/or production process steps | A product is an artifact resulting from an organizational process | A product is a complex assembly interacting components |
| Typical Performance Metrics | <p>"Fit with market"</p> <p>Market share</p> <p>Consumer utility</p> <p>(Sometimes profits)</p> | <p>"Efficiency"</p> <p>Total cost</p> <p>Service level</p> <p>Lead time</p> <p>Capacity utilization</p> | Project success | <p>"Form and function"</p> <p>Technical performance</p> <p>Innovativeness</p> <p>(Sometimes direct costs)</p> |
| Dominant Representational Paradigm | Customer utility as a function of product attributes | <p>Process flow diagram</p> <p>Parametric models of process performance</p> | <p>No dominant paradigm</p> <p>Organizational network sometime used</p> | <p>Geometric models</p> <p>Parametric models of technical performance</p> |
| Example Decision Variables | Product attribute levels, price | <p>Development process sequence and schedule</p> <p>Point of differentiation in production process</p> | Product development team structure, incentives | Product size, shape, configuration, function, dimensions |
| Critical Success Factors | <p>Product positioning and pricing</p> <p>Collecting and meeting customer needs</p> | <p>Supplier and material selection</p> <p>Design of production sequence</p> <p>Project management</p> | <p>Organizational alignment</p> <p>Team characteristics</p> | <p>Creative concept and configuration</p> <p>Performance optimization</p> |

3.2 New product development

Product is something sold by an enterprise to its customers (Ulrich and Eppinger, 2000). The concept of product can be defined in different ways. For example, from a marketing perspective, product is “a collection of physical, psychological, service and symbolic attributes that collectively yield satisfaction, or benefits (value), to a buyer or user” (Keegan and Green, 2000). While from the perspective of operations management, product is a sequence of development and/or production process steps (Krishnan and Ulrich, 2001).

New product development is probably the most researched type of innovation (Hovgaard and Hansen, 2004). It is the set of activities beginning with the perception of market opportunity and ending in the production, sale, and delivery of a product. New product development is an interdisciplinary activity, with “marketing”, “design” and “manufacturing” as its three integral functions (Ulrich and Eppinger, 2000), but it can also be defined as “the transformation of a market opportunity and a set of assumptions about product technology into a product available for sale” (Krishnan and Ulrich, 2001). From organizational perspectives, new product development is the means by which the organization adapts and diversifies itself to adjust to the changing technology and market conditions (Vazquez et al., 2001).

Benefits of successful new product development include achieving competitive advantages, increasing product value, and gaining more access to the marketplace. (Bumgardner et al., 2000).

Cooper et al (2004) suggested that culture, climate, cross-functional teams and senior management were the four most important contributors to the best NPD performance. In a previous study by Cooper (1979), product uniqueness and superiority (product advantage), market knowledge and marketing proficiency (marketing orientation), and technical and production synergy and proficiency (technology orientation) were identified as three key factors to new product success; while three facilitators were: marketing synergy, marketing communications and launch effort, and market demand, growth and size (Cooper 1979).

According to another study by Cooper and Kleinschmidt (1987), “new product success” is a “ multi-dimensional concept” , which can be evaluated from three aspects: financial performance, market impact and opportunity window. They contend that “a well-defined project prior to the development stage” , and firm’s internal resources and skills are critical to new product success, especially in terms of financial performance.

The Product Differentiation Spectrum (**Figure 14**) (Juslin and Hansen, 2003) illustrates the connection between product types and competitive strategies from the standpoint of marketing. Generally, there are three types of product strategies for companies to pursue:

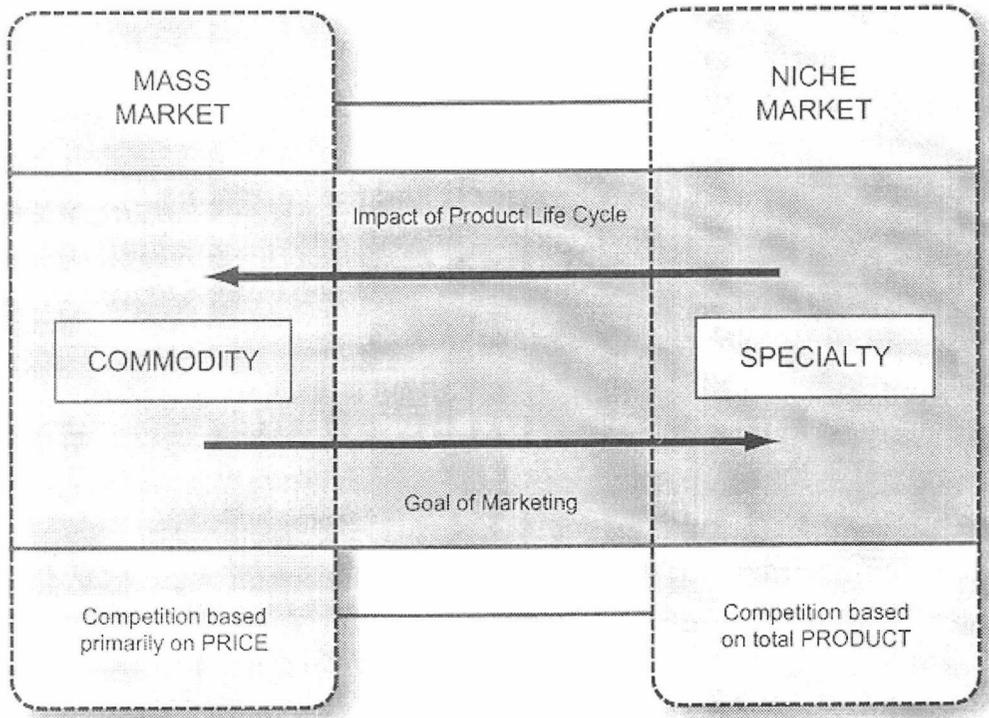


Figure 14. Product Differentiation Spectrum (Juslin and Hansen 2003)

Commodity products are targeted at the mass market without more differentiation. Customer loyalty is low as they can easily switch producers. Companies pursuing commodity strategies tend to compete on a price basis where low-cost production takes priority over product uniqueness.

Specialty products are those that have been adapted to fit specific needs, especially for niche markets. Competition in this area is relatively lower compared with those in the commodity market, and companies can charge premiums for unique product attributes.

Custom-made products are tailored to individual customer specifications. This is a highly differentiated area where product uniqueness is prioritized. Requirements for information flow, quality control, productivity, and technologies are high. Dell's Just-in-Time technology and Toyota's lean manufacturing are good examples of such approaches.

According to Porter (1998), competitive advantages are the results of a series of value-adding activities along the value chain (or supply chain). Innovation is an important source of competitiveness, by which companies gain advantages through organizing and conducting these value-adding activities in a new way. A supply chain is defined as the system encompassing all activities associated with the flow and transformation of goods from the raw materials (extraction) through to end users, as well as the associated information flow (Monczka et al., 2002). A supply chain can also be called a value chain, with all the activities contributing to buyer value. In this value system, the company does not compete independently as a single force, but as part of a larger network of suppliers and buyers. Gaining competitive advantage requires that a company's value chain be managed as a system rather than a collection of separate parts. Networking has become the new way of competition (Porter, 1998). Total cost reduction and strategic supplier relations have become the key components of network competitive advantages (Monczka et al., 2002).

Traditional information flows between buyers and suppliers often necessitate a lengthy and costly sequential process. With the development of Electronic Data Interchange (EDI) technologies and the Internet, Enterprise Resources Planning, Material Resources Planning II, Internet-based business-to-customer and business-to-business services provide new opportunities for companies to improve supply chain efficiency and increase customer satisfaction. Lean manufacturing, Just-in-time inventory and mass-customization are some examples illustrating the importance of information flow as a key component of supplier-buyer relations.

Shortening product life cycle and emerging new technologies provide market opportunities for manufacturers who are able to develop better products, in a faster manner and at lower costs. Earlier supplier involvement during new product development supports better decisions related to product design and manufacturability, and information flow (Monczka et al., 2002). This is especially true for fashion-sensitive consumer products, such as furniture.

3.3 Market orientation

Marketing orientation and senior management are primary components of business systems, which is one category of innovation (Hovgaard and Hansen 2004).

Market orientation was originally defined as an organizational-level culture: a set of shared values and beliefs about putting the customer first in business planning. Three levels of market orientation have been suggested as follows (Deshpande 1999):

Culture – the shared set of values and beliefs regarding putting customers first;

Strategy – creating superior value for a firm's customer;

Tactics – the set of cross-functional processes and activities directed at satisfying customers.

More recently, market orientation has been re-defined as a set of activities or behaviors relating to market intelligence gathering, dissemination cross-functionally within a firm, and the action of responses based on this intelligence. It has been suggested that market orientation involves an external or outward-looking perspective from a firm—a focus not only on customers but also on competitors. The firm's long-term focus on customers, competitors and the changing environment are suggested

as the three dimensions of market orientation (Deshpande 1999, Kohli and Jaworski 1990, Vazquez *et al.* 2001).

Vazquez *et al.* (2001) demonstrated the beneficial effects of market orientation on a company's innovation strategies and competitiveness, which was consistent with findings of mainstream research. The authors suggested that a market-oriented company which adopts a clear external focus in determining its customers' needs and wishes to satisfy them better than competition should practice a differentiation strategy to a greater extent. However, the authors also acknowledged "one of the most controversial recent debates", which concerns "whether market orientation fosters or leads to incremental development in product portfolios derived from modifications in customer preferences".

According to Vazquez *et al.* (2001), studying competitive strategies is another approach to analyze the influence of market orientation on firms' innovation. Companies pursuing differentiation strategies are supposed to be more market oriented. A long-term focus on technology management within company strategies is believed to reinforce the potential benefits of market orientation on innovation. The authors thus suggest that industrial firms keep the balance between technological and market orientations, considering the fact that industrial products are normally more complex than consumer products.

In this study, customer focus, competitor focus and long-term technology focus are employed as three key elements to test a company's market orientation.

3.4 Cultural concerns

Hofstede's cultural typology suggests five dimensions of culture: power distance, individualistic cultures, masculinity, uncertainty avoidance, and long term/short term orientation (Keegan and Green, 2000).

Li and Kwaku (1999) did a survey with Chinese high-tech firms investigating how Chinese national cultural values shape the interactions and decision-making behavior of NPD team members. The results suggest that marketing influence is significantly related to the new product development process. Because of the collectivist nature of Chinese culture and consensus decision-making in NPD in China, the degree of marketing impact depends on NPD context. When NPD activity is highly formalized, marketing influence is more likely to have a negative effect on NP performance. In addition, high risk avoidance would "lead to greater concern for formal procedures and communication, which results in slow and inflexible decision making".

This might partially explain why Chinese furniture companies are relatively conservative towards new product innovation by demonstrating preferences for incremental improvements rather than radical changes.

4. METHODS

Studying innovation in the context of the Chinese furniture industry is exploratory in nature due to the absence of previous research. With this, qualitative research was employed as the first stage of data collection to describe, illustrate and explain the topics of study. The second stage of data collection consisted of a regular quantitative questionnaire which tested the concepts and propositions obtained from the previous stage.

4.1 Qualitative research

The purpose of qualitative research is to identify key factors of the problem and “how” people think. A case study is one of the common ways of doing qualitative research. By definition, a case study is “an empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident” (Yin 1994). The case study inquiry “1) copes with the technically distinctive situation in which there will be many more variables of interest than data points, and as one result; 2) relies on multiple sources of evidence, with data needing to converge in a triangulating fashion, and as another result; 3) benefits from the prior development of theoretical propositions to guide data collection and analysis” (Yin 1994). Case studies are a preferred strategy for exploratory studies, “when questions such as ‘how’ and ‘why’ are being posed, when the investigator has little control over events” (Yin 1994).

4.1.1 Designing case studies

A research design is an action plan, or “blueprint”, that frames out key strategic steps during the whole research process from question designing to finding interpretation. Yin (1994) suggests five important components of a case study, they are:

- a study’s questions
- its propositions, if any
- its unit(s) of analysis
- the logic linking the data to the propositions
- the criteria for interpreting the findings

Identifying the type of research questions is the first and most important task in a case study. A basic categorization scheme for the types of research is “who”, “what”, “where”, “how”, and “why” (Yin 1994). These questions generally have both exploratory and explanatory functions. The exploratory function serves to provide “pertinent hypotheses and propositions for further inquiry” (Yin 1994), while the explanatory function serves to illustrate and evaluate causal relations (or linking) between propositions and findings.

Literature review is an effective way of determining the most relevant questions for a topic. As already discussed in Chapter 1, the main question for this study is “*What is innovation in the Chinese furniture industry?*” As this is an exploratory study, no propositions or pre-assumptions are made.

In the stage of qualitative research, China-based innovative furniture companies were carefully selected as units of analysis. Primary data was pooled through interviews with management-level officials, and generalized into a theoretical framework for the next stage of research.

4.1.2 Conducting interviews

There are six sources for data collection in case studies (Yin 1994): documentation, archival record, interview, direct observation, participation observation, and physical artifacts. Strengths and weaknesses of each of these sources are demonstrated in **Table 4** (Yin 1994).

Table 4. Six Sources of Data: Strengths and Weakness (Yin 1994)

| Source of Data | Strengths | Weaknesses |
|-------------------------|---|---|
| Documentation | -stable—can be reviewed repeatedly unobtrusive—not created as a result of the case study -exact—contains exact names, references, and details of events -broad coverage—long span of time, many events and many settings | -retrievability—can be low -biased selectivity, if collection is incomplete -reporting bias—reflects (unknown) bias of author access—may be deliberately blocked |
| Archival Records | <i>same as above for documentation</i> precise and quantitative | <i>same as above for documentation</i> accessibility due to privacy reasons |
| Interview | -targeted—focused, directly on case study topic -insightful—provides perceived causal inferences | bias due to poorly constructed questions response bias inaccuracies due to poor recall reflexivity—interviewee gives what interviewer wants to hear |
| Direct Observation | reality—covers events in real time contextual—covers context of event | time-consuming selectivity—unless broad coverage reflexivity—event may proceed differently because it is being observed cost—hours needed by human observers |
| Participant Observation | <i>same as above for direct observation</i> insightful into interpersonal behavior and motives | <i>same as above for direct observations</i> bias due to investigator's manipulation of events |
| Physical Artifacts | insightful into cultural features insightful into technical operations | selectivity availability |

An interview is designed to “give the investigator a means of collecting and treating qualitative data so that it may be both abundant and manageable” (McCracken 1988). There are four steps of inquiry involved in the research process (McCracken 1988):

Stage 1. Review of analytic categories & interview design. Exhaustive literature review is important in this stage to establish the foundation of the survey and “inventory of categories and relationships that the interview must investigate” (McCracken 1988).

Stage 2. Review of cultural categories and interview design. This is designed to “give the investigator an appreciation of his or her personal experience with the topic of interest” (McCracken 1988). Two processes are included: the first one is “familiarization”, which gives the investigator listening skills during interviews, the other one is “defamiliarization”, keeping the investigator a certain distance from his or her own deeply embedded assumptions (McCracken 1988).

Stage 3. Discovery of cultural categories and interview. This stage consists of two parts: questionnaire construction and field work.

Questions should be carefully designed and structured, and investigators should be able to encourage respondents to provide comments to exploit the topic to a deep level. In this study, questions were structured around the following concepts:

- Company biographic: respondents were asked to provide basic company information, including size, sales, types of ownership, target market (export or domestic selling), production style (branded manufacturers or original equipment manufacturers);

- Key concepts:
 - ▶ How would you define “innovation” and “innovativeness”?
 - ▶ Overall, do you think your company is innovative? Why?
 - ▶ Do you think your company is successful? Why?
- Further inquiry
 - ▶ What is your product strategy?
 - ▶ How would you define “new products”?
 - ▶ How do you differentiate yourself from competitors?
 - ▶ How do you maintain customers?
 - ▶ How to become an order winner, based on your company’s situation?
- General comments:
 - ▶ How would you comment on Chinese furniture market?
 - ▶ How would you predict the industry’s future development?

Selection of the appropriate informants is critical for the success of interviews.

Management-level interviews were conducted with 18 China-based furniture companies, which are located in major Chinese furniture production regions, including Beijing, Tianjin, Hebei Province (North China), Shanghai, Zhejiang Province (East China), and Guangdong Province (South China) (**Figure 15**).

