Chapter 3 Technological Innovation in Wooden Furniture Industry: An International and Malaysian Perspective

3.1 Introduction

This chapter provides a comprehensive overview of technological innovation in the wooden furniture industry. The first part of the chapter provides a global perspective on the furniture industry. It describes the global furniture trade, value chain, sectoral patterns of the industry, technological innovation and design economics, the spatial agglomeration and innovation systems studies of the industry. The second part of this chapter shifts the focus of discussion to the wooden furniture industry in Malaysia. It begins with the classification, components and structure of the industry, and then sketches the development of the industry in Malaysia. This is followed by a detailed account of the industry from the perspective of knowledge-based and technology domain, and actors and linkages development. As the furniture manufacturers in Malaysia are mostly classified as SMEs, a special account of the SMEs, particularly in terms of their technological development and challenges, as well as the STI policies directions are incorporated in this chapter. In summary, the main purpose of this chapter is to examine the key features of the furniture industry from both the Malaysian and global perspective, taking into account that the process of furniture manufacturing is essentially characterised as a domestic-based labour-intensive mass production activity.

3.2 The Global Furniture Sector: An Overview

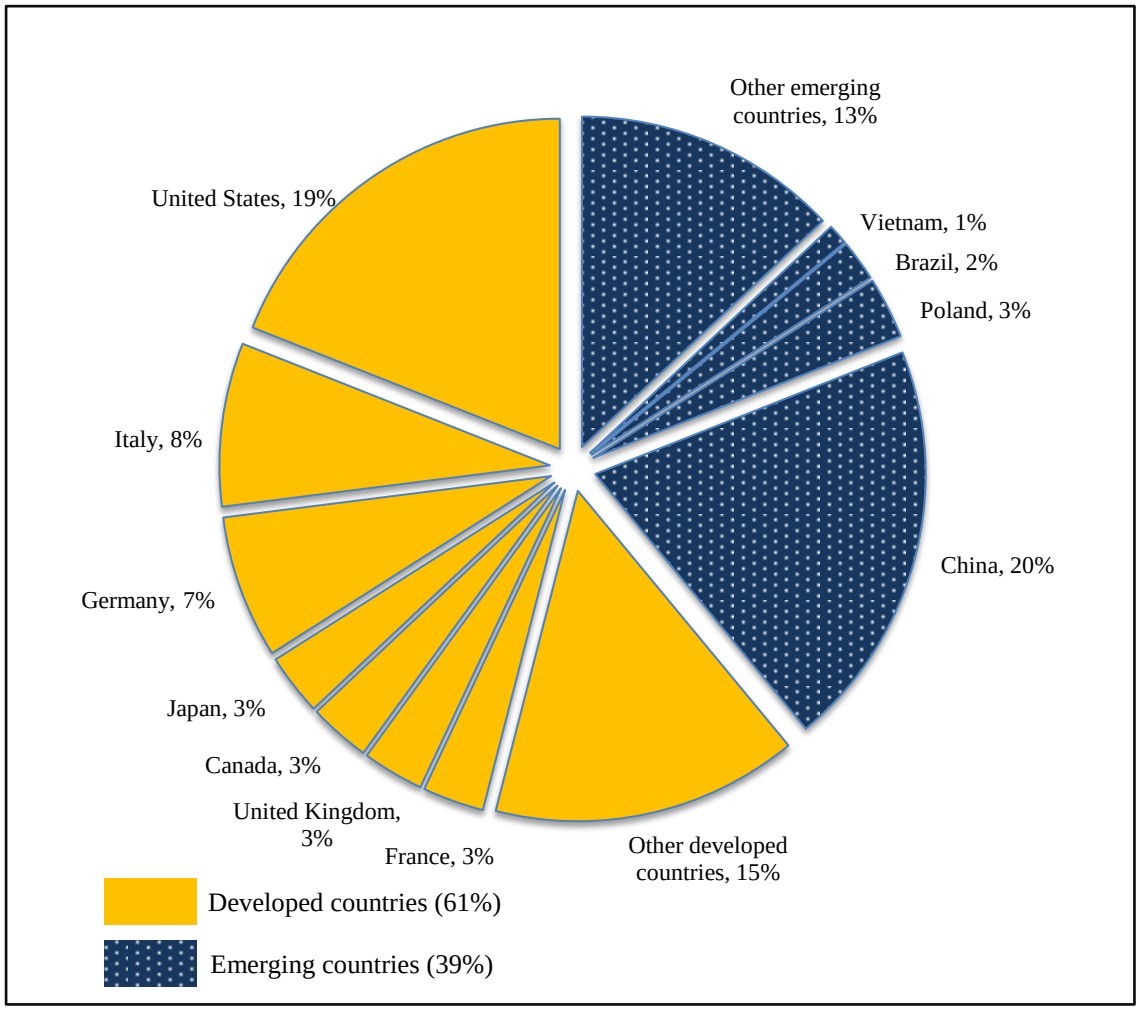
This section provides an overall background of the global furniture sector. It begins with an overview of global furniture trade and market structure. It is followed by the wooden furniture value chain and some details of the sectoral patterns of the furniture industry. Issues pertaining to the technological innovation and design economics of the furniture industry are also explored in this section. Selected important spatial agglomeration and innovation systems studies of the furniture industry are presented at the end of this section.

3.2.1 Global Trade and Market Structure

Furniture production is a huge global business that has grown rapidly in recent decades. A sectoral study on the global wooden furniture sector by Kaplinsky, Memedovic, Morris & Readman (2003) has demonstrated that between the years 1995 and 2000, the trade in furniture worldwide grew by 36 percent, which was faster than the merchandise trade as a whole (26.5 percent), apparel (32 percent) and footwear (1 percent). This study further revealed that by the year 2000, the furniture industry was the largest low-tech sector, exceeding apparel and footwear. Han, Wen & Kant (2009) believe that this surge in the global furniture trade was largely due to the innovation in packing and shipping such as ready-to-assemble and knock-down furniture products, as well as the breaking down of world trade barriers.