All the companies interviewed were recommended by industry veterans as industry innovation leaders, in either one or more of the following aspects: products, process and business systems, which are identified as the three key

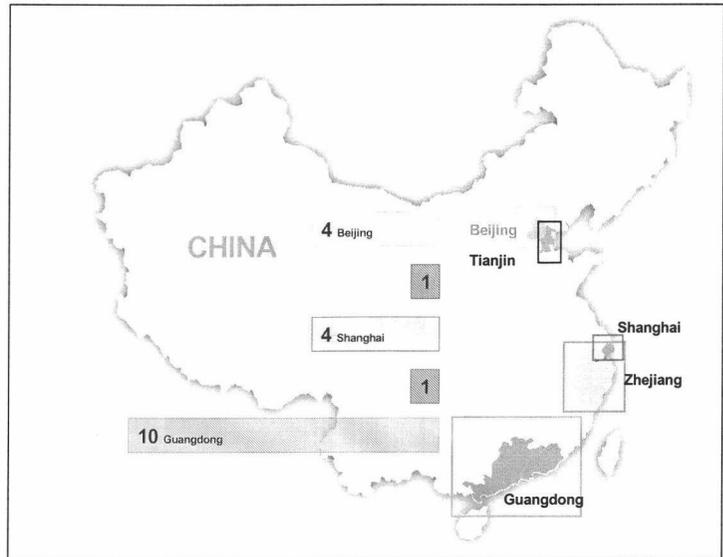


Figure 15. Interviews: Sample Distribution

measurements of innovation (Hovgaard and Hansen, 2004). All the 18 interviewees were company top-level administration people, including: 5 presidents, 6 general managers, 4 marketing managers, 2 product development managers and 1 production manager. The industry veterans were selected from either industry associations or academic institutes as follows:

- China National Furniture Association;
- Shanghai Furniture Trade Association;
- Shenzhen Furniture Association;
- Nanjing Forestry University;
- Furniture Magazine (Shanghai).

Stage 4. Discovery of analytic categories. Interviews were tape-recorded and careful verbatim transcription of interview data was performed. As the interviews were

conducted in Chinese, translation was also performed. This resulted in 52 pages of single-spaced text..

Analyses were conducted based on both tapes and transcribed text to “determine the categories, relationships and assumptions that form the respondent’s view of the world in general and the topic in particular” (McCracken 1988).

4.1.3 Interview Analysis

4.1.3.1 Company biographical

The eighteen companies interviewed had a diversified scope of business. Fifteen were both manufacturers and exporters specializing in upholstery furniture, wood household furniture or office furniture products. The three non-manufacturers were a big-box retailer, a trade association and a research institute. Retailers, trade associations and research institutes are inseparable parts of the industry in China. Interviews with these elements provided a holistic view of the innovation situation in the furniture industry in China.

In terms of ownership, all 15 manufacturers were non-state owned businesses, and 12 of them were either joint ventures or foreign-owned companies, coming from Taiwan, Hong Kong, Singapore, the U.S. and European countries.

4.1.3.2 Innovation, innovativeness and success

Q: How would you define innovation based on your company’s situation?

Most of the definitions made by respondents followed a cross-functional approach and covered a variety of areas (**Appendix 1**), including: product, material use,

marketing, technology, processing management, corporate culture and employees.

Respondents were generally positive toward contributions of innovation to success and competitiveness. Here are some example responses:

“Innovation can be defined as new product development, it also results from each employee’s participation... Innovation can bring us higher management efficiency, lower costs, higher profits, smoother distribution, less warehousing, faster delivery...innovation is the most powerful driver to company’s sustainable development”.

“Innovation should be viewed as a whole system...besides product design, innovation could be defined from perspectives of marketing, corporate mechanism, business model, production, employee, and positions...it [innovation] awards companies with new dynamism and core competencies”

“Innovation can be defined in terms of processing technology, production organization and material use”.

Q: How would you define innovativeness based on your company’s situation?

Once again, definitions of innovativeness were cross-functional and the concept was mainly perceived by respondents as the “leadership”, or “motivation” in developing competitiveness and corporate culture. Examples are:

“Innovativeness represents company’s various abilities...corporate spirit and culture determine corporate innovativeness...and innovativeness contributes to market competitiveness”;

“Industry innovativeness lies in information leadership...goes a step ahead of market changes”

“Innovativeness lies with people’s motivations to achieve changes—the inner desire to innovate. It is also a result of market demands from the outside”

In general, both the concepts of innovation and innovativeness are considered to be multi-faceted by the Chinese furniture industry people. In other words, innovation

and innovativeness are perceived as combined advantages coming from a variety of areas (**Appendix 2 and 3**). This cross-functional definition approach echoed the findings of previous studies (Krishnan and Ulrich 2001). Potential areas of innovation and innovativeness include: product, design, material, technology, processing, employee, management, culture, information, customer, competitor and sales. These areas are similar to findings by Hovgaard and Hansen (2003), which can be generalized into three larger groups:

| | |
|------------------|--|
| Product | product design, quality |
| Process | material, technology, processing |
| Business systems | employee, management, culture, customer, competitor, sales |

Q: In general, do you think your company is successful? Why?

This question was designed to investigate how “success” was understood by the Chinese industry people and where innovation fits. It was found that price and product were thought to be important factors for companies to succeed. Example:

“We are successful by supplying upper-end products for medium-lower price. ...Also we have good credit and reputation in the industry”

“I think, for a company to be successful, it should develop its own style and personality, in order to attract best resources. This is the core of innovation.”

4.1.3.3 New product development

As previously discussed, new product development is considered the core of innovation by past research. Understanding of Chinese company product strategies might be instrumental in gaining insights into their innovation orientations.

Q: What is your product strategy?

“Our products are not the best in the market, we see our products as ‘selected commodities’, which are better designed but affordable by most of the Chinese consumers”

“we change our products a little bit based on regular product styles (commodities) in the market. For example, we use specially designed hardware accessories to differentiate from competitors. But we just can not afford to pursue too many such changes (specialties)”

“As an exporter, we are producing commodities of few varieties...Specializing in manufacturing can help us achieve economies of scale...Services and marketing tactics are rarely needed by exporters, because local sales agencies will take care of all these issues. But things can be more complicated if we sell domestically”

It can be seen that commodity-type products with lower costs were most produced by these responding companies, although some companies also chose to develop specialty products, which, however, are based on commodity prototypes. In addition, there was some differentiation between exporters and domestic market-focused manufacturers, in terms of product strategies pursued (**Appendix 4**).

Q: How do you define new products/new product development?

Similarly, concepts of new products can have a variety of aspects, according to respondents (**Appendix 5**). For example:

“Contents of new product development include applications of new materials, new processing technology and new equipment.”

“Two styles of new product development--one being market-driven, which means products are developed to meet existing demands...the other being market-leading--products are developed as symbols of new lifestyles and to create demands”

“New products should be developed based on company’s unique resources and personalities. These are hard to be copied by competitors”

Further, the usual procedure for developing new products was introduced by respondents (**Appendix 6**). In terms of degrees of “new”, new product development is seen as a gradual process, or incremental improvements based on existing products, rather than abrupt changes or developing “totally new” products (**Appendix 7**). There is reason to believe that “incremental improvement” would be the new product development approach mostly pursued by the Chinese furniture companies. Examples are:

“Most of our R&D activities are continuous modifications of existing products...or based on customer orders”

“we develop new products by following these steps:
imitations–improvement–modifications–unique designs”

“Only by continuously improving the existing products in the market can we become stronger and more mature, and after that, we can have enough resources to develop our own designs”

From the evidence above, it can be seen that a majority of these responding companies are pursuing commodity strategies without significant improvements in product development. Possible reasons could be attributed to the lack of marketing orientation, or the lack of motivations to make big changes due to limited resources or cultural considerations. A further inquiry for potential sources of new product development ideas was conducted and the results revealed that consumers, competitors, retailers, trade shows and company management represented major contributors to new product development (**Appendix 8**). Examples:

“we are market-oriented, we collect information from trade shows, and raw material suppliers, based on sales records”

“we get market information by visiting retailers. We have our showroom in High Point”

“consumer tastes and information from customers determine our products”

4.1.3.4 Competitiveness

Q: What is your competitive advantage(s), if any?/how do you differentiate from competitors?

Most respondents think they are competitive, and their strengths mainly come from: cost leadership, technology leadership, new material use and product quality; while some respondents suggested market orientation, branding, corporate culture, product design and good supplier relations (the business systems and product aspects of innovation) as future sources of competitiveness.

“we use new materials and processing methodology to achieve lower costs and higher quality, as well as a differentiated processing...Our profits come from (cheap) material use, and good finishing skills”

“In earlier times, quality and automation were the key elements in determining competitiveness. But today, quality and automation are required, together with branding, corporate image, marketing, Corporate Identity system, and R&D and unique technology ”

“Processing (technology) leadership, the technology we used is new to our local competitors”

4.1.3.5 Future development

In the final stage of interviews, respondents were asked to comment on the industry or company’s future development, based on their knowledge and experience. Results reveal that none of the respondents doubted the industry’s potency to grow stronger in the future. Regarding future planning for innovation, automation/technology

would be on the top of the list. Meanwhile, value-adding commodity production would be increasingly pursued in the industry. Adoption of mass customization in the Chinese furniture industry, however, was less positively perceived than expected by the investigator (**Appendix 9**). Examples:

“the Chinese furniture industry and market are simply characterized by supply chain and commodity market. Mass customization is based on highly sophisticated manufacturers and distributors (retailers), which don’t exist today. The basic drive for a concept to be adopted by industry is market demands, which are not yet seen today”

“we manufacturers want to adopt automation...we need to pursue innovation both internally to reduce costs and externally to improve market performance”

4.1.4 Theory development

A conceptual innovation model for the Chinese furniture industry was developed based on interview analysis (**Figure 16**). The model consists of two major parts from left to right: innovation sources, innovation focuses of today, and in the future.

4.1.4.1 Innovation sources

Innovation sources are potential contributors to innovation and new product ideas. They can also be drivers that gear manufacturers up to pursue innovation actively. With this, innovation sources can be grouped into two large categories—push factors and pull factors—depending on their specific positions and functions along the industry value chain. Push factors in this case represent chain members and competitors driving companies toward innovation, before products reach customers. On the other hand, pull

factors mainly refer to market feedback from business customers and end consumers guiding companies to seek innovation.

A strong export orientation, measured in terms of the percentage of exports as a proportion of total annual sales, is an important characteristic of the Chinese furniture industry. Many exporting companies in China are or will sell both overseas and in domestic markets. Domestic sales will likely outgrow exports in the near future, as a combined result of increasing global competition and pent-up Chinese market demands. These companies, as new entrants into the domestic Chinese market, definitely pose challenges to existing players. An understanding of innovativeness of these exporting companies would thus provide evidence for predicting future market competition and industry trends.

In **Figure 16**, the dotted arrows represent uncertain relationships between the two groups of factors and three innovation categories (focuses), which were to be measured via quantitative analysis. Export orientation is listed as a separate factor that could possibly be related to any innovation focus.

4.1.4.2 Innovation today and future

Business systems, process and product are identified as the three categories (focuses) of innovation (Hovgaard and Hansen, 2004). According to interviews, this categorization also applied to Chinese furniture companies.

The future innovation focus of the industry was the question of interest that was explored in the quantitative survey. This information can be used to evaluate the current industry competition strategies and future competitiveness.

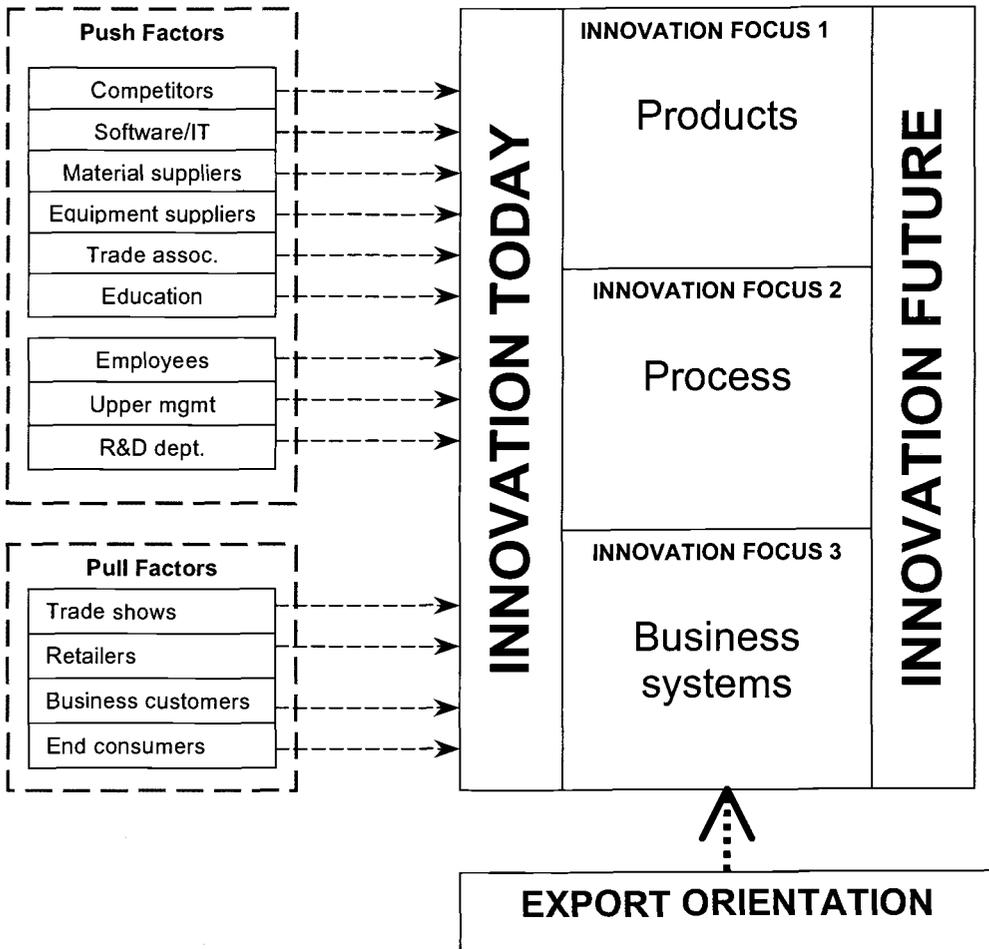


Figure 16. Conceptual Innovation Model

4.2 Quantitative Research

A quantitative survey was conducted as the second stage of research to collect data on a wider basis with exposure to a range of industry sectors.

4.2.1. Population definition

The target population was composed of all furniture related firms based in China, including furniture manufacturers, traders, suppliers, and design agencies.

Manufacturers refers to furniture product makers, such as upholstered furniture, wood household furniture, kitchen furniture and cabinets. These manufacturers are located downstream in the industry chain as secondary manufacturers.

Traders refers to retailers and wholesalers who are responsible for distributing finished furniture products from manufacturers to end consumers.

Suppliers in this study were defined as furniture raw material and accessory producers and/or traders, such as lumber, coating and hardware manufactures. Suppliers are located upstream in the industry chain as primary manufacturers, and dealing directly with furniture makers, rather than end consumers.

Design agencies represent an emerging new business type in the Chinese furniture industry, providing product design and related consulting services to both industry customers and end consumers.

In terms of ownership, China-based, foreign-owned companies and joint ventures were also considered as target population for this survey, given their significant presence and contributions to industry revenues.

4.2.2. Sample

The industry's large population and wide geographical distribution, made sub-sampling an appropriate method for data collection for this survey. The sample was selected on the site of the Shenzhen Furniture International Expo. (held March 17th to 20th, 2004), in South China's Guangdong Province. The show is sponsored by the Shenzhen Furniture Association and held semi-annually every spring (March) and fall (August). Products exhibited in the show are mainly upholstery and household panel furniture products, with 65% of exhibitors coming from Shenzhen and its neighboring areas. Past statistics indicate that the four-day event attracts an average 40,000 visitors, of which 53% are furniture traders (retailers and wholesalers), 15% material merchants and 10% designers. Furniture manufacturers account for less than 13% (SZFA 2004).

4.2.3. Data collection

The Softwood Export Council (SEC) and Oregon State University jointly participated in the show with a standard-sized booth (10'x10') . The SEC's backdrop, softwood samples and Chinese publications were displayed during the show. In addition, to achieve the best possible results and increase exposure, a feature article for this survey was published in the show's newsletter (**Appendix 19**).

Three student helpers were hired to assist with the data collection. They were aware of the survey contents and survey ethics, and were asked not to provide any misleading information when answering respondent questions (**Figure 17**).

The booth setting was made more inviting and comfortable by providing bottled water and seating for respondents. Visitors were invited to the booth to fill out the question form with the assistance of interviewers. Visitors were pre-screened on the basis of business areas and position to make sure that respondents had the knowledge, opinions, or facts that would be relevant to this survey. Respondents' business cards, if provided, were attached to questionnaire forms for position analysis. Interviewers were required to go through the details of each question and choice on the questionnaire and read to respondents. This helped to minimize potential mistakes from misreading.



Figure 17. On-site Questionnaire Survey

4.2.4 Data analysis

4.2.4.1 Frequency distribution

Frequency distribution reports the number of each item (category) in the question received and is the simple way of determining the empirical distribution of the variable (Aaker et al. 1995). There are two types of frequency distributions: percentage breakdown (pie chart) and histogram (bar chart). Descriptive statistics including mean, median, mode, standard deviation can be used to report frequency distribution. In most marketing research applications, only sample means and/or percentages are reported (Aaker et al 1995).

4.2.4.2 ANOVA

An analysis of variance (ANOVA) can be used to compare the differences between three or more mean values of sub-groups of interest. This is an accurate tool for multi-comparisons (Gall *et al* 1999). ANOVAs were used to test for differences among the mean values of three types of innovation: product, process and business systems. The underlying assumption was that these three aspects of innovation were equally weighted and comparable to each other.

4.2.4.3 Correlation analysis

Correlation analysis was used to measure the strength of the relationship between two or more variables (Aaker et al. 1995). A major advantage of correlation analysis is that researchers can explore a variety of relationships in the same study. The main

purpose of using correlation analysis in this study was to explore the relationships between variables of interest, such as innovativeness, competitiveness and export orientation.

4.2.5 Questionnaire development

4.2.5.1 Attitude measurement

Most questions in this survey were designed to measure attitudes or respondents perceptions about innovation (**Appendix 20**). Measurement can be defined as “a standardized process of assigning numbers or other symbols to certain characteristics of the objects of interest, according to some pre-specified rules”(Aaker et al. 1995). Scaling is “the process of creating a continuum on which objects are located according to the amount of the measured characteristics they possess” (Aaker et al. 1995).

4.2.5.2 Question Design

- Respondent demographic information

We collected information about the respondents’ business scope and size. Based on statistics of past shows, furniture retailers, wholesalers, material suppliers, manufacturers and designers were the major attendee groups (SZFA, 2004). Some manufacturers may also indicate themselves to be traders, if they own direct market outlets such as chain stores. In this case, respondents were asked to specify only one area as their key business type. Company size was determined by number of employees, which was divided into five groups: 1-50, 51-100, 101-250, 251-500 and 501+.

Question 1: Please check the category that best represent your company's business style.

- Manufacturer
- Wholesaler
- Retailer
- Supplier
- Designer
- Other (please specify): _____

Question 2: How many employees are there in your company?

- 1-50
- 51-100
- 101-250
- 251-500
- 501+

Question 3 (Appendix 20) was designed to understand market awareness of U.S. softwood species for market studies by the Softwood Export Council. Details related to this question are not discussed in this study.

- Self-evaluation of innovativeness

Respondents were asked to evaluate their company's current innovation activities in terms of each of the three aspects of innovation: products, process and business systems, based on a 1-5 likert scale, in which 1 represented "not innovative at all", and 5 was "strongly innovative". The same people were also asked to predict their company's future innovation performance by using the same criteria.

Recall from the conceptual innovation model (**Figure 16**) that the purpose for designing this questionnaire was to identify the current and future innovation focus today and the one in the future within the Chinese furniture industry. Combining the

data of the two questions of interest (Question 4 and Question 8, **Appendix 20**) also allows us to explore the relationship between innovation and competitiveness.

Question 4: Based on 1-5 scale, please evaluate the following areas in your company regarding today's status AND future's trend?

| | | Not innovative at all | | Somehow not innovative | | Average | | Somehow innovative | | Very innovative | |
|--|-------------|-----------------------|---|------------------------|---|---------|---|--------------------|---|-----------------|---|
| Product innovation (e.g. design, function) | | | | | | | | | | | |
| TODAY | IN 10 YEARS | 1 | 1 | 2 | 2 | 3 | 3 | 4 | 4 | 5 | 5 |
| Processing innovation (e.g. tech and material use) | | | | | | | | | | | |
| TODAY | IN 10 YEARS | 1 | 1 | 2 | 2 | 3 | 3 | 4 | 4 | 5 | 5 |
| Business systems innovation (e.g. marketing) | | | | | | | | | | | |
| TODAY | IN 10 YEARS | 1 | 1 | 2 | 2 | 3 | 3 | 4 | 4 | 5 | 5 |

- Innovation sources

Respondents in management-level interviews were asked to define and comment on innovation, innovativeness and sources for innovation ideas. A list of selected industry key players were identified as the most likely innovation sources, which were commonly mentioned by the interviewees. Survey respondents were asked to evaluate these potential sources using a 1-5 likert scale, from “strongly disagree” to “strongly agree”.

Question 5: Please indicate the degree of agreement for each of the following areas based on what drives innovation in your company:

| In my company, ideas for innovation can be illuminated by... | Totally Disagree | Cautiously disagree | Neutral | Cautiously agree | Totally agree |
|--|------------------|---------------------|---------|------------------|---------------|
| Raw material suppliers | 1 | 2 | 3 | 4 | 5 |
| Industrial customers (upstream customers), | 1 | 2 | 3 | 4 | 5 |
| Upper management | 1 | 2 | 3 | 4 | 5 |
| Retailers | 1 | 2 | 3 | 4 | 5 |
| Trade associations | 1 | 2 | 3 | 4 | 5 |
| Processing technology suppliers (e.g. equipment) | 1 | 2 | 3 | 4 | 5 |
| Competitors | 1 | 2 | 3 | 4 | 5 |
| Employees | 1 | 2 | 3 | 4 | 5 |
| End consumers | 1 | 2 | 3 | 4 | 5 |
| Information technology suppliers (e.g. software) | 1 | 2 | 3 | 4 | 5 |
| Product design dept/agencies | 1 | 2 | 3 | 4 | 5 |
| Educational/research institutions | 1 | 2 | 3 | 4 | 5 |
| Trade shows (e.g. furniture, material shows) | 1 | 2 | 3 | 4 | 5 |
| Others: | 1 | 2 | 3 | 4 | 5 |

- New product development and material use perceptions

This question was composed of three statements that might represent common perceptions held by the Chinese furniture manufacturers from interviews regarding material use and new product development. Respondents were asked to evaluate these statements based on a 1-5 likert scale from “strongly disagree” to “strongly agree”.

Question 6: Based on 1-5 scale, please evaluate each of the following statements:

| | Totally Disagree | Cautiously disagree | Neutral | Cautiously agree | Totally agree |
|---|------------------|---------------------|---------|------------------|---------------|
| When developing new products, we will always consider new material and its supplying issues. | 1 | 2 | 3 | 4 | 5 |
| It is very unlikely for us to adopt certain new materials before we see proven (existing) market prospects (demands) for them. | 1 | 2 | 3 | 4 | 5 |
| Rather than radical changes, new product development should be based on company's existing lines (resources), with small modifications. | 1 | 2 | 3 | 4 | 5 |

- Export orientation

Given the Chinese furniture industry's strong exporting capabilities, this question is concerned with the relations between company's export orientation and company's ambitions to innovate. Respondents are asked to indicate the share of the company's export sales out of annual sales in 2003. Export orientation is thus measured in terms of the percentage of export of total sales, the higher the percentage of exports, the higher degree of export orientation.

- Competitiveness assessment

Lastly, respondents are asked to evaluate the company's current competitive positions in areas of company sales, sales growth rate, and profitability, respectively.

Question 8: Please indicate the category that in your opinion best approximates how your operation compares with other competitors in your industry during the most recent year.

| | Much lagged behind competitors | Moderately lagged behind competitors | Equal with competitors | Moderately ahead of competitors | Much ahead of competitors |
|----------------------------|--------------------------------------|---|---------------------------|---------------------------------------|------------------------------|
| Sales Level | 1 | 2 | 3 | 4 | 5 |
| Sales Growth Rate | 1 | 2 | 3 | 4 | 5 |
| New product development | 1 | 2 | 3 | 4 | 5 |
| Profitability | 1 | 2 | 3 | 4 | 5 |
| Others: | 1 | 2 | 3 | 4 | 5 |

4.2.5.3 Hypothesis testing

The purpose of hypothesis testing is to assume the differences between the hypothesized population parameter and the actual sample (Aaker et al. 1995). The null hypothesis is usually defined as an argument that no difference or relationships exist between two groups, and falls outside the cut-off limits, beyond which a null hypothesis will be rejected. Testing at higher significance levels increases the likelihood that a null hypothesis will be rejected when it is true (Aaker et al. 1995).

In this study, the null hypotheses tested included:

- Company competitiveness has nothing to do with innovativeness.
- Neither company size nor business type was related to company innovativeness.
- No significant difference exists among the three categories of innovativeness: product, process and business systems;
- Export orientation has no significant relationship to company innovativeness.

4.2.5.4 Pretest

A pretest was used to make sure that the information obtained from the questionnaire would meet researcher expectations, and allowed the researcher to identify and correct potential deficiencies which might not have been spotted by the question designer.

A pretest of 80 participants was conducted in February 2004 during the WoodMac show in Shanghai, China, at the booth of the Softwood Export Council. Feedback from both interviewers and respondents indicated that the questionnaire was too long, and that some questions were apparently not appropriate for on-site surveys. For example, it was found that likert scale type questions got better results than point-allocating questions, in which respondents were asked to allocate a certain number of points among items of interest. As a result, point-allocating questions were converted into likert scale questions, as seen in *Question 5 (Appendix 20)*.

5. RESULTS AND DISCUSSION

Two hundred and sixty-three (263) responses were collected during the three-day on-site survey, of which 128 were fully completed questionnaires. Incomplete responses could be attributed to unwillingness to answer, lack of relevant knowledge, lack of time on the part of respondents, and interruptions by incoming visitors to the booth. Non-responses resulted in different sample sizes for each question in the questionnaire.

5.1 Respondents' demographics

A total of 249 complete responses were collected for *Questions 1* and *2* (**Appendix 20**). In terms of positions of respondents, 87 were department managers, 85 sales, 42 designers, and 35 others.

In *Question 1*, respondents were asked to specify their company's main business area by checking only one of the six options listed. Around 50% of respondents were from manufacturing companies, followed by traders (30%). Companies categorized as "others" represent a diverse range of business types including fabrics, education, architecture, and advertising. (**Figure 18**). The mix of respondents was quite different

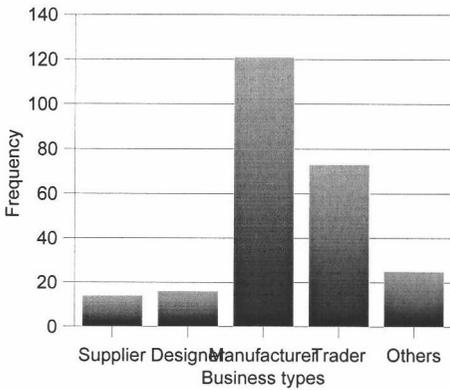


Figure 18. All Respondents by Business Type

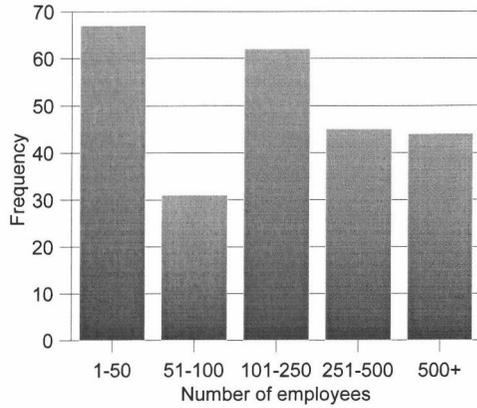


Figure 19. All Respondents by Company Size

from previous show demographics. A possible explanation of the differences is that show organizers may follow a different classification system to expand the traders group in order to attract more manufacturers to exhibit in the show.

Figure 19 and **Figure 20** provide summarized data on company size for all respondents and manufacturers, respectively. For all respondents, smaller companies with a range of 1-100 employees represented almost 40% of the respondents, followed by larger companies with more than 250 employees (36%), and medium-sized companies (101-250 employees) (24%) (**Table 5**). This is generally consistent with industry demographics, in which smaller-to medium-sized companies make up the majority of the total population (**Section 2.2.1**).

Although the sample obtained in the

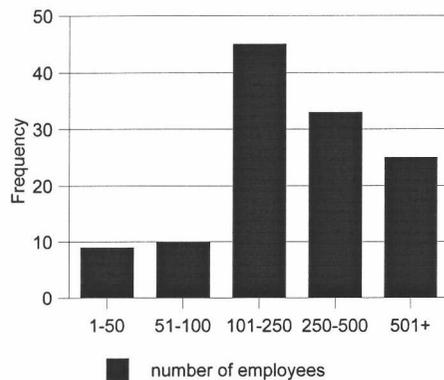


Figure 20. Manufacturers by Company Size

survey contained a wide range company types, manufacturers were the main focus of the research. Accordingly, the following results are reported for “all respondents” (n=249) and “manufacturers” (n=122). Breaking down manufacturers by size, medium-sized companies formed the largest sector (37%), followed by larger companies (48%) (**Table 5**).

Table 5. Company Sizes of All Respondents and Manufacturers

| | Smaller companies (1-100 employees) | Medium companies(101-250 employees) | Larger companies (>250 employees) | Total |
|-----------------|--|---|--------------------------------------|-------|
| All respondents | 98 | 62 | 89 | 249 |
| Manufacturers | 19 | 45 | 58 | 122 |

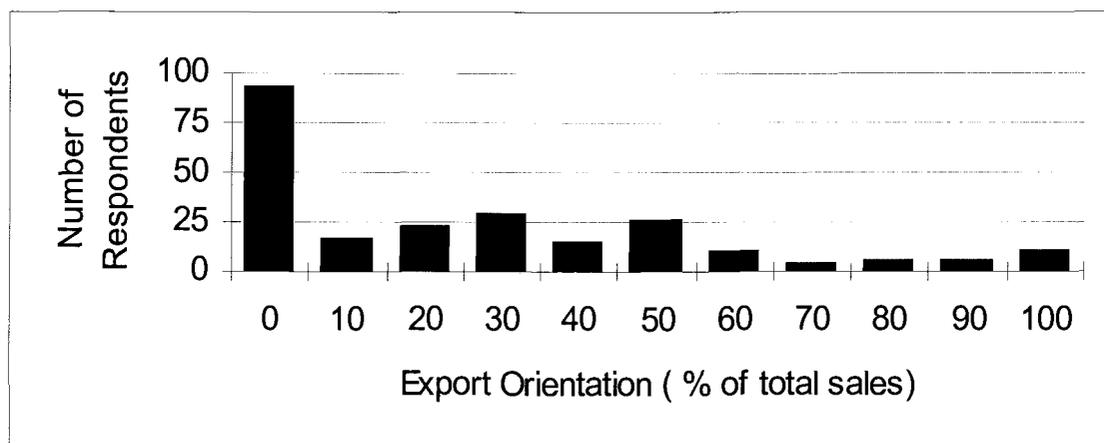
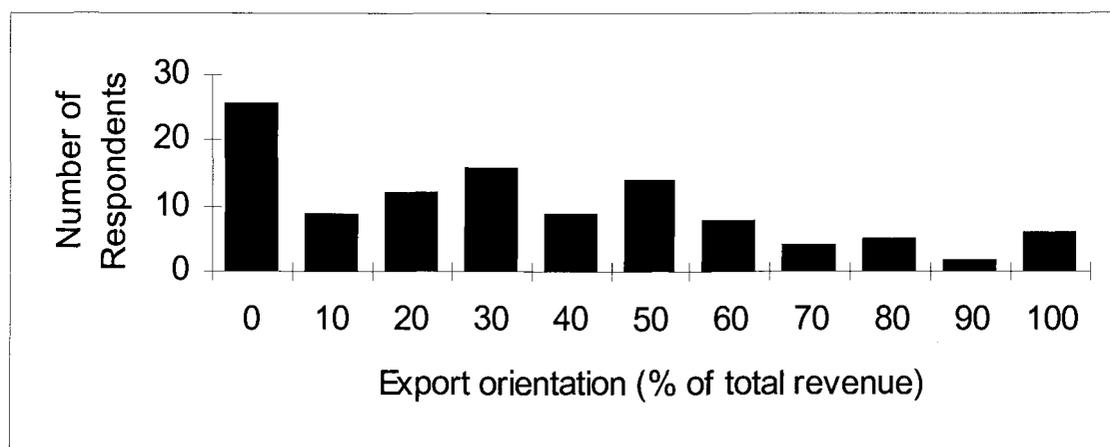
5.2 Export orientation

Question 7 (Appendix 20) was designed to investigate export orientation, measured in terms of export sales as a percentage of total sales revenue. The two hundred and forty-four (244) responses showed that export orientation was highly skewed away from domestic-selling companies (**Figure 21**). Ninety-three (93) companies (38%) were identified as 100% domestic market sellers (0% export). Less than 25% of the respondents had an apparent export orientation with export sales accounting for 60%-100% of total annual revenue.

The export orientation of manufacturers was more evenly distributed (**Figure 22**). Twenty percent (20%) of the respondents demonstrated an apparent orientation towards exports, while less than 25% (26) of manufacturers were non-exporters (**Table 6**).