The latest statistics from the Centre for Industrial Studies[18] (CSIL) (2009) indicate that worldwide, furniture production was worth about USD 350 billion in 2008. Of this, 61 percent was produced by developed countries while the remaining 39 percent was produced by emerging countries. The major furniture producers from the developed countries are the United States of America (USA), Italy, Germany, Japan, Canada, the United Kingdom (UK) and France, whilst China, Poland and Vietnam are the main producers from the emerging countries. Figure 3:1 shows the world furniture production in for 2008.

Figure 3:1 World furniture production in 2008



Source: (CSIL, 2009)

[18] CSIL is an independent economic research and consulting company. It was founded in Milan in 1980 and it speciailses in applied economic research, SMEs economics and providing evaluation and technical assistance to development projects and programmes.

One of the interesting observations from world furniture production as shown in Figure 3:1 is that although furniture production is a resource and labour intensive industry, the major furniture producers are the industrially advanced economies. In fact, a similar observation was made in an earlier study by Kaplinsky, Morris & Readman (2002) on the top 15 net exporting countries in the years 1994-98:

> … of the 15 major exporters, only six (Brazil, China, Indonesia, Mexico, Malaysia and Thailand) are in the developing world. Given that emerging and developing countries tend to be small importers of furniture, their participation in the group of the largest net exporters is much more significant, with only five industrially advanced countries registering amongst the top 15 countries. Italy remains by far and away the largest net exporter (with a growing surplus during 1998–94), with Canada, Denmark, Spain and Sweden filling the 3rd, 5th, 8th and 11th positions respectively. (pp. 1160-1161)[19]

The global trend in the furniture trade and business can be discerned in more detail by tracking the periodic performance of the key world furniture producers, and studies by Kaplinsky and Readman (2005) and Han, et al. (2009) have provided insightful account of this trend. Drawn upon the concept of unit price and market share as a matrix of upgrading, Kaplinsky and Readman (2005) suggest the combined use of unit price and market share as an indicator of relative innovation performance.[20] Their framework on

[19] Further excellent explanation is available in Kaplinsky and Morris (2002).

[20] Kaplinsky and Readman (2005) write:

> Our logic for the choice of these indices is as follows. Firms which engage in successful product innovation (be they minor differentiations or more substantial changes in product design and performance) can expect to receive relatively higher prices for their output. (Note the word 'relatively'—this can also cover a world in which prices fall, but at a lower rate than those of competitors.) Higher prices may also reflect inefficiencies in production, suggesting a decline in innovative performance, but in this case with regard to process innovation. Therefore we need an indicator of cost competitiveness, and it is for this reason that we are drawn to the use of market shares. Producers who are not cost-competitive are likely to experience declining market shares. (p.682)

four different innovation outcomes is captured in four quadrants as illustrated in Figure 3:2.

Figure 3:2 Schemas for assessing product and process upgrading and downgrading

	MARKET SHARE DECREASES	**MARKET SHARE INCREASES**
UNIT VALUE RISES RELATIVELY TO INDUSTRY AVERAGE	Quadrant 1 Failed product upgrading	Quadrant 2 Product upgrading
UNIT VALUE FALLS RELATIVELY TO INDUSTRY AVERAGE	Quadrant 3 Product and process downgrading	Quadrant 4 Process Competitiveness

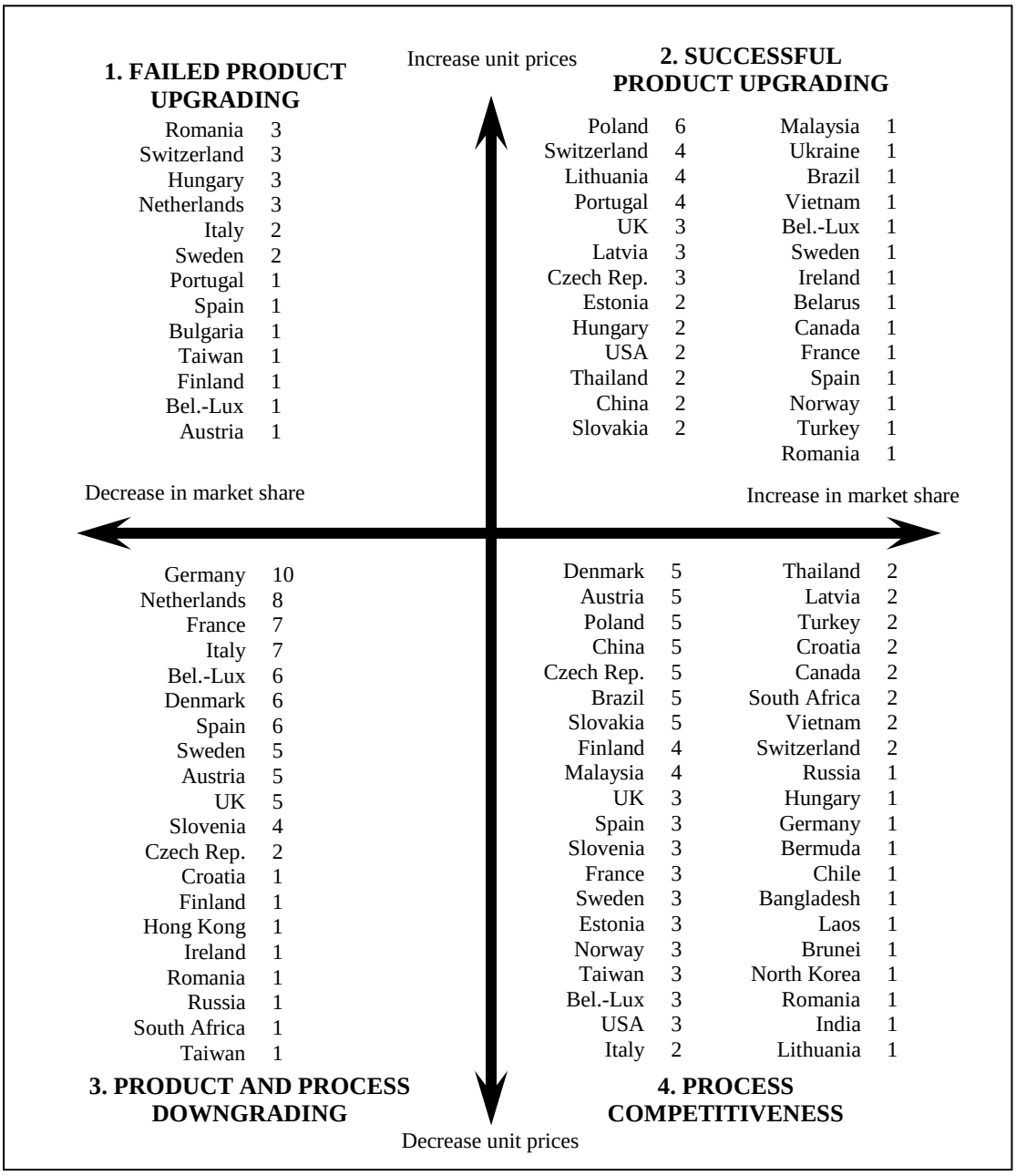
Source: Kaplinsky & Readman (2005)