Table 6. Export Orientation of All Respondents and Manufacturers

| | Non-exporters (0% revenue) | Moderate exporters (1-50% revenue) | Heavy exporters (>60% revenue) | Total |
|-----------------|----------------------------|------------------------------------|--------------------------------|-------|
| All respondents | 93 | 112 | 39 | 244 |
| Manufacturers | 26 | 60 | 25 | 111 |

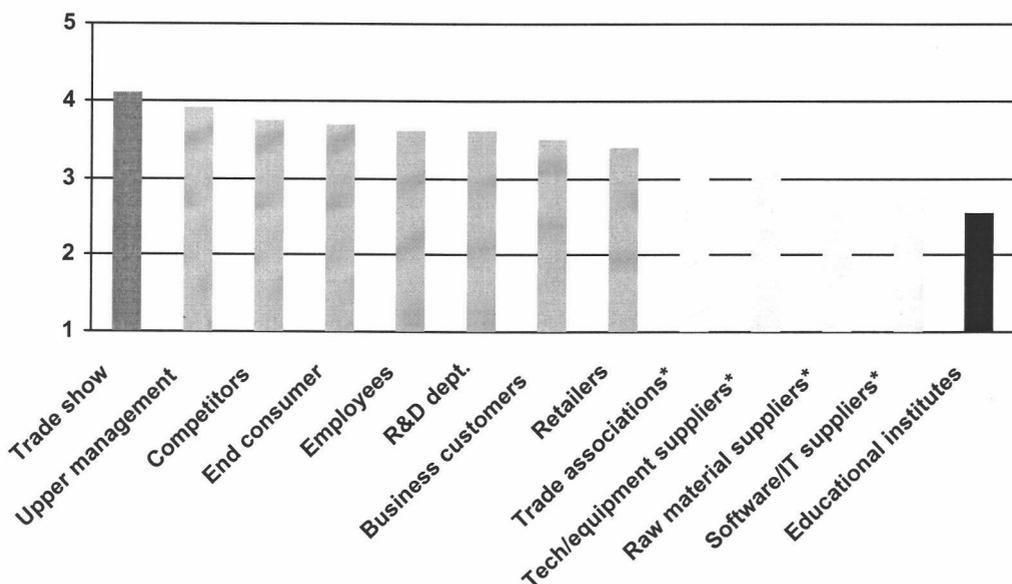
**Figure 21. Export Orientation by All Respondents****Figure 22. Export Orientation by Manufacturers**

5.3 Innovation sources

Question 5 (Appendix 20) provided a list of key industry players as potential innovation contributors, as identified by previous management-level interviews.

This question was novel to most Chinese respondents, and demanded more time and thinking from respondents than any other survey question. As a result, only 157 respondents provided complete answers to this question.

The ratings of the potential innovation contributors (**Figure 23**) indicated that trade shows, upper management, competitors, end consumers, R&D department, employees, business customers, retailers were among the top sources for innovation. Mean likert scale values were all significantly higher than the middle point of 3 ($p < 0.01$); while educational institutes received the lowest rating (2.54) among all the listed items ($p < 0.01$). Trade associations, technology/equipment suppliers, raw material

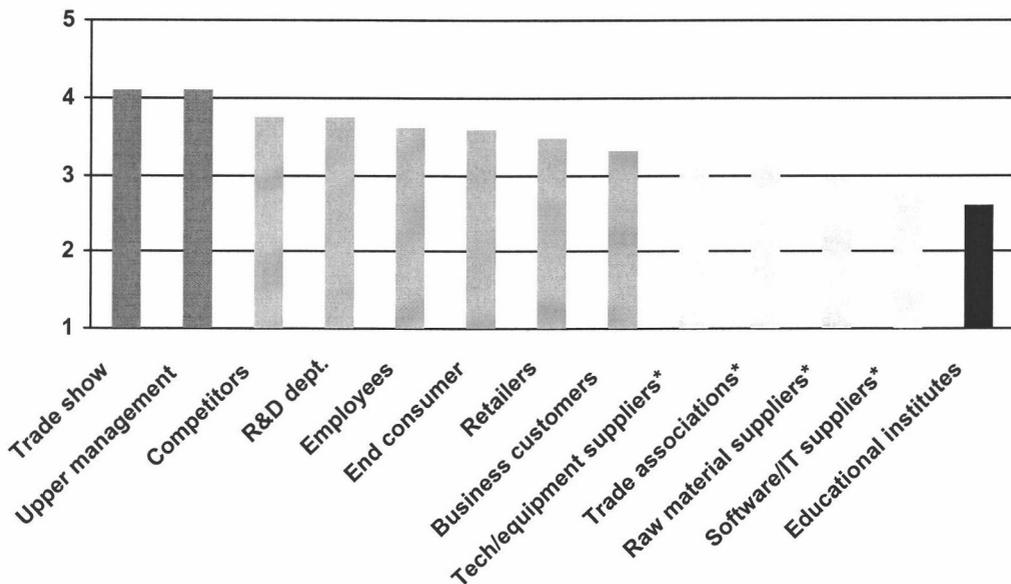


* denotes value is non-significant different from the midpoint of 3 ($\alpha = 0.05$)

Figure 23. Potential Innovation Sources Rated by All Respondents

suppliers, and software/IT suppliers were not significantly different from 3 ($p>0.05$) (Appendix 10).

Very similar results were found for manufacturers (Figure 24). The roles of trade shows, upper management, competitors, end consumers, R&D, employees, business customers and retailers in driving company innovation were perceived to be significantly higher than the midpoint of 3 ($p<0.05$). Educational institutes were rated the lowest with a the mean value significantly lower than 3 ($p<0.01$). There was no



* denotes value is non-significantly different from the midpoint of 3 ($\alpha=0.05$)

Figure 24. Potential Innovation Sources Rated by Manufacturers

(1: totally disagree, 5: totally agree)

evidence suggesting a significant difference between the mean values of trade associations, technology/equipment suppliers, raw material suppliers, or software/IT suppliers and the midpoint of 3 (Appendix 10).

5.4 Industry Innovativeness

In *Question 4 (Appendix 20)*, respondents were asked to assess company innovativeness in terms of product, process and business systems, respectively. To predict future changes, the same respondents were asked to compare innovation today and the situation 10 years in the future for each

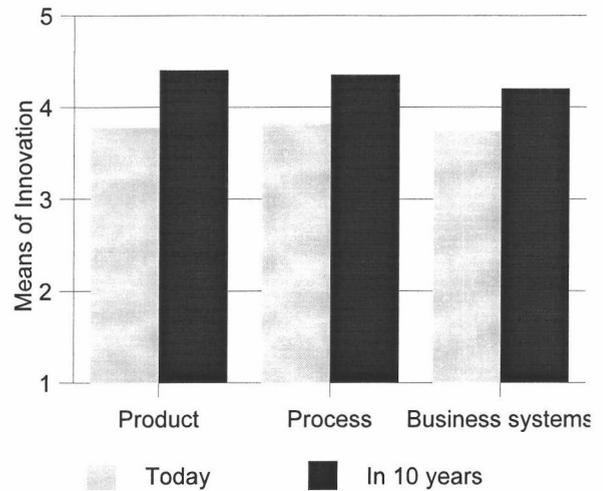


Figure 25. Innovativeness Today and Future by All Respondents
(1: not innovative at all, 5: very innovative)

category. The mean differences between innovativeness today and in the future represents the degree of future changes in innovativeness for each category. These differences can be used to test innovation ambitions for future changes or to what extent the innovativeness of a category will change in 10 years.

A total of 233 complete responses were collected for this question (**Figure 25**). Respondents generally considered their companies to be more innovative than the midpoint of 3 (**Appendix 11**) and expected that they would become more innovative in 10 years ($p < 0.01$) (**Appendix 12**).

No significant differences were found among categories for current innovation. A clear difference existed between product and business systems, and between process and business systems for future innovation (in 10 years); but no significant differences were detected between product and process innovation (**Appendix 11**). This provides convincing evidence that future innovativeness in business systems (in 10 years) in the

Chinese furniture industry were generally rated lower than the other two categories ($p < 0.05$) (**Appendix 11**). As mentioned earlier, company ambitions for future changes in innovativeness can be measured in terms of the difference between mean values of future innovation categories and their corresponding category means for innovation today. However, there was no convincing evidence that significant differences existed among categories. (**Appendix 13**) ($p \geq 0.05$). This suggests that there is a clear intention within the industry to be more innovative in the future in all three aspects of innovation, while no category of innovation will likely be changed to a significantly greater degree than the others. Similar findings were also identified for manufacturers (**Figure 26**), except that future product innovativeness was rated significantly higher than business systems ($p < 0.05$) (**Appendices 14 and 15**).

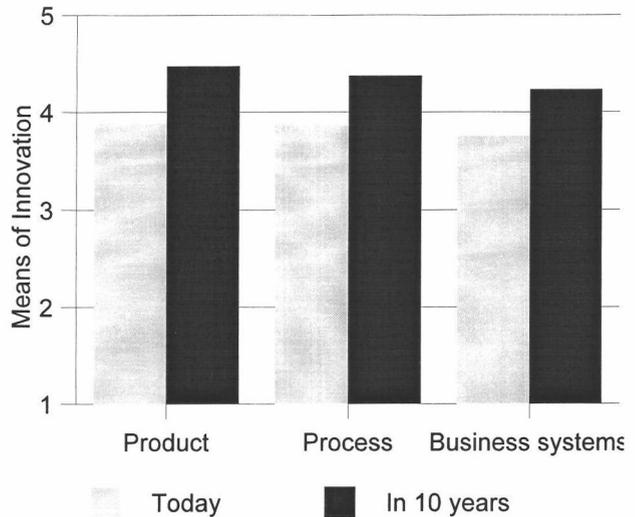


Figure 26. Innovativeness Today and Future by Manufacturers

(1: not innovative at all, 5 very innovative)

5.4.1 Differences in innovativeness by export orientation

Innovativeness was compared among groups of non-exporters, moderate exporters (with 1-50% export sales of revenue) and heavy exporters (with >50% export sales of revenue) of all the respondents, as well as of manufacturers (Table 7 and Table 8).

Table 7. Differences in Innovativeness by Export Orientation by All Respondents (ANOVA)

| Export orientation (mean value) | | Mean difference | Sig. | |
|--|---------------------------|---------------------------|---------|------|
| Product innovativeness today | Non-exporters (3.56) | Moderate-exporters (3.86) | -0.30** | 0.02 |
| | | Heavy-exporters (3.74) | -0.18 | 0.49 |
| | Moderate-exporters (3.86) | Heavy-exporters (3.74) | 0.12 | 0.71 |
| Business systems innovativeness future | Non-exporters (4.08) | Moderate-exporters (4.37) | -0.29** | 0.03 |
| | | Heavy-exporters (4.00) | 0.08 | 0.87 |
| | Moderate exporters (4.37) | Heavy exporters (4.00) | 0.34** | 0.04 |

** denotes significant difference at the level of 0.05

For all the respondents, non-exporter current product innovativeness and future business innovativeness were significantly lower than those for moderate exporters ($p < 0.05$). Future innovativeness in business systems for moderate exporters was also significantly higher than that for heavy exporters ($p < 0.05$).

Table 8. Differences in Innovativeness by Export Orientation for Manufacturers (ANOVA)

| | Export orientation (mean value) | | Mean difference | Sig. |
|--|---------------------------------|---------------------------|-----------------|------|
| Process innovativeness today | Non-exporters (3.88) | Moderate-exporters (3.97) | -0.09 | 0.89 |
| | | Heavy-exporters (3.50) | 0.38 | 0.20 |
| | Moderate-exporters (3.97) | Heavy-exporters (3.50) | 0.47** | 0.04 |
| Business systems innovativeness future | Non-exporters (4.08) | Medium companies (4.41) | -0.33 | 0.15 |
| | | Heavy exporters (3.92) | 0.16 | 0.71 |
| | Moderate exporters (4.41) | Heavy exporters (3.92) | 0.49** | 0.02 |

** denotes significant difference at the level of 0.05

For manufacturers, moderate exporters tended to be more innovative than heavy exporters in terms of current process innovativeness and future business systems innovativeness.

The results suggest that manufacturers selling both in domestic and overseas markets, with a major focus on the domestic Chinese market, tend to be more innovative in current process and also in future business systems than heavy exporters. Of all business types, moderate exporters tended to be more innovative in current product innovativeness and future business systems. Heavy exporters tend to be less innovative than moderate exporters in future business systems.

5.4.2 Differences in innovativeness by company size

Innovativeness was compared based on company sizes. Of all the respondents, large companies tended to be significantly more innovative than small companies in terms of current product innovativeness, future business system innovativeness, future

process innovativeness, as well as current and future overall innovativeness (**Table 9**).

For manufacturers, large companies also demonstrated higher innovativeness than small companies, in terms of current product, future business systems, and overall current and future innovativeness (**Table 10**).

There was no significant difference in the categories of innovativeness between small- and medium-sized groups.

Table 9. Differences in Innovativeness by Company Size for All Respondents (ANOVA)

| | Company size (mean value) | | Mean difference | Sig. |
|--|---------------------------|-------------------------|-----------------|------|
| Product innovativeness today | Small companies (3.62) | Medium companies (3.70) | -0.08 | 1.0 |
| | | Large companies (3.92) | -0.30** | 0.04 |
| | Medium companies (3.70) | Large companies (3.92) | -0.22 | 0.34 |
| Business systems innovativeness future | Small companies (4.09) | Medium companies (4.17) | -0.06 | 1.0 |
| | | Large companies (4.37) | -0.28** | 0.04 |
| | Moderate companies (4.17) | Large companies (4.37) | -0.28 | 0.44 |
| Process innovativeness future | Small companies (4.17) | Medium companies (4.33) | -0.16 | 0.47 |
| | | Large companies (4.56) | -0.39* | 0.00 |
| | Medium companies (4.33) | Large companies (4.56) | -0.23 | 0.17 |
| Overall innovativeness today | Small companies (3.66) | Medium companies (3.74) | -0.08 | 0.69 |
| | | Large companies (3.92) | -0.26** | 0.03 |
| | Medium companies (3.75) | Large companies (3.92) | -0.17 | 0.31 |
| Overall innovativeness future | Small companies (4.19) | Medium companies (4.27) | -0.08 | 0.17 |
| | | Large companies (4.49) | -0.30* | 0.00 |
| | Medium companies (4.27) | Large companies (4.49) | -0.22 | 0.07 |

* denotes difference is significant at 0.01 level, ** denotes difference is significant at 0.05 level

Table 10. Differences in Innovativeness by Company Size for Manufacturers (ANOVA)

| | Company size (mean value) | | Mean difference | Sig. |
|--|---------------------------|-------------------------|-----------------|------|
| Product innovativeness today | Small companies (3.50) | Medium companies (3.84) | -0.34 | 0.29 |
| | | Large companies (4.04) | -0.54** | 0.04 |
| | Medium companies (3.84) | Large companies (4.04) | -0.20 | 0.31 |
| Business systems innovativeness future | Small companies (3.75) | Medium companies (4.19) | -0.45 | 0.11 |
| | | Large companies (4.41) | -0.66* | 0.01 |
| | Moderate companies (4.19) | Large companies (4.41) | -0.22 | 0.30 |
| Overall innovativeness Today | Small companies (3.52) | Medium companies (3.80) | -0.28 | 0.28 |
| | | Large companies (3.97) | -0.45** | 0.03 |
| | Medium companies (3.52) | Large companies (3.97) | -0.17 | 0.35 |
| Overall innovativeness Future | Small companies (4.10) | Medium companies (4.30) | -0.20 | 0.09 |
| | | Large companies (4.51) | -0.41* | 0.00 |
| | Medium companies (4.30) | Large companies (4.51) | -0.13 | 0.24 |

* denotes difference is significant at 0.01 level, ** denotes difference is significant at 0.05 level

5.5 Industry Competitiveness

In *Question 8 (Appendix 20)*, respondents were asked to evaluate company competitiveness in terms of “sales level”, “sales growth rate”, “profitability”, and “new product development”.

Two hundred and thirty-five (235) complete responses were collected. All four categories were significantly higher than the scale midpoint of 3 ($p < 0.01$) (**Figure 27**) (**Appendix 16**). Competitiveness in terms of sales growth rate, sales level and new product development were rated significantly higher than was profitability ($p < 0.05$) (**Appendix 17**). This means that respondents generally perceived their companies to be more competitive than major competitors, with special strengths in sales performance (sales level and sales growth rate) and new product development. Profitability was widely perceived as the least competitive area across the industry.

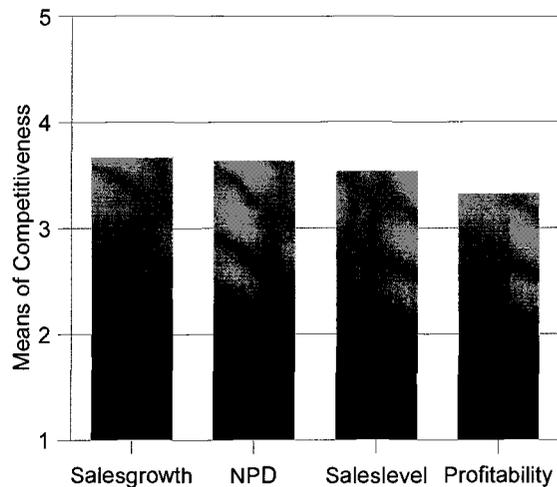


Figure 27. Industry Competitiveness by All Respondents
(1: much lagged behind competitors
5: much ahead of competitors)

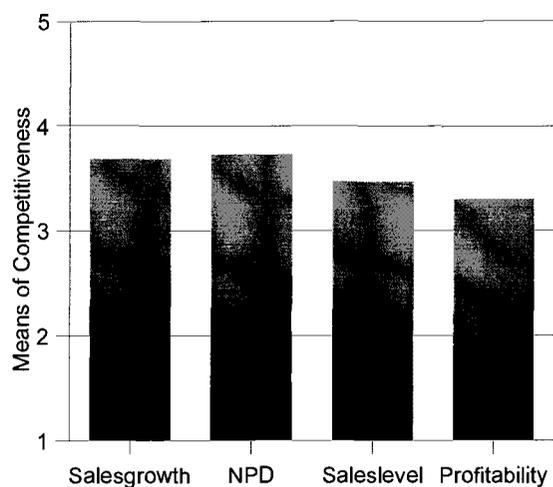


Figure 28. Industry Competitiveness by Manufacturers
(1: much lagged behind; 5: much ahead of competitors)

Findings for manufacturers were similar (**Figure 28**), except that the difference between profitability and sales level was not significant (**Appendices 16 and 17**).

5.5.1 Differences in competitiveness by export orientation

For all respondents, moderate exporters tended to be more competitive than non-exporters in terms of sales growth rate, new product development, and overall competitiveness (**Table 11**). However, no such differences were detected for manufacturers.

Table 11. Differences in Competitiveness by Export Orientation for All Respondents (ANOVA)

| | Export orientation (mean value) | | Mean difference | Sig. |
|-------------------------|---------------------------------|---------------------------|-----------------|------|
| Sales growth rate | Non-exporters (3.47) | Moderate-exporters (3.87) | -0.40* | 0.00 |
| | | Heavy-exporters (3.51) | -0.04 | 0.96 |
| | Moderate-exporters (3.87) | Heavy-exporters (3.51) | 0.36 | 0.07 |
| New product development | Non-exporters (3.45) | Moderate-exporters (3.82) | -0.37* | 0.01 |
| | | Heavy-exporters (3.60) | -0.18 | 0.49 |
| | Moderate exporters (3.45) | Heavy exporters (3.60) | 0.12 | 0.70 |
| Overall competitiveness | Non-exporters (3.42) | Moderate exporters (3.67) | -0.25** | 0.02 |
| | | Heavy exporters (3.55) | -0.13 | 0.60 |
| | Moderate exporters (3.67) | Heavy exporters (3.55) | 0.12 | 0.60 |

* denotes difference is significant at the level of 0.01

5.5.2 Differences in competitiveness by company size

As with innovativeness differentiation, significant differences were found between large companies and small companies in the areas of sales level, sales growth rate, profitability, and overall competitiveness. In comparison with medium companies, large companies tended to achieve higher sales growth rate and overall competitiveness ($p < 0.05$) (Table 12).

Table 12. Differences in Competitiveness by Company Size for All Respondents (ANOVA)

| | Company Size (mean value) | | Mean difference | Sig. |
|-------------------------|---------------------------|-------------------------|-----------------|------|
| Sales level | Small companies (3.38) | Medium companies (3.47) | -0.09 | 0.82 |
| | | Large companies (3.77) | -0.39* | 0.01 |
| | Medium companies (3.47) | Large companies (3.77) | -0.30 | 0.09 |
| Sales growth rate | Small companies (3.53) | Medium companies (3.44) | 0.09 | 0.94 |
| | | Large companies (3.98) | -0.45* | 0.00 |
| | Moderate companies (3.44) | Large companies (3.98) | -0.54* | 0.00 |
| Profitability | Small companies (3.17) | Medium companies (3.32) | -0.15 | 0.47 |
| | | Large companies (3.52) | -0.35* | 0.00 |
| | Medium companies (3.32) | Large companies (3.52) | -0.19 | 0.17 |
| Overall competitiveness | Small companies (3.42) | Medium companies (3.43) | -0.01 | 1.0 |
| | | Large companies (3.78) | -0.36* | 0.00 |
| | Medium companies (3.43) | Large companies (3.78) | -0.35* | 0.00 |

* denotes difference is significant at 0.01 level, ** denotes difference is significant at 0.05 level

For manufacturers, large companies were rated significantly higher in all four areas of competitiveness measurements than were small companies (Table 13). Large companies also appeared to be more competitive than medium-sized companies in terms of sales growth rate, profitability and overall competitiveness.

Table 13. Differences in Competitiveness by Company Size for Manufacturers (ANOVA)

| | Company size (mean value) | | Mean difference | Sig. |
|-------------------------|---------------------------|-------------------------|-----------------|------|
| Sales level | Small companies (2.76) | Medium companies (3.38) | -0.62** | 0.05 |
| | | Large companies (3.76) | -1.00* | 0.00 |
| | Medium companies (3.38) | Large companies (3.76) | -0.38 | 0.09 |
| Sales growth rate | Small companies (3.47) | Medium companies (3.46) | 0.01 | 1.00 |
| | | Large companies (3.93) | -0.46 | 0.10 |
| | Moderate companies (3.46) | Large companies (3.93) | -0.47* | 0.01 |
| Profitability | Small companies (2.75) | Medium companies (3.15) | -0.40 | 0.27 |
| | | Large companies (3.60) | -0.85* | 0.00 |
| | Medium companies (3.15) | Large companies (3.60) | -0.45** | 0.04 |
| Overall competitiveness | Small companies (3.17) | Medium companies (3.40) | -0.23 | 0.43 |
| | | Large companies (3.78) | -0.61* | 0.00 |
| | Medium companies (3.40) | Large companies | -0.38** | 0.01 |

* denotes difference is significant at 0.01 level, ** denotes difference is significant at 0.05 level

5.6 Correlations between competitiveness and innovativeness

The strength of the relationship between innovativeness and competitiveness is of interest for predicting industry competitiveness from its innovation situation. Correlation tests were conducted for all the industry respondents and for manufacturers separately as shown in **Table 14** (excerpted from **Appendix 18**).

Table 14. Correlations between Innovativeness and Competitiveness (All Respondents / Manufacturers)

| | | Sales level | | Sales growth rate | | NPD | | Profitability | |
|------------------|-------|---------------------|-----------|---------------------|-----------|---------------------|-----------|---------------------|-----------|
| | | Pearson correlation | Sig. |
| Product | Today | .19* / .28* | .00 / .00 | .25* / .20** | .00 / .04 | .32* / .33* | .00 / .00 | .10 / .08 | .13 / .43 |
| Process | Today | .22* / .19 | .00 / .04 | .20* / .22** | .00 / .02 | .26* / .27* | .00 / .01 | .03 / -.04 | .67 / .72 |
| Business systems | Today | .22* / .11 | .00 / .24 | .24* / .13 | .00 / .19 | .29* / .19** | .00 / .04 | .11 / .06 | .09 / .53 |

* correlation is significant at 0.01 level; **correlation is significant at 0.05 level (2-tailed)

Overall, innovativeness in product, process and business systems were found to be significantly correlated with company competitiveness in sales level, sales growth rate and new product development. Weaker correlations were identified within the manufacturer group where product innovativeness was significantly correlated with competitiveness in sales level, sales growth and new product development. Process innovativeness was correlated with company competitiveness in sales growth rate and new product development; while innovativeness in business systems was only correlated with new product development.

The results suggest that company innovativeness in terms of product, process and

business systems were generally related to company competitiveness in sales performance and new product development. There was no convincing evidence showing that profitability was significantly correlated with any of the three innovation categories

In the previous section, profitability was identified as the lowest rated type of company competitiveness, suggesting that profitability is neither considered a major source of competitiveness nor the direct motivation for innovation. It is not difficult to understand why sales performance was considered a major source of competitiveness with significant bearings on innovativeness. Most companies that follow low-cost-low-profit operational approaches depend on improving sales revenues and aggressive investment in production expansion in order to survive the intensified competition in the furniture industry. Innovation, especially in the areas of product and process, has primarily been pursued by Chinese furniture companies to improve sales performance.

5.7 Various correlations

Statistical analyses suggest varying degrees of correlations between innovativeness, competitiveness and company size and export orientation ($p < 0.05$) (Table 15). Across all industry, the four types of company competitiveness and innovativeness in product and business systems were significantly correlated with company size. In the future, larger companies will tend to be more innovative in areas of process and business systems ($p < 0.05$).

Table 15. Correlations between Company size, Export Orientation and Competitiveness-Innovation (All Respondents / Manufacturers)

| | | Company size | | Export Orientation | |
|-----------------------|-------------------|---------------------|-----------|---------------------|-----------|
| | | Pearson correlation | Sig. | Pearson correlation | Sig. |
| Competitiveness | Sales level | 0.20* / 0.39* | .00 | -0.04 / 0.05 | .56 / .61 |
| | Sales growth rate | 0.26* / 0.27* | .00 / .01 | 0.03 / 0.02 | .62 / .83 |
| | NPD | 0.15** / 0.09 | .02 / .34 | 0.06 / 0.03 | .36 / .76 |
| | Profitability | 0.20* / 0.40* | .00 | 0.12 / 0.13 | .08 / .20 |
| Innovativeness Today | Product | 0.14** / 0.19** | .03 / .04 | 0.10 / 0.09 | .15 / .38 |
| | Process | 0.12 / 0.14 | .07 / .13 | -0.13** / -0.24** | .04 / .01 |
| | Business systems | 0.18* / 0.21** | .01 / .03 | 0.05 / 0.02 | .46 / .86 |
| Innovativeness Future | Product | 0.09 / 0.12 | .15 / .21 | 0.05 / -.12 | .43 / .24 |
| | Process | 0.21* / 0.17 | .00 / .07 | -0.07 / -0.23** | .28 / .02 |
| | Business systems | 0.15** / 0.27* | .02 / .01 | 0.00 / -0.09 | .98 / .34 |

* correlation is significant at 0.01 level; **correlation is significant at 0.05 level (2-tailed)

For manufacturers, company size was significantly related to company sales level, sales growth rate, and profitability ($p < 0.05$). Company size was also positively correlated to current product and business systems innovativeness ($p < 0.05$). No evidence was provided for a strong relationship between company size and process or

company innovativeness in new product development. For both manufacturers and overall respondents, export orientation was negatively correlated with process innovativeness, suggesting that the larger percentage of export sales a company has, the less competitive it will be in the process area. The finding is contrary to a preconception, that exporters were mostly original equipment manufacturers (OEMs), who tended to be active technology and equipment adopters due to the need to stay competitive in global markets (Lei and McGowin 2002, Xu 2004b).

The results from **Sections 5.4–5.7** suggest that heavy exporters and non-exporters are generally less innovative than moderate exporters, especially in future business systems. Non-exporters and heavy exporters generally have less flexibility and/or motivations for innovation in manufacturing, new product development and marketing areas than moderate exporters, who have much more control over production and marketing in the domestic market. Moderate exporters are also more competitive than non-exporters in new product development and sales increases. This competitiveness can be attributed to more diversified marketing strategies on the part of moderate exporters.

5.8 Various topics on new product development

Question 6 consisted of three statements generated from interviews, that were expected to be representative of or contradictory to common industry views. The purpose was to understand common industry attitudes towards new product development and new material adoption, which, in this study, were considered as key components of product innovation and process innovation.

In the questionnaire, respondents were asked to evaluate each of three statements, based on 1-5 scale, from “totally disagree” to “totally agree”.

Statement 1. “When developing new products, we will always consider new material and its supplying issues.”

Surprisingly, this notion received overwhelming support from respondents. Almost 90% of the respondents chose either “totally agree” or “cautiously agree” (**Figures 29, 30**). This result was contrary to the stereotypical viewpoint within the industry. According to a veteran Chinese furniture manufacturer during a managerial interview, new material use in furniture making, especially for wood furniture production, should be pursued with extreme caution. Because furniture raw materials should not only meet quality requirements and be low in costs, but must also fit the production style and equipment of the factory. Careless new material adoption might be fatal to furniture manufacturers once the material was applied to mass production. A medium- to larger-sized Chinese furniture factory usually has a traditional production focus and technical know-how. It will likely cost more for a factory to adapt to new materials while giving up its traditional strengths.

The result suggests that new material adoption is actually an option for most Chinese furniture manufacturers when they are developing new products. This is relevant to raw material suppliers who are targeting the Chinese furniture market. Considerations should be given to increasing market accessibility for new materials and encouraging early participation in new product development using, for example, market promotions and sponsoring design contests.

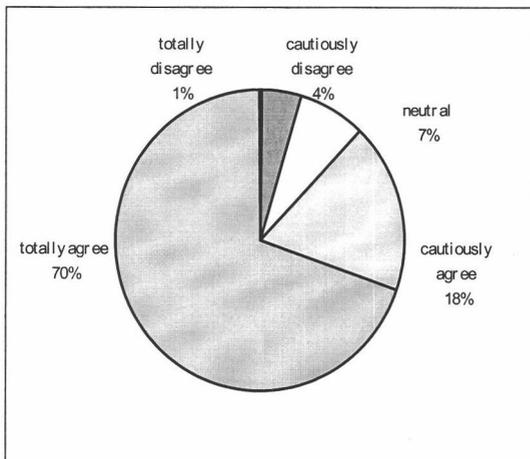


Figure 29 . Attitudes toward New Material Use in NPD by All Respondents (MEAN=4.53)
(1:totally disagree; 5: totally agree)

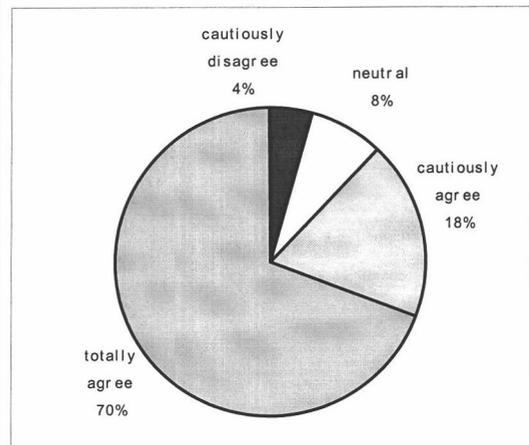


Figure 30. Attitudes toward New Material Use in NPD by Manufacturers (MEAN=4.52)
(1: totally disagree; 5: totally agree)

Statement 2. “It is very unlikely for us to adopt certain new materials before we see proven (existing) market prospects (demands) for them.”

Responses to this statement were generally positive. Over half of the respondents from either the manufacturer group or the all-respondents group indicated that existing market demands were a required condition for adopting new materials (**Figures 31, 32**).

As mentioned previously, furniture manufacturers are less willing to give up their

traditional production styles and change to make new-to-factory products with which they had little experience. Successful new product development also normally demands continuous investments, and is associated with high risks of failure (Ulrich and Eppinger 2000). From the resource perspective, companies with limited resources like most Chinese furniture-making companies are unable to invest intensively in new product development unless they are convinced of proven advantages and profit prospects. From a cultural perspective, unwillingness to assume risks is called “risk avoidance” (Section 3.4).

An empirical interpretation based on this statement is: Chinese furniture companies’ limited resources and potential risk avoidance may deter new material adoption, which is a key component of process innovation.

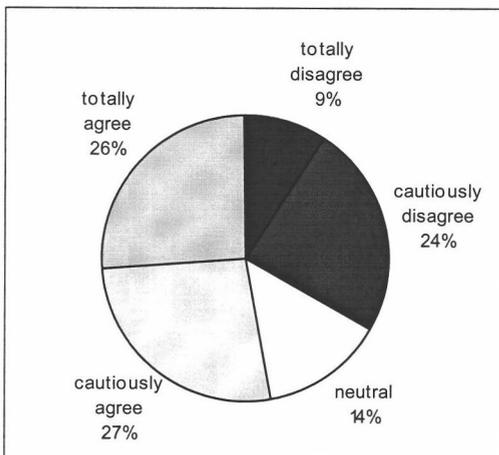


Figure 31. New Material Use-Risk Avoidance by All Respondents (MEAN=3.37)

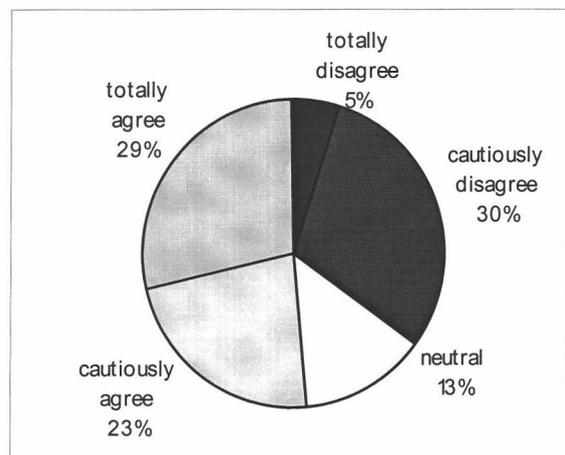


Figure 32. New Material Use-Risk Avoidance by Manufacturers (MEAN=3.41)

(1: totally disagree, 5: totally agree)

Statement 3 “Rather than radical changes, new product development should be based on company’s existing product lines (resources), with small modifications.”

A majority (+70%) of the respondents, from either total respondents or manufacturers, checked the “totally agree” or “cautiously agree” option (Figures 33, 34). This suggests that new product development within the Chinese furniture industry generally follows an incremental approach. New products based on company or existing market products could be the major type of new product development strategy pursued within the Chinese furniture industry as part of innovation. The risk-avoiding philosophy and limited resources of Chinese companies may be possible explanations for these attitudes.