Quadrant 1 shows the scenario of failed product upgrading as producers are unable to offset rising prices by sufficiently developing attractive products and consequently lose market share. Quadrant 2 exhibits a product upgrading scenario because the market share increases despite relative rising prices. Quadrant 3 shows a product and process downgrading scenario. This is due to the falling prices as well as producers' inability to sustain market share. Quadrant 4 reflects a trajectory of competitiveness in process, in which the market share increases due to the cheaper unit price.

The result of Kaplinsky and Readman (2005) study on four clusters of innovation performance is presented in Figure 3:3. The number beside the country names indicates the number of furniture subsectors (out of the eleven subsectors studied) that provides a significant result to the cluster. They postulated that good and bad performers are to be found across the range of per capita income groups. In other words, the capacity to

upgrade in furniture is not determined by the country's level of income. For instance, as shown in Quadrant 3, the higher income economies such as Germany, Netherlands, France, Italy, etc. were more likely to perform badly. In the case of Malaysia, it has been classified as one of the strong competitors in the process competitiveness quadrant, besides being categorised as one of the furniture producers in the successful product upgrading quadrant.

Figure 3:3 Four clusters of innovation performance



Source: Kaplinsky & Readman (2005)

Han, et al. (2009) examine the direction of change in the global furniture trade by looking at the 'Revealed Comparative Advantage (RCA)' [21] of selected countries. Table 3:1 presents the RCA of wooden furniture for selected countries in the period of 1993-2007. Almost all the middle to low-income countries exhibited an increasing RCA trend. In contrast, the downward trend was most marked in nations with high-income except for Canada. With regard to individual performance, Italy, Poland, Malaysia, Indonesia, and Vietnam showed an extremely strong comparative advantage; China and Canada displayed a strong comparative advantage; Germany a moderate comparative advantage; and USA lost its competitive edge with global producers, exhibiting an overall disadvantage over the period. Han, et al. (2009) conclude that the global market which was once 80 percent dominated by the high income countries, is now dwindling to 50 percent, and significantly replaced by the medium and low income countries. High-income countries such as the USA, Italy, Germany, and Canada showed a declining trend in market share, while some medium- and lower-income countries have emerged as potentially significant new sources of furniture exports to the international market. Among them, China has exhibited an impressive expansion in exports.[22]

[21] RCA is an index that compares the export share of a given commodity or sector in a country with the export share of that commodity or sector in the world market. The country is considered to be specialised in a sector if the RCA is above 1. If RCA >2.5, it shows that the country is extremely strong comparative advantage; 1.25<RCA<2.5 means a strong comparative advantage; 0.8<RCA<1.25 means a moderate comparative advantage; RCA<0.8 means a weak comparative advantage; and RCA<0 means a comparative disadvantage Han, et al. (2009).

[22] According to World Bank Gross National Income Country Classification 2008 and UN Comtrade Database, USA, Canada, Germany and Italy are high-income countries; Brazil, Malaysia and Poland are upper-middle income countries; China and Indonesia are lower-middle income countries, and Vietnam is a lower-income country.

Table 3:1 RCA of wooden furniture for selected countries, 1993-2007

	USA	Canada	Germany	Italy	China	Indonesia	Malaysia	Brazil	Poland	Vietnam
1993	0.37	0.98	1.18	3.64	0.81	1.66	1.88	1.29	6.12	–
1994	0.35	1.11	1.10	3.79	0.89	1.91	2.12	1.23	7.10	–
1995	0.28	1.14	1.03	3.90	0.86	2.00	2.08	1.49	7.72	–
1996	0.28	1.37	1.02	3.85	0.98	2.04	2.38	1.47	8.57	–
1997	0.29	1.65	0.99	3.87	1.15	1.80	2.71	1.49	9.36	–
1998	0.27	1.93	0.95	3.63	1.32	1.00	2.70	1.35	8.39	–
1999	0.25	2.01	0.98	3.45	1.44	3.37	2.70	1.72	7.91	–
2000	0.27	2.19	0.97	3.56	1.56	3.59	2.81	2.04	8.22	3.00
2001	0.26	2.21	0.96	3.44	1.58	3.78	2.63	1.80	7.39	3.52
2002	0.25	2.21	0.89	3.26	1.82	3.93	2.59	1.94	6.98	4.42
2003	0.26	2.19	0.83	3.13	1.91	3.94	2.60	2.02	6.78	6.13
2004	0.26	2.05	0.83	3.10	1.91	4.11	2.62	2.18	6.34	7.91
2005	0.27	1.90	0.98	3.03	1.97	3.81	2.57	1.91	6.15	8.66
2006	0.27	1.85	1.04	3.15	2.00	3.51	2.71	1.60	5.56	9.66
2007	0.29	1.56	1.15	3.37	1.93	3.42	2.90	1.52	–	–
Mean	0.28	1.76	0.99	3.48	1.48	2.92	2.53	1.67	7.33	6.19
Rank	10	6	9	3	8	4	5	7	1	2
Direction	−	+	−	−	+	+	+	+	−	+