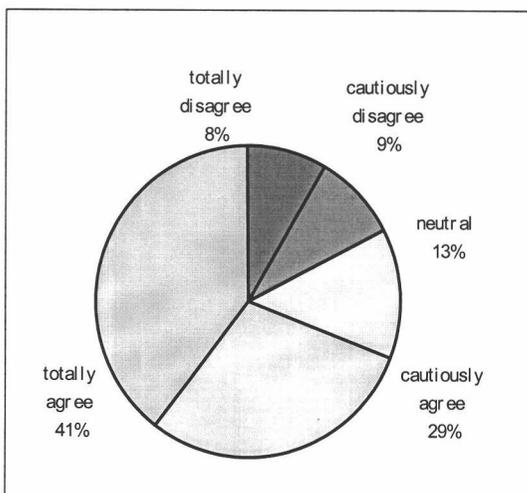


Figure 33. New Product Development–Attitudes toward Incremental Improvement by All Respondents (MEAN=3.83)

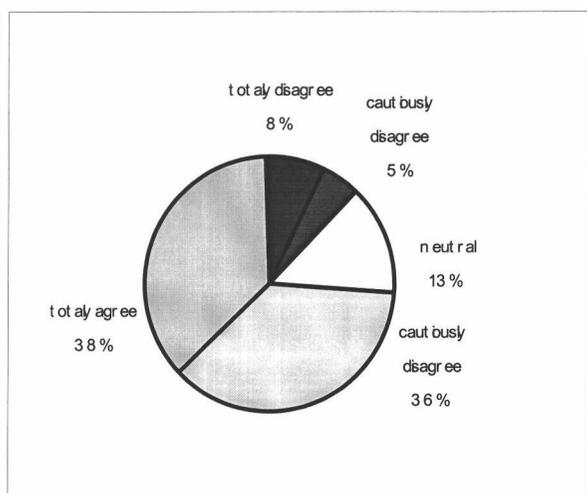


Figure 34. New Product Development–Attitudes toward Incremental Improvement by Manufacturers (MEAN=3.91)

5.9 Hypothesis-testing summary

- *Company competitiveness has nothing to do with innovativeness.*

Varying degrees of correlations were found between company competitiveness categories (sales level, sales growth rate and new product development) and innovation categories (product, process and business systems). So there is evidence that company competitiveness is correlated to innovativeness.

- *Neither company size nor business type was related to company innovativeness.*

Different levels of correlations existed between company sizes and innovativeness. Larger companies generally demonstrated higher innovativeness than small companies.

- *No significant difference exists among the three categories of innovation: product, process and business systems.*

For current innovation, no significant difference was found among the three categories; for future innovation, innovation in business systems was rated significantly lower than the other two categories.

- *Export orientation has no significant relationship to company innovativeness.*

Moderate exporters tended to be more innovative than non-exporters and heavy exporters in current process or product innovation. In the future, moderate exporter tended to be more innovative in business systems.

5.10 Managerial implications

In this section, the implications of this study are addressed: to advocate for future strategic alliances between the Chinese and U.S. furniture industries, in view of a complimentary role that Chinese furniture companies can play.

5.10.1 For Chinese managers

This study revealed that Chinese furniture companies are pursuing innovation with three equal focuses: product, process and business systems. Company competitiveness was significantly correlated with innovativeness, which may come from both external sources and internal sources.

External sources include trade shows, competitors, industrial customers and end consumers. Trade shows were rated as the number one innovation driver. Malecki (1997) suggests that trade shows are especially important for small manufacturing companies with limited resources for market information and innovation. This also suggests that the Chinese furniture industry is gaining a market orientation, since an increasing focus on customers and competitors for market information was noted in this study. This represents a shift from the industry's traditional low-cost production focus. The role of educational institutes, which are considered as the essential part of furniture industry's center of excellence (Schuler and Buelhmann 2003), was, however, perceived of little value by the Chinese industry people as an innovation source. A possible explanation to this bias could be attributed to the lack of communication between educational institutes and industry practitioners.

Internal resources refer to upper management, R&D department and employees.

Chinese companies are adapting to a modern business culture by improving management skills, research and development and employee training to establish a unique corporate identity. The importance of internal resources for the furniture industry was identified by Desrochers (2001), who suggested that the mobility of flows of tacit knowledge and skilled personnel from one furniture company to another is critical for companies to compete successfully.

The innovativeness of Chinese furniture companies is largely based on these traditional low-cost-low-risk production philosophies. The Chinese furniture industry has a long and entrenched tradition of low-cost production which still has a strong influence on company innovation perceptions and activities. Robb and Xie (2003) contend that minimizing costs will help Chinese furniture companies to adopt advanced technologies. The survey revealed that enhancing sales performance, rather than profitability, represents the most direct motivation for Chinese companies to pursue innovation. In terms of new product development, Chinese companies tend to seek incremental improvements based on existing products to minimize costs and risks of failure.

Looking into the future (in 10 years), Chinese companies will likely become more innovative in product than in business systems. This further suggests that the industry will likely become more competitive in production, than in marketing.

Compared with non-exporters and heavy exporters, moderate exporters represented the most dynamic group engaged in innovation and competitiveness development. This provides implications that a diversified marketing strategy could help increase company competitiveness and innovativeness by increasing a company

production flexibility and control over market changes.

Large companies tended to be more innovative than small companies in terms of current product and future business systems. Large companies were also better positioned than small companies, in all fields of competitiveness. This echoes the findings by Schumpeter (1942), who contended that larger companies maintain their competitive status by being innovators. However, there was no such significant difference in either competitiveness or innovativeness between small- and medium-sized companies. This provides evidence that the great majority of Chinese furniture companies are similar in terms of innovativeness and competitiveness. Large companies, which account for only a fraction of the industry population (**Section 2.2.1**), will likely grow stronger and faster in the future and become market share leaders. This could mean, more business will be taken by larger, innovative companies, and as a result, small- to medium-sized companies may become OEMs for these larger companies.

5.10.2 For U.S. managers

Allying with large-sized Chinese manufacturers with moderate export orientations may be a useful strategy for U.S. furniture companies wishing to compete successfully with foreign imports as hoping to expand into the Chinese market.

Schuler and Buehlmann (2002) suggest that proximity to the market is the U.S. residential wood furniture industry's "only sustainable competitive advantage at hand" when facing increasing global competition. They propose a paradigm shift for the industry to be competitive in the future, including:

innovation-seeking differentiation combined with marketing orientation

new business model—mass customization;
 new manufacturing strategies: e.g. strategic alliances, industry clusters, “JIT”
 reinventing furniture—new design, construction, modular unit
 new sales channels—including Internet

Raymond (1999) points out key characteristics a future U.S. furniture factory should have in face of increasing competition:

Focused Production: relatively short product line and serves relatively few distribution channels. Its advantages include fewer setups, less manufacturing complexity, and better custom service.

Reduced business scope: focused on higher-value added sectors, such as customization, assembly and custom service, while separating raw material and component processing from the factory.

Machinery mix: focus and flexibility.

The Chinese furniture industry will likely continue to be low-cost manufacturers in the near future, with new strengths developing through innovation in product and process. Process innovation is prevalent in the Chinese furniture industry as reflected by increasing equipment purchases (Xu 2003) and evolution of “labor-tech intensive” manufacturing approaches (Lei and McGowin 2002). New materials use during new product development should also be considered part of process innovation.

Under the trend of globalization, outsourcing has become a key strategy to increase company core competitiveness, especially for furniture industries. The Chinese furniture industry follows a commodity-style production approach featuring low cost and competitive quality. However, due to a long history of low-cost-low-profit production, and limited capital resources, Chinese furniture companies are unlikely to become dramatic innovators in the near term. Business systems will likely remain less innovative and competitive than product and process for most Chinese companies,

especially small- to medium-sized companies with less differentiated marketing strategies.

U.S. companies have better-developed business strategies and management skills, which most Chinese companies usually lack. Large Chinese manufacturers with major focus on the domestic Chinese market are better positioned for this kind of international co-operation based on advantages in production capabilities, credibility and market knowledge. Therefore, strategic alliances between U.S. and Chinese furniture companies will help result in a win-win situation by pooling strengths.

5.11 Limitations

The furniture industry in China is highly diversified with wide regional differences (CNFA 2004). For example, industry infrastructure and facilities located in the coastal regions (in East China) are generally more developed than those in the interior regions. Samples for this study were mainly collected from the coastal regions in the East and Southeast China, with a diversified scope of business areas. Significant differences could also occur within manufacturing approaches and marketing environments between the metal office furniture-making and wood household furniture-making sectors. These variances were not considered in this survey.

5.12 Future research

This study is preliminary research on innovation in the context of the Chinese furniture industry. A variety of future studies can be conducted based on current findings.

Following the three generic types of innovation activities (product, process and business systems), further exploration will be necessary to understand the exact role of each type of innovativeness in forming industry's current and future competitiveness. For example, a question of interest can be: to what extent has process innovation helped increase company sales, compared with product innovation?

It would also be interesting to compare innovativeness of the U.S. and Chinese furniture industries by using a benchmarking method, which in this case refers to a continuous process of measuring three types of innovation against top U.S. furniture companies, in order to achieve the best performance in future innovation. Data include investments in new product development, equipment and machinery, business operations, and training, as percentages of sales.

6. CONCLUSION

The main objective of this study was to investigate innovativeness of the Chinese furniture industry today and in the future. Two questions were presented and discussed throughout this study:

- *What is innovation in the Chinese furniture industry?*
- *What is the motivation behind these innovation activities?*

The project was conducted based on a combination of 18 managerial interviews and an on-site questionnaire survey. Findings suggest that innovation activities in the Chinese furniture industry today can be categorized into three types: product innovation, process innovation and business systems innovation. In the future, Chinese furniture companies will likely become more innovative in all three categories, with focuses on product and process innovation.

Innovation drivers include both external and internal resources. Trade shows, upper management, competitors, customers, research and development departments represented the most common sources for innovation ideas.

Competitiveness in sales levels and sales growth rate, rather than profitability, was significantly correlated with company innovativeness. This suggests that improving sales performance and minimizing costs present direct incentives to Chinese furniture companies to pursue innovation. A further implication is that the Chinese furniture industry's traditional low-cost-low-profit production focus has a significant influence on the industry innovation perceptions, and the scope of innovation activities, which are based on incremental development, instead of radical changes.

Company innovativeness and competitiveness also varied with company size and

export orientation. Large companies tended to be more innovative and competitive than small- to medium-sized companies, which was consistent with previous findings. Non-exporters and heavy exporters tended to be less innovative or competitive than moderate exporters in various areas. This suggests that diversified marketing strategy helps increase company innovativeness and competitiveness, when the main focus is on the domestic Chinese market.

Allying with large Chinese manufacturers with moderate export orientation is suggested for U.S. furniture companies wishing to expand into Chinese markets.

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APPENDIX

Appendix 1. Cross-functional Definitions of Innovation/Innovativeness/Competitiveness

| Cross-functional fields | Comments by interviewees |
|--|--|
| Product Business systems | Innovation can be defined as new product development, it is also a result of participation by everyone in the company. Company gains dynamism only when every one of its departments and employees is motivated with innovative spirits...Higher management efficiency, lower costs, higher profit, smoother distribution, less warehousing, faster delivery are also among the results coming with innovations in these areas. Consumers will have better knowledge of our products and trust in our quality and services, if our marketing department does a good job in innovation. In all, innovation is the most powerful driver to company's sustainable development. |
| Business systems | innovation should be viewed as a whole system. ...Beyond product design, innovation could be defined from perspectives of marketing, corporate mechanism, business model, plant, employees and positions... I think it awards companies with new dynamism and core competence, which are able to think and design in a way out side of stereotypic notions. |
| Business systems | ...industry innovation first lies in information leadership. For example, corporation management, ERP, CNC, MRPII. Most Chinese furniture companies are poorly constructed in this regard. |
| Product Process Business systems | It is a multi-facet concept, which includes design, material use, corporate management, and product development. Our company focuses on material use and processing technology innovation. ...Generally, we use processing, material use and new technology, from "impossible to possible", to achieve innovation. |
| Business systems | It is business model—how could business model be changed, from the past. how outsourcing would be located; dissolve distribution is another possibility of innovation, as well as, obviously, design, by our definition of innovation, is relatively transitional. ...Our business model is the way we conduct our business, design is more on the later part, because everybody can design something. Come back to innovation, (it is) depending on what consumers are buying, but you know, (we can be) different in how to distribute our products and how we focus on it. |
| Product Process Business systems | it could be only new to manufacturers, but not for the market. Or only new to this region, but not for another. new in material use combinations; Technology, function, design and constructions can all be aspects of innovation. Innovation should be sustainable and become company's core competitiveness to achieve higher profit margins. |
| Process | changes with new materials and new processing technologies. Basically, the fundamental driver for these changes is new material. |
| Process Product | To be different. We have our own unique features in material use and production lines. |
| Business systems | Innovation is a life-long theme for every company's survival. ... Furniture companies in their peak times should seek management modernization as the priority, instead of production expansion. Our company is trying to position ourselves based on specified production and industrial cooperation, and seeks growth by forming strategic alliance. |
| Process | ...can be defined in terms of processing technology and production organization....Only innovations in materials can bring about furniture innovation. |
| Product | new lifestyles--renovating people's lives both spiritually and materially. |
| Process | Chinese companies have many ways of material innovation, but lack of technological improvements. Innovations in material use in China are largely confined to processing |
| Business systems | it is more in understanding of what needs customers have, and finding solutions for their needs, that is our rules. Innovation process is our sales collect information in market about customer needs, and goes to central process so that we know more about market demands for the next a few weeks. |
| Product Business systems | Innovation means revolution and changes—to be unique in our (product and corporate) styles..., the core of competitiveness is innovation I think, for a company to be successful, it should develop its own style and personality, in order to attract best resources. This is the core of innovation. |
| Product Process | I would define innovation in terms of this accumulating process (individual improvements). ...the industry is not so mature right now to pursue differentiation and new (totally new) designs;...may not overly pursue (absolute) innovation without practical considerations to the industry environment. |
| Product Business systems | Innovation not only refers to product innovation, but also refers to idea innovation. A company should pursue idea innovations when it reaches certain stage of development. In the context of globalization, innovation is the way to position the company on the global basis. Middle-sized companies may seek growth through finance management such as expansion and acquisition, rather than struggling by itself with individually accumulations. |

**Appendix 1. Cross-functional Definitions of
Innovation/Innovativeness/Competitiveness (Continued)**

| Cross-functional fields | Comments by interviewees |
|--------------------------------|--|
| Product | Innovation in furniture products includes two aspects of meaning: one with furniture types—new design, new materials, the other is with function innovation—new lifestyles, which is the wider aspect. Design innovation is easier to achieve than innovation in lifestyles, which is slow to develop to be accepted by the whole society. |
| Product Business systems | It concerns corporate mechanism to innovate, capital resources, marketing, R&D, and the ability to promote new products. I think the core of innovation is corporate culture. The key is the central idea when you are pursuing innovation. Innovativeness is the reflection of corporate culture. Innovativeness represents various abilities, which provide supports to it. It is more than R&D. Deeper levels of corporate spirit and culture will determine corporate innovativeness. In other words, corporate innovativeness is corporate competitiveness. Fails in competition cannot be defined as innovation, we only think of innovation when it brings us success in competition and business development. We don't think as "innovative activities" which result in failure out of bold moves. Innovativeness is a comprehensive concept, which reflects the corporate dynamism and cultural core. Culture drives innovativeness and innovativeness drives market competitiveness. Innovative companies must be healthy. |
| Business systems | I think innovation lies with our motivations to achieve changes. The most important is the inner desire or drive to innovate, as well as outside market demands. Our company lacks innovativeness. That is, we don't have inner motivations to innovate, neither we are driven by market demands. |
| | we would better off defining it as "comparative innovativeness", rather than "absolute innovativeness". |
| Business systems | It is a passion within all employees. |
| Business systems | Innovativeness lies with employee quality. |
| Business systems | Our company always goes a step ahead of the market changes |
| Business systems | To be an innovative designer, This requires both understandings of the market and qualified decision makers. |

Appendix 2. Process Innovation Focus

| Perspectives | Comments by interviewees |
|---|---|
| New material / Material differentiation | ... Actually, every revolution in furniture history came with emergence of new materials. Only innovations in materials can bring about furniture innovation. |
| | I don't see any big or revolutionary breakthroughs in new material use in furniture. ... I think we have had so many kinds of materials today, and they would be enough for us if we could properly use them by trying out different combinations of materials. |
| | We use new materials and processing methodology to achieve lower costs and higher quality, as well as a differentiated processing. ... Our profits derive from (cheap) material use, (whose negative effects can be mended) by finishing techniques. |
| | the material should help lower overall costs, improve quality, and increase market share—higher profitability, higher quality, lower costs. A material is good if it can make processing easier, faster (workability), better and cheaper. Raw materials supplies should be tailored to individual company needs. |
| | We have a very general idea (regarding material use) in the beginning, we will make several changes during the process, we will need to consider costing and processing issues—we need to make backup plans in case any problems with our initial design. |
| | In wood market, pricing is transparent. We follow international standards in material sourcing. We source different species from different regions. We don't mix radiata pine and Finnish spruce together within the same piece of furniture. we are selective with species. |
| | (Radiata pine) is a plantation species, with good characteristics, such as sustainability, and workability, which are good for furniture making. |
| | We feel the difference in making hardwood furniture from softwood furniture, including different tools, such as saws, sand paper. But that is not a big problem. |
| | Materials for furniture could be divided into base materials, decorative materials (surface materials) and hardware (accessories). |
| | We determine material use from the very first beginning of product development We change materials frequently. We determine material use and suppliers after we determine on colors, and styles. |
| | New materials should be fit for furniture making, and it should be adaptable for different uses, at appropriate prices. |
| | Our competitors are using softwoods, poplar, and make veneer laminated wood furniture, but we won't follow their approaches, because they are the largest Chinese manufacturers and have advantages in economies of scale. We produce solid wood furniture using American cottonwood and we position ourselves to be the No 1 solid wood furniture maker in China |

Appendix 2. Process Innovation Focus (Continued)

| Perspectives | Comments by interviewees |
|---------------------------------|---|
| Technology (automation) | I think the two approaches (marketing pull and technology push) are interactive. |
| | technology and marketing are inseparable. Technology provides support to marketing, to some extent, technology is more important than marketing. Marketing is the goal of technology. |
| | With this technology, we are able to use low-end materials (character-marked wood), such as poplar, as base materials and use this printing technology to achieve real lookings of valuable species. There are several other Chinese companies are also using this new technology to cut down costs and improve processing efficiencies. ... to lower costs from efficient use of container space (through furniture structure design). Automation is a third way of enhancing processing efficiency. Technology determines prices. |
| | We once focus on the technology end, but since this year we have changed to the marketing end. But we are still leading in technology. We realize that leaders in labor-intensive manufacturing sectors should be the masters of the most sophisticated handwork skills. But industrialized production is another story, and it requires the easiness (efficiencies) of processing. Those who have the easiest way (the most efficient way) of mass production will be the leaders. We are leading in technology sophistication (skill/labor intensive), not in easiness (processing efficiency). So from this perspective, we are lagged behind (other industrialized sectors). We must evolve to production easiness (the industrialized end). Sophistication (skill/labor intensiveness) would certainly present barriers to imitators of our products, but it is also hard for us to make production automated. |
| Cost leadership | Unlike most other Chinese manufacturers, I would buy in raw materials before orders. In this way, I can assure potential customers that I have enough stocks and can delivery products on time. Compared with local manufacturers, we have the advantage in mass production, lower in costs. Also, in Australia, we have our own market network and brand. |
| | We are successful by delivering mid-higher end products for mid-lower prices. We are cheaper with comparative quality. Also we have good credit and reputation in the industry. |
| | Cost leadership is our competitiveness. ... To achieve cost leadership, you must pursue industrialization, specialization and cooperation. |
| Cost + Tech leadership | We'd try to achieve better quality at better value. deliver quality, better quality and at better price. The value is price. |
| Technology leadership | Processing (technology) leadership, the technology we used is new to our local competitors |
| Changing competitive strategies | In earlier times, quality and automation were the key elements in determining competitiveness. Today, quality and automation are among the necessary conditions, others including branding, corporate image, marketing, CI system, and R&D and unique technology. |

Appendix 3. Business Systems Innovation Focus

| Perspectives | Comments by interviewees |
|--|--|
| Marketing orientation | <p>I think marketing strategy could be changed more than product changes. Product (physically) should not be changed too much.</p> <p>You should have good products first, instead of promotions. Our company is competitive with its stability—it has a clearly identified goal and understanding of its own strengths and weaknesses. The company can obtain its identity based on its personality. A company should have its identity.</p> |
| Marketing channels vs. branding | <p>we should focus on high-end market. We don't have our own brand in the US market. Our philosophy is, a store has more power--more say to customer than brand today.... We do have a brand for our furniture, but we do not market that brand to the consumers though, we market that brand to the retailers.</p> |
| Branding & processing (cost + quality control) | <p>They look to branding for achieving higher added values. Also, they are lower in production costs with higher quality, which presents barriers for imitators.</p> |
| Product differentiation vs. processing differentiation | <p>Changes in material use and processing technology will definitely bring us improvements in manufacturing, which enables us to differentiate from others.</p> <p>To differentiate from competitors, we emphasize that our products are of German styles. In terms of processing technology, I don't see too much difference, because furniture making is of labor-intensive nature across the industry.</p> |
| | <p>We don't have any real-sense differentiation strategies on the marketing level. Lack of differentiation is the main reason for our small market share.</p> |
| Stages for Chinese companies entering overseas markets | <p>Chinese companies first entering U.S. markets may want to sell through local manufacturers, in this way, you can understand what American consumers like and need. Once you know the market better, then you might seek other channels. You can buy local brands together with its market networks. You can specialize in manufacturing and focus on developing logistics systems at home (China), as means of producing on order-taking basis, while keeping low warehousing costs. You will get back capital investments quickly, and you want to market the company in other countries, such as Singapore and Australia, as a holding company, and in this way, you can collect more money from stockholders, and turn into further business expansion. ...We have three kinds of customers: manufacturers in U.S.; wholesalers, and retailers like Costco and Wal-Mart. Products selling to manufacturers and wholesalers don't bear our brands. Our branded products are sold through retailers.</p> |
| Customer orientation | <p>Consumers are price sensitive and trend followers (designers have to design whatever consumers like, and follow the trends led by western designs.)</p> <p>Chinese market consists of two parts: commodity market, which is based on low costs, and high value-added market, which requires complicated business efforts—the key is how to improve consumer perceived values.</p> <p>we are not trying to beat our competitors, instead, we are trying to provide better service to our customers. Customers are our only competitors. We need to meet whatever customers want and to fulfill their desires.</p> <p>market demands drive you to innovate (your business) and innovation will in turn increase profits.</p> |

Appendix 3. Business Systems Innovation Focus (Continued)

| Perspectives | Comments by interviewees |
|--------------------|--|
| Supplier relations | Manufacturers need to develop strong sales network and train franchisers. |
| | Companies without supports from industry supply chain should have comprehensive manufacturing capacities. |
| | Chinese supplying industries are not able to deliver in time, lasting a long time. |
| | Supplier relationship is our weakest side.... Most of our business relationships are simply buy-in and sell-out. For example, we are not working with suppliers to serve our common customers as key accounts. Neither do we give strong supports to our retailers in trying to better serve end consumers. What we do now is mostly based on our "feelings", lack of scientific methods of analysis. Our sales and suppliers communicate inefficiently. |
| | Supply shortage and warehousing is the common problem facing many order-taking style manufacturers, as they can't wait long to get all raw materials ready once taking production orders. |
| | The main problem is from our side—the risks of increasing warehousing of raw materials are too high for us to afford. Panel furniture manufacturers are also facing the same problem, but still different in nature—for us (upholstery manufacturers), problems come from raw material supplies, while panel furniture manufacturers are faced with high risks associated with finished products storage. |
| | Group purchase is difficult to operate. You have to take care of various demands by consumers from different regions. In my perspective, our product structure is loose and lengthy. This is in part due to poor management, which is caused by conflicts between market demands and poor marketing channels. |
| | The first important is with design. This is the most direct way of communication. It should be adapted to Chinese lifestyles. I would suggest US suppliers work closely with Chinese designers in this job. |
| | using group purchasing to lower costs. I think Chinese furniture industry should follow Italian's model, and evolve into industry clusters, such as an industrial park. The park is composed of branding companies, suppliers (finishing, hardware), OEMs, and service agencies (design, consulting...). This also needs assists from the government, education institutes. |
| Senior management | ...corporate management and production organization are more important as bigger profit generators than technology and automation issues. Italians have a profound understanding of industrialization: it is the result of production organization, management, and specification, instead of automation. |
| | We don't usually buy new machines, instead, we take good care of current old machines, which are working well. These machines are specially designed for single process (one-function). The life expectance of our saws is three times longer than others. Good management brings profits. |

Appendix 4. New Product Development

| Product strategies | Comments by interviewees |
|--------------------------------|--|
| Commodity | Our products are not on the highest-end level, we position our products as “mass collection” (which means good designs affordable by the mass populations), targeting at wide consumer basis. We differentiate ourselves simply based on product differentiation. Our products are not superior to other competitive products, |
| Mix of commodity and specialty | Basically, we would choose to use standardized products (commodities) combined with a few specifically designed products, which are made by manufacturers. Using specially designed hardware also serves as a barrier to copying by competitors. But we can not afford to use too much special hardware in the product. |
| Commodity | Chinese furniture industry is lack of differentiation in product design, companies are vying to copy designs, and compete on price basis, instead of new designs. |
| | Exports are normally commodities in mass volume. Little service and few marketing tactics are required for exporters in overseas markets. Local agencies will take care of these issues for manufacturers. Domestic selling procedure is much more complicated. |
| Niche (specialty) | Specialized manufacturing can achieve us economy of scales. It is a question of “many varieties in small volumes” or vice versa. |
| | Our products are mainly targeted at lower-medium income levels. So we design products to be on the lower-medium ends, which has specific pricing standards. Our technicians will take care of the whole process. |

Appendix 5. Definitions of New Product

New products development is mainly concerned with uses of materials, processing technology, and machinery. That is, concepts of new products include new materials, new processing technology and new equipment. Products with changes in colors, styles, and functions can not be defined as new products. ...firstly, we should determine material use and target consumers when we design products.

New products don't necessarily bring you better economic returns. New products have two categories--one being market-driven, which are developed to meet consumer demands, in terms of design, color, and materials; the other being developed to promote new lifestyles and to lead the market.... New products are developed as the combination of entire company resources and personalities. Imitated products don't have these connotations.

Our product series in this show are new in terms of material use

Risks are also opportunities... The risks associated with new product development are mostly due to undeveloped distribution and sales system in Chinese market, which lacks order and regulation, because every player wants to dominants the market place. Chinese companies have very fragmented and small networks which are isolated from each other.

Appendix 6. New Product Development Procedure

Currently, the biggest problem facing NPD is the lack of the formal procedure from preliminary marketing research, R&D, marketing planning, to products launching.

NPD process: Positioning, designing (appearance), evaluation (prices and functions), and pass it.

NPD process: we first based on market demands, then do a market survey, analyze competing products in terms of pricing, material use, design, and their market performance. After these, we develop our own designs; we make samples, refine them, put to trial production, trial selling, and industrial production.

We have three functional groups. Tech/structure design and lifestyle research; model making and environment design, which is responsible for most part of the detailed work; the last one is graphic design, which takes care of communication functions—responsible for communicating design ideas to manufacturers, dealers and end consumers. They are also responsible for collecting feedbacks and other related information. ...designers should work closely with manufacturers till the final decision is made. ...All designers involved and personnel from sample making workshop, engineers. In some cases, company owners are not involved. ...then trial production and market testing.

Appendix 7. Degrees of New

| Perspectives | Comments by interviewees |
|--|--|
| Incremental improvement (new to existing products) | In developing new products, we mainly based on our existing product lines , and it is relatively easy for us to identify target market since we are targeting at a narrow market segment (niche market) . |
| Incremental improvement | Most of our R&D activities are continuous modifications of existing products , and we also try to fill in the voids of our product lines. Another way of R&D is based on customer orders . |
| Incremental improvement (new to existing products) | Our way of business follows the procedure from imitations (of existing designs), improvement (to original designs), modifications (to original designs) and finally, to the development of our own designs . |
| Product development as core competency | Positioning. Company's core competence. Product development should go with its core competence . |
| | "New" is a comparative and evolving concept. It could be defined by percentage—new%—this is an important perspective. A product can be totally new in terms of material, structure, technology and proceedings, among all other factors.... our society needs such bravery explorers to boost development. |
| Incremental improvement | In the real business world, companies should pursue new products in a progressive, not radical, approach . Say, you (are more likely to success in new product development if you) change 10% every time and gradually increase the percentage of newness. |
| Incremental improvement | By continuously improving existing products in the market and we become strong and mature, we can seek to develop our own designs (new products). |
| Incremental improvement | step by step (based on existing products). ...to absorb outside resources for our R&D needs... Furniture design is a gradually evolving process . It is limited by economic development and cultural environment. We don't think it is right time to pursue original designs in Chinese market today. |
| Incremental improvement | we study original designs by other companies in the western countries' markets: we figure out why these products can be sold at such high prices, and how they are manufactured, why they are designed like this not that? The answers will give us insights in our product development. ...So we begin with hot selling products already existing in the market. ...we based on a picture or a sample of existing product, modify and improve it, make a sample, take a picture of it for brochure, we have a group discuss, then, we break down the design into components and put them for trial production. |
| New-to-existing products | Our products are developed according to market demands, with reference to overseas designs . We incorporate new elements in our own designs . Innovation is key to company development. |
| | we develop new products based on our existing product lines and material use patterns . |
| New-to-industry | original design is not acquired from existing furniture products, it is developed based on outside resources that have never been used in furniture design . |
| New-to-company | on the company level, a new product may be new in design, form, function, and material use. And on the industry level, new products should be original to all industrial players. New products can be defined on both company and industry levels... |

Appendix 8. Sources for New Product Development Ideas

| |
|--|
| Applications of information include many aspects , such as information about product designs, technologies, modern materials, etc. We should develop the industry with information technologies. |
| We usually get international market information through attending international trade shows , which provide us opportunities to learn from overseas upper stream suppliers for international market information. We collect information on domestic market mainly from our sales network . |
| We are market-oriented, We collect information from trade shows, and raw material suppliers, based on sales records |
| By owning retail networks , we can better serve consumers and collect information of competitors. we look for suppliers mostly through trade shows |
| We get market information by visiting retailers. We have our showroom in High Point. |
| We design products based on market information, which is collected from trade shows, such as those in High Point, Cologne, and also from customers. |
| The main channels for us to look for new suppliers are, say, AHEC and trade shows . |
| We use traditional channels, for the lowest costs. |
| We have our own sales companies responsible for communicating with end consumers . We also seek retailers , but we don't have control on them. |
| Before NPD, we would go to marketplace to collect thousands of existing product styles and take home for analysis. |
| During the recent two years, we have been learning from western companies . |
| We just established a website for sales and sourcing purposes. We have established a database of our distributors and end consumers. |
| Positioning is the most crucial in developing new products: we need serious researches to identify our target consumers. |
| we changed to new materials and market innovation to develop new product series. |
| Market oriented. Consumer tastes and information from customers determine our products. |
| Every new product is developed under two principles—I (company director) like them, and consumers need them. ... the director has insights into market trends and represents part of consumer preferences. |
| I (company director) would bring back all the related brochures and product pictures from marketplaces, and analyze them. I study the market, and develop designs. Market research and product design are all done by myself. I trust my sense of market and designs. |

Appendix 9. Future Development

| Perspectives | Comments by respondents |
|--|--|
| Strategic development | Considerations should be made based on short-term, mid-term and long-term "strategic planning". |
| Technology focus | We are a manufacturing plant. We want to change into automation . Yes, we need to develop both inner drives to innovation, as well as the outside drives. Costs can be lowered through inner improvement, and in turn market performance can be improved. |
| Social responsibility | Chinese companies should develop their own values too, doing something beneficial for the society and bringing people more surprises.... I expect Chinese furniture industry would see changes since the third and fourth generations of company owners, who are well educated and have broader views of the world. |
| | Company is a cell of the society, we are part of the society and we need to be accepted and popular in the community. |
| Commodity producing vs. mass customization | Chinese market is a pent-up market with competition increasing. Commodities look the same in appearance, but differ significantly in quality, construction, finishing, and material use. |
| | Localization of production and globalization will bring China more job opportunities and release workload pressure, but we are losing more of our home markets and higher amount of economic benefits to western countries, which are using our labors for higher added values. |
| | In my eyes, the Chinese furniture industry and market are simply characterized by supply chain and commodity market . Mass customization is based on highly sophisticated manufacturers and distributors (retailers), which don't exist today. The basic drive for a concept to be adopted by industry is market demands, which are not yet seen today. |
| | The trend is clear but none of Chinese furniture companies can do that now. One-to-one marketing is not yet to come, on which the theory is based. There are three types of marketing: less-to-less, less-to-more and more-to-more marketing. I would say furniture market is already segmented according to region and consumer groups. But furniture market is unlikely to become the one-to-one marketing style and it is not even necessarily to be so. |

**Appendix 10. Ratings of Innovation Sources for All Respondents /
Manufacturers (One sample T-test)**

| | Rank | Mean | Sig. (2-tailed) test value=3 |
|--------------------------|-------------|-------------|-------------------------------------|
| Trade shows | 1 / 1 | 4.10 / 4.11 | .00 |
| Upper management | 2 / 1 | 3.90 / 4.11 | .00 |
| Competitors | 3 / 3 | 3.78 / 3.75 | .00 |
| End consumers | 4 / 6 | 3.62 / 3.58 | .00 |
| Employees | 5 / 5 | 3.58 / 3.59 | .00 |
| R&D dept. | 6 / 4 | 3.57 / 3.74 | .00 |
| Retailers | 7 / 7 | 3.42 / 3.47 | .00 |
| Business customers | 8 / 8 | 3.38 / 3.33 | .00 |
| Trade associations | 9 / 10 | 3.16 / 3.20 | .10 / .10 |
| Tech/equipment suppliers | 10 / 9 | 3.11 / 3.25 | .30 / .10 |
| IT/software suppliers | 11 / 12 | 2.90 / 2.89 | .30 / .40 |
| Raw material suppliers | 12 / 11 | 2.90 / 2.95 | .40 / .80 |
| Education | 13 / 13 | 2.54 / 2.67 | .00 / .03 |