Source: Han, et al. (2009)

In summary, the current trend of global trade in furniture is characterised as increasing penetration by developing countries, and decreasing and converging unit prices. The trend toward a common and falling global price is due to either falling barriers to entry and new entrants, or increasing efficiency and falling costs, or both (Kaplinsky, et al., 2002). Another important development in the global furniture trade is the rise of the Chinese furniture industry. Buoyed by a strong domestic economy and construction sector along with a booming export business, furniture manufacturing has grown rapidly - with a doubling of production in the second half of the 1990s, and subsequent double-digit annual growth (Robb & Xie, 2003). Today, as in other low-tech industries such as clothing and footwear, China is currently the world's biggest exporter. As Drayse (2010) observes:

> The key to rising furniture imports is the explosive growth of a Chinese furniture industry combining rock-bottom wages (between 50 and 75 cents per hour) with sophisticated technology in massive, state of-the-art factories. Furniture 'mega-plants' employ thousands of workers who live in company-owned dormitories. Dynamic furniture manufacturing agglomerations have emerged in coastal China, based on a convergence of Chinese labour and foreign capital. The shift of Taiwanese furniture capital and knowhow across the strait has been especially important. (p. 9)

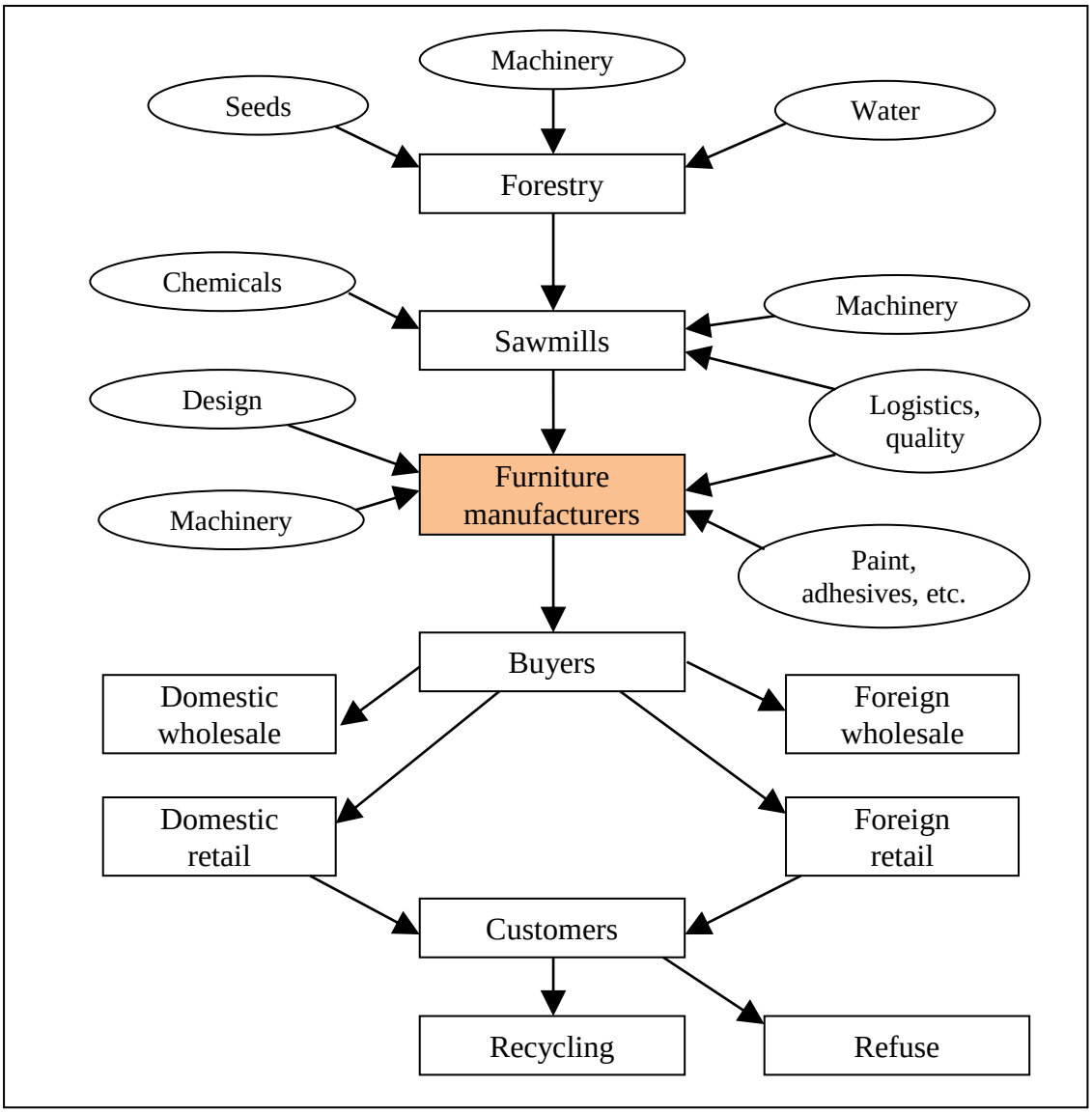
3.2.2 The Wooden Furniture Value Chain

The term value chain is used to describe the full range of activities required to bring a product or service from conception, through the different phases of production, delivery to final consumers, and final disposal after use. A value chain commonly consists of four main phases, namely design, production (inward logistics, transforming input, and packaging), marketing, and consumption and recycling. However, according to Kaplinsky & Morris (2000), the value chain in the real world is much more complex and there tends to be many more links in the chain. In the case of the furniture industry, the extended value chain is described as:

> ... involves the provision of seed inputs, chemicals, equipment and water for the forestry sector. Cut logs pass to the sawmill sector which gets its primary inputs from the machinery sector. From there, sawn timber moves to the furniture manufacturers who, in turn, obtain inputs from the machinery, adhesives and paint industries and also draw on design and branding skills from the service sector. Depending on which market is served, the furniture then passes through various intermediary stages until it reaches the final customer, who after use, consigns the furniture for recycling. (p. 4)

Figure 3:4 provides the schema for the value chain in the wood furniture industry.

Figure 3:4 Value chain in the wood furniture industry

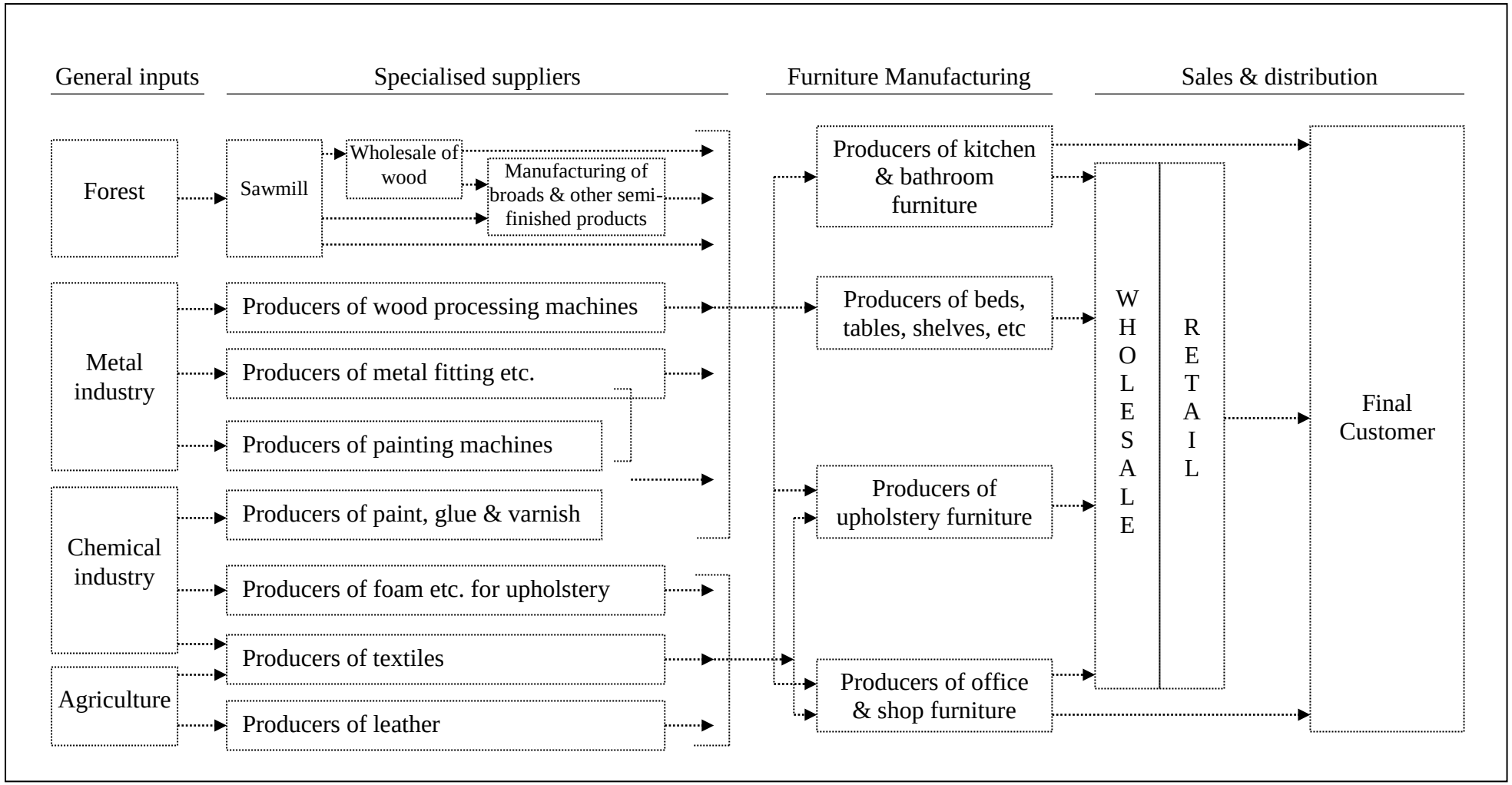


Source: Kaplinsky & Morris (2000)

In the same vein, Maskell, Eskelinen, Hannibalsson, Malmberg & Vatne (1998) describe the furniture value chain as an industrial system which ranges from the transformation of the raw material (timber, metal, plastic, rattan, etc) and semi-finished products (boards, etc) to final products (bed, chair, etc.), and still further to the marketing, sales and distribution of the products to consumers. Its basic inputs – moderately skilled workforce, raw materials and machinery – are generally accessible anywhere and to anybody. Maskell's furniture value chain is presented in Figure 3:5.

Furniture products, like apparel, footwear and toys, are classified as buyer-driven commodity. According to Gereffi (1999), buyer-driven commodities commonly involve large retails, markets, with branded manufacturers playing the pivotal role in setting up decentralised production networks in a variety of exporting countries. What is interesting about the buyer-driven chain is that their profits are derived not from scale, volume, and technological advances as in producer-driven chains, but rather from the unique combination of high-value research, design, sales, marketing, and financial services that allow the retailers, designers, and marketers to act as strategic brokers in linking overseas factories and traders with evolving product niches in their main consumer markets. The main features of the buyer-driven commodity chain and its comparison to producer-driven commodities chain are highlighted in Table 3:2.