**Appendix 11. Competitiveness for All Respondents / Manufacturers
(One sample T-test)**

| Innovativeness | Categories | Mean | Sig. (2-tailed) test value=3 |
|----------------|------------------|-------------|------------------------------|
| Today | Product | 3.75 / 3.89 | .00 |
| | Process | 3.82 / 3.86 | .00 |
| | Business systems | 3.74 / 3.75 | .00 |
| Future | Product | 4.40 / 4.47 | .00 |
| | Process | 4.35 / 4.39 | .00 |
| | Business systems | 4.21 / 4.23 | .00 |

**Appendix 12. Innovation Ambitions for All Respondents / Manufacturers (One
sample paired T-test)**

| Innovation Ambition (Future - Today) | mean difference | Sig. (2-tailed) (test value=3) |
|---|-----------------|--------------------------------|
| Product innovation | 0.64 / 0.59 | .00 |
| Process innovation | 0.53 / 0.54 | .00 |
| Business systems innovation | 0.47 / 0.50 | .00 |

**Appendix 13. Difference in Innovation Ambitions for All Respondents /
Manufacturers (ANOVA)**

| Innovation ambition (Future - Today) | Mean difference | Sig. |
|---|-----------------|----------------|
| Business systems | Product | -0.18* / -0.09 |
| | Process | -0.06 / -0.04 |
| Product | Process | 0.12 / 0.05 |

* denotes the mean difference is significant at the 0.05 level

**Appendix 14. Today Innovation Focus for All Respondents / Manufacturers
(ANOVA)**

| | Mean square | F | Sig. |
|------------------|----------------|---------------|--------------|
| Innovation today | Between groups | 0.365 / 0.631 | 0.579 / 1.02 |
| | Within groups | 0.630 / 0.616 | 0.56 / 0.36 |

**Appendix 15. Future Innovation Focus for All Respondents / Manufacturers
(ANOVA)**

| Future Innovation | | Mean difference | Sig. |
|-------------------|---------|-----------------|-------------|
| Business systems | Product | -0.18* / -0.24* | 0.02 / 0.03 |
| | Process | -0.14 / -0.16 | 0.11 / 0.20 |
| Product | Process | 0.04 / 0.08 | 0.80 / 0.67 |

* denotes the mean difference is significant at the 0.05 level

**Appendix 16. Competitiveness for All Respondents / Manufacturers (One sample
paired T-test)**

| Competitiveness group | mean | Sig. (2-tailed)(test value=3) |
|-------------------------|-------------|-------------------------------|
| Sales growth rate | 3.67 / 3.69 | .00 |
| New product development | 3.65 / 3.73 | .00 |
| Sales level | 3.53 / 3.47 | .00 |
| Profitability | 3.32 / 3.30 | .00 |

**Appendix 17. Difference in Competitiveness for All Respondents /
Manufacturers (ANOVA)**

| Competitiveness group | | Mean difference | Sig. |
|-----------------------|-------------------|-----------------|-------------|
| Profitability | Sales level | -0.21* / -0.17 | 0.04 / 0.48 |
| | Sales growth rate | -0.34* / -0.39* | 0.00 / 0.01 |
| | NPD | -0.32* / -0.42* | 0.00 / 0.00 |
| Sales level | Sales growth rate | -0.13 / -0.22 | 0.32 / 0.25 |
| | NPD | -0.11 / -0.25 | 0.46 / 0.12 |
| NPD | Sales growth rate | -0.02 / 0.03 | 0.99 / 0.99 |

Appendix 18 Correlations between Innovativeness and Competitiveness by All Respondents / Manufacturers

| | | Sales level | | Sales growth rate | | NPD | | Profitability | |
|-------------------------|--------|---------------------|-----------|---------------------|-----------|---------------------|-----------|---------------------|-----------|
| | | Pearson correlation | Sig. |
| Product | Today | .19* / .28* | .00 / .00 | .25* / .20** | .00 / .04 | .32* / .33* | .00 / .00 | .10 / .08 | .13 / .43 |
| | Future | .14** / .14 | .03 / .14 | .18* / .20** | .01 / .03 | .23* / .16 | .00 / .11 | .07 / .18 | .30 / .23 |
| Process | Today | .22* / .19 | .00 / .04 | .20* / .22** | .00 / .02 | .26* / .27* | .00 / .01 | .03 / -.04 | .67 / .72 |
| | Future | .22* / .18 | .00 / .06 | .23* / .24* | .00 / .01 | .22* / .16 | .00 / .09 | .07 / .06 | .28 / .53 |
| Business systems | Today | .22* / .11 | .00 / .24 | .24* / .13 | .00 / .19 | .29* / .19** | .00 / .04 | .11 / .06 | .09 / .53 |
| | Future | .25* / .23** | .00 / .02 | .29* / .25* | .00 / .01 | .29* / .24* | .00 / .01 | .12 / .15 | .07 / .12 |

* Correlation is significant at the 0.01 level (2-tailed)

** Correlation is significant at the 0.05 level (2-tailed)

Appendix 20. Sample Questionnaire (in English) Page 1

New Product development and Innovation in the Chinese Furniture Industry

This survey is part of a joint project by Oregon State University and the Softwood Export Council, which is designed to study market awareness, buyer-supplier relations and innovative abilities within the Chinese furniture industry.

Your contribution is extremely important to the success of this research. All information on the questionnaire will be held in strict confidence and the information you provide will never be associated with your name or company. If you would like to see the results, please provide us your business card for future contacts.

SECTION I

We'd like to know about company general information and your awareness of U.S. softwoods:

1) Please check the category that best represent your company's business style.

- | | |
|---------------------------------------|--|
| <input type="checkbox"/> Manufacturer | <input type="checkbox"/> Material trader |
| <input type="checkbox"/> Wholesaler | <input type="checkbox"/> Designer |
| <input type="checkbox"/> Retailer | <input type="checkbox"/> Other: _____ |

2) How many employees are there in your company?

- | | |
|----------------------------------|----------------------------------|
| <input type="checkbox"/> 1-50 | <input type="checkbox"/> 251-500 |
| <input type="checkbox"/> 51-100 | <input type="checkbox"/> 501+ |
| <input type="checkbox"/> 101-250 | |

3) Do you recognize the following U.S. softwood species?

- | | | |
|--|---|---|
| <input type="checkbox"/> Douglas fir | <input type="checkbox"/> Incense Cedar | <input type="checkbox"/> Aromatic Cedar |
| <input type="checkbox"/> Hemlock | <input type="checkbox"/> California Redwood | <input type="checkbox"/> Sitka Spruce |
| <input type="checkbox"/> Ponderosa Pine | <input type="checkbox"/> Alaskan Yellow Cedar | <input type="checkbox"/> White Fir |
| <input type="checkbox"/> Western Red Cedar | <input type="checkbox"/> Southern Yellow Pine | <input type="checkbox"/> Sugar pin |

SECTION II

The following questions ask for your opinions regarding raw material purchasing and production strategies:

4) Based on 1-5 scale, please evaluate the following areas in your company regarding today's status AND future's trend?

| | | Not innovative at all | | Somehow not innovative | | Average | | Somehow innovative | | Very innovative | |
|--|-------------|-----------------------|---|------------------------|---|---------|---|--------------------|---|-----------------|---|
| Product innovation (e.g. design, function) | | | | | | | | | | | |
| TODAY | IN 10 YEARS | 1 | 1 | 2 | 2 | 3 | 3 | 4 | 4 | 5 | 5 |
| Processing innovation (e.g. tech and material use) | | | | | | | | | | | |
| TODAY | IN 10 YEARS | 1 | 1 | 2 | 2 | 3 | 3 | 4 | 4 | 5 | 5 |
| Business systems innovation (e.g. marketing) | | | | | | | | | | | |
| TODAY | IN 10 YEARS | 1 | 1 | 2 | 2 | 3 | 3 | 4 | 4 | 5 | 5 |

5) Please indicate the degree of agreement for each of the following areas based on what drives innovation in you company (see next page):

Appendix 20. Sample Questionnaire (in English) (Continued)

Page 2

2

| In my company, ideas for innovation can be illuminated by... | Totally Disagree | Cautiously disagree | Neutral | Cautiously agree | Totally agree |
|--|------------------|---------------------|---------|------------------|---------------|
| Raw material suppliers | 1 | 2 | 3 | 4 | 5 |
| Industrial customers (upstream customers) | 1 | 2 | 3 | 4 | 5 |
| Upper management | 1 | 2 | 3 | 4 | 5 |
| Retailers | 1 | 2 | 3 | 4 | 5 |
| Trade associations | 1 | 2 | 3 | 4 | 5 |
| Processing technology suppliers (e.g. equipment) | 1 | 2 | 3 | 4 | 5 |
| Competitors | 1 | 2 | 3 | 4 | 5 |
| Employees | 1 | 2 | 3 | 4 | 5 |
| End consumers | 1 | 2 | 3 | 4 | 5 |
| Information technology suppliers (e.g. software) | 1 | 2 | 3 | 4 | 5 |
| Product design dept/agencies | 1 | 2 | 3 | 4 | 5 |
| Educational/research institutions | 1 | 2 | 3 | 4 | 5 |
| Trade shows (e.g. furniture, material shows) | 1 | 2 | 3 | 4 | 5 |
| Others: | 1 | 2 | 3 | 4 | 5 |

6) Based on 1-5 scale, please evaluate each of the following statements:

| | Totally Disagree | Cautiously disagree | Neutral | Cautiously agree | Totally agree |
|---|------------------|---------------------|---------|------------------|---------------|
| When developing new products, we will always consider new material and its supplying issues. | 1 | 2 | 3 | 4 | 5 |
| It is very unlikely for us to adopt certain new materials before we see proven (existing) market prospects (demands) for them. | 1 | 2 | 3 | 4 | 5 |
| Rather than radical changes, new product development should be based on company's existing lines (resources), with small modifications. | 1 | 2 | 3 | 4 | 5 |

SECTION III

To wrap up this survey, please provide the following information to facilitate our analysis.

7) Could you estimate the proportions of domestic sales vs. export sales by your company in 2003?

Sales domestic _____% + Sales export _____% = 100%

8) Please indicate the category that in your opinion best approximates how your operation compares with other competitors in your industry during the most recent year.

| | Much lagged behind competitors | Moderately lagged behind competitors | Equal with competitors | Moderately ahead of competitors | Much ahead of competitors |
|-------------------------|--------------------------------|--------------------------------------|------------------------|---------------------------------|---------------------------|
| Sales Level | 1 | 2 | 3 | 4 | 5 |
| Sales Growth Rate | 1 | 2 | 3 | 4 | 5 |
| New product development | 1 | 2 | 3 | 4 | 5 |
| Profitability | 1 | 2 | 3 | 4 | 5 |
| Others: | 1 | 2 | 3 | 4 | 5 |

Thank you for your assistance!! If you would like to see the results of this study, please provide us your business card as contact info.

Appendix 21. Sample Questionnaire (in Chinese) Page 1

先生/女士，请您抽出 3-5 分钟参加我们的问卷调查，好吗？

中国家具工业新产品开发和创新市场调查

这次问卷调查是美国俄勒冈州立大学 (Oregon State University) 与美国针叶材外销委员会 (the Softwood Export Council) 共同发起的“产业创新”系列研究中的一部分。您的意见和看法对我们的研究十分重要，同时我们会将您的观点传递给美国供应商，为他们更好地了解中国客户、提高服务质量提供指导。我们恪守保密的规则，您提供的所有信息不会被外泄。如果您希望得到本次调查的分析报告，请赐您的名片以便联系，谢谢！

首先，我们希望了解一些关于贵公司的基本情况：

1) 贵公司的主要类型是（请勾选一项）：

- | | |
|-------------------------------|--|
| <input type="checkbox"/> 制造企业 | <input type="checkbox"/> 材料商 |
| <input type="checkbox"/> 批发商 | <input type="checkbox"/> 设计师 |
| <input type="checkbox"/> 零售商 | <input type="checkbox"/> 其它 (请注明): _____ |

2) 贵公司的员工人数在以下哪个范围？

- | | |
|------------------------------------|------------------------------------|
| <input type="checkbox"/> 1-50 人 | <input type="checkbox"/> 251-500 人 |
| <input type="checkbox"/> 51-100 人 | <input type="checkbox"/> 500 人以上 |
| <input type="checkbox"/> 101-250 人 | |

3) 请勾选以下您所了解的美国针叶木材：

- | | |
|--|--|
| <input type="checkbox"/> 美国黄杉 (花旗松) Douglas fir | <input type="checkbox"/> 南方黄松 Southern Yellow Pine |
| <input type="checkbox"/> 铁杉 Hemlock | <input type="checkbox"/> 西部云杉 Sitka Spruce |
| <input type="checkbox"/> 美国黄松 Ponderosa Pine | <input type="checkbox"/> 香杉 Incense Cedar |
| <input type="checkbox"/> 西部红杉 Western Red Cedar | <input type="checkbox"/> 白杉 White Fir |
| <input type="checkbox"/> 加州红杉 California Redwood | <input type="checkbox"/> 香松 Aromatic Cedar |
| <input type="checkbox"/> 阿拉斯加黄杉 Alaskan Yellow Cedar | <input type="checkbox"/> 糖松 Sugar Pine |

根据贵公司的情况，请就下面的问题谈谈您的看法：

4) 您如何评价贵公司现在及将来在以下领域的创新？

| | | 根本没有创新 | | 基本没有创新 | | 一般 | | 基本有所创新 | | 绝对有创新 | |
|----------------|---------|--------|---|--------|---|----|---|--------|---|-------|---|
| 产品创新 (如设计和功能) | | | | | | | | | | | |
| 现在 | 今后 10 年 | 1 | 1 | 2 | 2 | 3 | 3 | 4 | 4 | 5 | 5 |
| 工艺创新 (如技术和材料) | | | | | | | | | | | |
| 现在 | 今后 10 年 | 1 | 1 | 2 | 2 | 3 | 3 | 4 | 4 | 5 | 5 |
| 商务系统创新 (如市场策略) | | | | | | | | | | | |
| 现在 | 今后 10 年 | 1 | 1 | 2 | 2 | 3 | 3 | 4 | 4 | 5 | 5 |

5) 下列因素对促进创新的作用如何，请发表您的观点：（请见下页）

Append 21. Sample Questionnaire (in Chinese) (Continued)
Page 2

2

| 在我们公司,创新的点子可以来自于: | 完全不同意 | 基本不同意 | 中立 | 基本同意 | 完全同意 |
|-------------------|-------|-------|----|------|------|
| 原材料供应商 | 1 | 2 | 3 | 4 | 5 |
| 上游客户 (如房产开发商) | 1 | 2 | 3 | 4 | 5 |
| 公司管理层 | 1 | 2 | 3 | 4 | 5 |
| 零售商 | 1 | 2 | 3 | 4 | 5 |
| 行业协会 | 1 | 2 | 3 | 4 | 5 |
| 加工设备供应商 | 1 | 2 | 3 | 4 | 5 |
| 竞争对手 | 1 | 2 | 3 | 4 | 5 |
| 公司员工 | 1 | 2 | 3 | 4 | 5 |
| 终端客户 (消费者) | 1 | 2 | 3 | 4 | 5 |
| 信息技术供应商 (如软件公司) | 1 | 2 | 3 | 4 | 5 |
| 产品开发部门或设计公司 | 1 | 2 | 3 | 4 | 5 |
| 教育研究机构 | 1 | 2 | 3 | 4 | 5 |
| 展览会 (如家具、材料展) | 1 | 2 | 3 | 4 | 5 |
| 其它 (请注明): | 1 | 2 | 3 | 4 | 5 |

6) 您是如何评价以下观点的?

| | 完全不同意 | 基本不同意 | 中立 | 基本同意 | 完全同意 |
|--|-------|-------|----|------|------|
| 在开发新产品过程中我们会经常考虑新材料的使用及其供应问题。 | 1 | 2 | 3 | 4 | 5 |
| 除非客户或市场有对新材料的明确需求,否则我们主动使用这种材料的可能性极低。 | 1 | 2 | 3 | 4 | 5 |
| 新产品开发应该在公司现有产品 (或资源) 的基础上逐步改进,而不是去大刀阔斧地改变它们。 | 1 | 2 | 3 | 4 | 5 |

最后,请您提供以下信息帮助我们进一步分析:

7) 请您估计一下贵公司 2003 年出口和内销的比例可以吗?

内销 (国内市场) _____% + 外销 (出口) _____% = 100%

8) 在您看来,贵公司在以下方面和同行业的竞争对手相比处于什么样的位置?

| | 远远落后 | 略逊一筹 | 和竞争对手不相上下 | 略胜一筹 | 遥遥领先 |
|-----------|------|------|-----------|------|------|
| 销售额 | 1 | 2 | 3 | 4 | 5 |
| 销售增长速度 | 1 | 2 | 3 | 4 | 5 |
| 新产品开发 | 1 | 2 | 3 | 4 | 5 |
| 利润水平 | 1 | 2 | 3 | 4 | 5 |
| 其它 (请注明): | 1 | 2 | 3 | 4 | 5 |

再次感谢您的支持!!! 如果您需要了解本次调查的分析结果,请赐名片以便我们和您联络。