Figure 3:5 Maskell's furniture value chain



Source: Maskell (1996)

Table 3:2 Main characteristics of buyer-driven and producer-driven global commodity chains

	Buyer-Driven Commodity Chains	**Producer-Driven Commodity Chains**
Drivers of Global Commodity Chains	Commercial Capital	Industrial Capital
Core Competencies	Design; Marketing	R&D; Production
Barriers to Entry	Economies of Scope	Economies of Scale
Economic Sectors	Consumer Nondurables	Consumer Durables, Intermediate Goods, Capital Goods
Typical Industries	Apparel; Footwear; Toys	Automobiles; Computers; Aircraft
Ownership of Manufacturing Firms	Local Firms, predominantly in developing countries	Transnational Firms
Main Network Links	Trade-based	Investment-based
Predominant Network Structure	Horizontal (clusters of similar firms, such as competitors)	Vertical (supply chains and customer relationships)

Source: Gereffi (1999)

Despite the complexity of the extended furniture value chain, the buying agents are still among the critical actors simply because they facilitate the entry of wood furniture producers into the final markets. Kaplinsky et al. (2003) identified three major buying agents in the furniture value chain:

a) Large multi-store retailers, with outlets and suppliers in many countries. IKEA, for example, sources from 2,000 suppliers in 52 countries and has more than 300 outlets in three continents.
b) Small-scale retailers, which buy directly from a limited number of suppliers in a limited number of countries.
c) Specialised medium-sized buyers, which source from many countries and sell on to retail outlets, usually in a single country or region.

3.2.3 Sectoral Patterns of the Furniture Industry

Scott (2006) asserts that one of the noteworthy features of the modern economy is the emergence of many different kinds of low-technology, and labour-intensive industries as engines of growth. Among these sectors are the furniture, clothing and footwear industries. These industries are often marked by low wages, unskilled workers, and sweatshop conditions. However, they provide employment opportunities and target fashion-oriented segments.

According to Malerba & Orsenigo (1997), the differences in the structure of innovative activities may be related to a fundamental distinction between Schumpeter Mark I and Schumpeter Mark II technologies. The pattern of innovation activity for Schumpeter Mark I is characterised by 'creative destruction' with technological ease of entry and a major role played by entrepreneurs and new firms in innovative activities; whereas Schumpeter Mark II suggests that the pattern of innovative activities is characterised by 'creative accumulation' with the prevalence of large established firms and the presence of relevant barriers to entry for new innovators. In the case of the furniture industry, a cross-country comparison of the Schumpeterian patterns of innovation by Malerba & Orsenigo (1997) on Germany, France, the UK, Italy, Japan and the USA showed that the furniture industry is consistently in the Schumpeter Mark I camp. In other words, the patterns of innovative activity in the furniture industry are mainly generated by the entrepreneurial activity and creativity of small and new firms. Table 3:3 shows the taxonomy of patterns of innovative activities.

Table 3:3 Taxonomy of patterns of innovative activities

Schumpeter Mark I technological classes	Schumpeter Mark II technological classes
- Clothing and shoes	- Gas, hydrocarbons and shoes
- Furniture	- Organic chemicals
- Agriculture	- Macromolecular compounds
- Chemicals	- Biochemicals, bio- and genetic engineering
- Physical processes	- Aircraft
- Medical preparation	- Engines, turbines and pumps
- Chemical processes for food and tobacco	- Laser technology
- Machine tools	- Optics and photography
- Industrial automation	- Computers and other office equipment
- Industrial machinery and equipment	- Electronics components
- Railways and ships	- Telecommunications
- Material handling apparatus	- Multimedia systems
- Civil engineering and infrastructure	- Ammunition and weapons
- Mechanical engineering	- Nuclear technology
- Mechanical and electric technologies	
- Household electric appliances	
- Lighting systems	
- Measurement and control instruments	
- Sports and toys	

Source: Malerba & Orsenigo (1997)

Pavitt's (1984) pioneering work suggests that the taxonomy of sectoral patterns of technical change can be addressed in three categories, namely supplier dominated, production intensive (scale intensive and specialised suppliers), and science-based. These different trajectories can in turn be explained by sectoral differences in terms of three characteristics, namely sources of technology, users' needs, and the means of appropriating benefits. The wood sector, together with textiles, lumber, paper, mill products, printing and publishing, and construction are classified as supplier dominated sectors. Most innovation comes from the suppliers of equipment and materials, although in some cases large customers and government-financed research and extension services also make a contribution. A relatively high proportion of the innovative activities in these sectors are directly related to process innovation. According to Vega-Jurado, Gutiérrez-Gracia & Fernández-de-Lucio (2009), technological knowledge in supplier dominated sectors is mainly embodied in the machinery, equipment, and capital assets

produced by other sectors. Based on a survey of 1,234 small firms and micro firms in the Netherlands, Jong and Marsili (2006) propose a more diverse pattern of innovation in small firms than in Pavitt's taxonomy. Their results indicate that the innovativeness of all supplier-dominated firms are low in all dimensions, namely in terms of input (financial, time and employment), formal planning and management attitude. Innovation mainly consists of process innovation, and is essentially a response to proposals from suppliers. In the same vein, Kautonen (1996) asserts that for supplier-dominated sectors like the furniture industry, the process of innovation is primarily a process of diffusion of best-practice capital goods and of innovative intermediate inputs, while in-house R&D expenditures and other endogenously generated opportunities are rather limited.

Resource and labour intensity are also the main characteristics of the furniture industry, as Kaplinsky, et al. (2003) observed:

> Furniture has traditionally been a resource and labour-intensive industry that includes both local craft-based firms and large volume producers. Mass producing furniture became a viable manufacturing strategy with the advent of flat-pack or ready-to-assemble designed furniture. This product innovation paved the way for firms to design, manufacture and ship products in large quantities. Firms that mass-produce flat-pack furniture tend to supply products for the low- to medium-price markets. (p. 1)

Besides, OECD (2007) classification of manufacturing industries based on technology into high-technology, medium-high-technology, medium low-technology and low-technology groups, after ranking the industries according to their average 1991-99 against aggregate OECD R&D intensities, manufacture of furniture which is in the class

of 36-37 (Manufacturing, n.e.c.; Recycling) in ISIC Rev. 3, is classified as a low-technology industry. As shown in Table 1:1 in Chapter 1 of this thesis, the class of 36-37 is leading in terms of R&D intensities compared to other industrial activities which are in the group of low-technologies, such as wood, pulp, paper, paper products, printing and publishing (class 20-22); food products, beverages and tobacco (class 15-16); and textiles, textile products, leather and footwear (class 17-19).

3.2.4 Technological Innovation and Design Economics

Ratnasingam (2004) views the value in furniture as a matter of perception as it is sold based on perceived value, rather than actual value. This suggests that the creation of value-added furniture is not about using high quality materials or state-of-the-art technologies, but rather it is about expressing a lifestyle in a creative and innovative manner. The artistic part of the piece of furniture drives its value, while the scientific part assists in the consistent production of the piece. Table 3:4 provides a summary of the factors that determine the value in a piece of furniture.

Table 3:4 Value drivers in furniture

Tangible Values	Intangible Values
- Structural Rigidity	- Aesthetic Appeal
- Functional Reliability & Performance	- Environmental Friendly
- Safety	- Pricing
- Durable	- Feel Good Factor
- Purposeful	- Social Status / Identify
- Fine Workmanship / Construction	- Exclusivity / Copyrighted
- Quality Materials	- Niche Product

Source: Ratnasingam (2004)

Indeed, a similar view of the value of furniture has been advanced by Ettema (1981), who argued that furniture is an important means of self-presentation, and that it is particularly sensitive to ostentation. Ettema (1981) write:

> Combining style, materials, and technology in a desirable product at a price the market will accept has always been the basic problem facing furniture makers. Since costs are, in part, dependent on the labor intensity of their technologies, manufacturers must design pieces with the capabilities of their tools in mind, constantly compromising between cost and style. This system of give and take is the economic interface between technology and style. It is the economics of design. (p. 199)

Ettema (1981) further argued that technology has directly caused elaborate and degraded styles to appear within the furniture industry. This is because machines have destroyed the traditional bond between art and industry, eliminating skilled workmen and under-mining the small-shop system of manufacture. In general, machines have allowed furniture production to increase, but they have also failed to democratise style, because machines cannot produce inexpensive copies of an expensive-looking ornament.

Additionally, Ratnasingam (2004) proposed value-addition in the furniture business is simply about creating a perception of reliability, dependability and value for money among the customers. Hence, the highest value-addition is achieved in the design and marketing stages of the business, rather than the manufacturing stage. Furniture enterprises involved in product design and retailing activities are indeed very profitable.

Unfortunately, product design and marketing are not the strong points of the furniture industry. A similar view has been highlighted by Kaplinsky, et al. (2002), in which design is seen as one of the drivers behind the "functional upgrading" of the furniture industry.

3.2.5 Spatial Agglomeration and Innovation Systems Studies

From the literature review it was found that the process and patterns of technological innovation in furniture industries have been mostly studied using the spatial agglomeration perspective, which is founded extensively on the concept of cluster and Regional Innovation Systems (RIS). According to Asheim & Coenen (2005), these two concepts belong to the territorial innovation theory family and they have demonstrated particular resonance in academic and policy circles. For Scott (2006), the global landscape of furniture production is marked by enormous diversity from place to place, but is nonetheless organised in important ways around the great agglomerations that constitute the main developmental poles of the industry. In general, these agglomerations function as spatial anchors of series of international trading flows, which include direct exports of final products, intra-firm trade, and outsourcing relationships. In the same vein, Beerepoot (2004b) believes that operating in a cluster provides companies with the opportunity to monitor the work of similar firms and combine this with their own efforts.

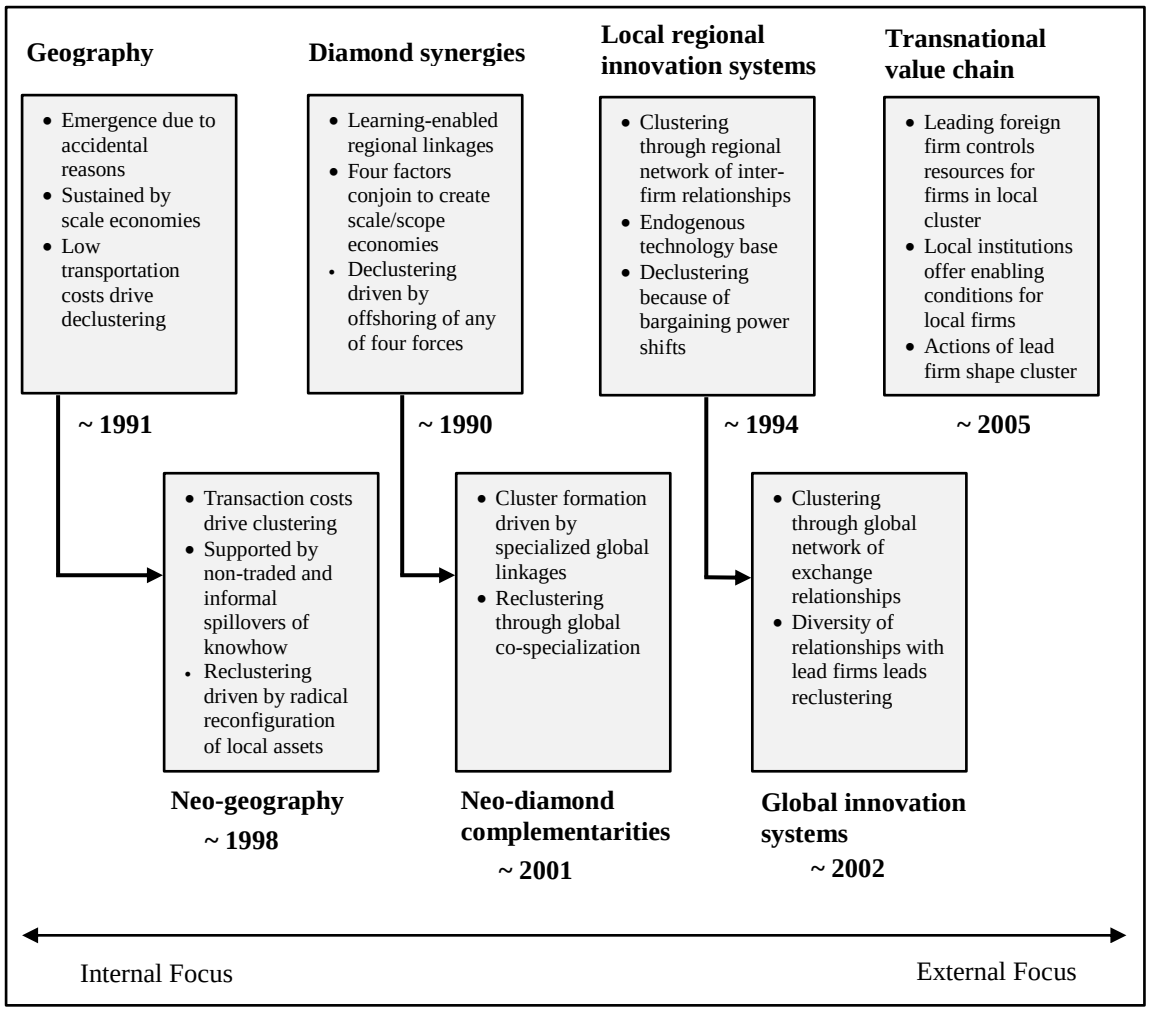
Although the concept of cluster and RIS are to a certain extent closely related, they should not be conflated. Asheim & Coenen (2005) point out that the cluster concept is

more towards a concentration of interdependent firms within the same or adjacent industrial sectors in a small geographic area. In contrast, RIS is the defined as interacting knowledge generation and exploitation subsystems linked to global, national and other regional systems. In layman's terms, the cluster concept is substantially narrower than the RIS concept because of the strong sectoral connotation in clusters whereas a RIS can transcend multiple sectors. In addition, not all clusters are innovation systems. The RIS, as other variants of innovation systems, is highly focused on the process of evolutionary, learning, and interaction amongst the main actors in an innovation ecosystem.

A comprehensive overview of the growing literature on regional clustering competitive advantage, which spans over the development of cluster concept to innovation systems, has been provided by Gupta & Subramanian (2008). Their literature on the sequential development of Grand Rapids office furniture cluster in the USA suggest that there are basically three streams of spatial agglomeration literature, namely the economics of geography, the linkages of diamond, and the innovation systems. The economics of geography underlines the gains from co-location, the linkages of diamond emphasises the gains from mutually reinforcing cluster of linkages, and the innovation systems looks at the networking relationships that generate innovation. Gupta & Subramanian (2008) further classify these three streams into six distinct operational perspectives: (a) Krugman's geography perspective; (b) Neo-geography perspective; (c) Porter's diamond perspective; (d) Neo-diamond perspective; (e) Regional innovation systems

perspective; and (f) Global innovation systems perspective.[23] Figure 3:6 illustrates the sequential developments of spatial agglomeration literature.

Figure 3:6 Sequential developments of spatial agglomeration literatures



Source: Gupta & Subramanian (2008)

[23] For an excellent account, please refer to Gupta, V., & Subramanian, R. (2008). Seven perspectives on regional clusters and the case of Grand Rapids office furniture city. *International Business Review*, 17(4), 371– 384.

Mytelka & Farinelli (2000) claim that the innovation systems approaches have broken ranks with the traditional view of innovation as a process of radical change at the frontier of an industry. Innovation systems approaches recognise that innovation extends beyond formal R&D activities to include continuous improvement in product design and quality, changes in organisation and management routines, creative marketing and modifications to production process that bring costs down, increase efficiency and ensure environmental sustainability. It is important to note that to emphasise innovation in this sense is not to deny the role that R&D can play in generating new knowledge. Rather the point is to avoid overemphasis on R&D and to encourage policymakers to take a broader perspective on the opportunities for learning and innovation in SMEs and the so-called traditional industries than they have done in the past.

Table 3:5 is an attempt to summarise numerous empirical studies which are related to innovation activities in the furniture industry. It reveals that the approaches of spatial agglomeration have been used extensively to elicit data and information pertaining to the trend and process of furniture manufacturing activities, both in developed and developing countries. These studies show that generally there is not much difference between the furniture manufacturing activities of those clusters from developed and developing countries. However, the Italian furniture industry is an exception. Compared to other furniture clusters which are mostly Original Equipment Manufacturer (OEM) based, Italian firms typically are design-oriented, which aims at strong product uniqueness and new design forms (Lindman, Scozzi, & Otero-Neira, 2008). The importance of linkages, especially the role of subcontracting in fostering the technological and skill capabilities of the furniture industries have been addressed in

almost all the studies. For instance, the importance of external connections in stimulating internal innovation in Canadian furniture clusters (Drayse, 2010); vertical and horizontal networks as the primary sources of innovation in furniture clusters in Denmark (Asheim & Coenen, 2005); subcontracting relationships with foreign investors and buyers as well as agglomeration economies in Indonesian furniture clusters (Berry, Rodriguez, & Sandee, 2002), etc.

Additionally, the studies have highlighted a few case specific characteristics of the global furniture clusters as listed below:

a) In the USA, there are signs of declustering drive. This is because the advent of container shipping technology allowed efficient shipment of quality materials to China for low cost production, and shipment of assembled pieces to various markets, thereby weakening the home-based diamond linkages (Gupta & Subramanian, 2008). In addition, the industry's mix of strategic resources changes as a result of the entry of foreign competition in a domestic market. This often leaves domestic firms with obsolete resources and the difficulties associated with generating new ones. Consequently, the performance of domestic firms that do not adapt to the new environmental conditions suffers (Carpano, Rahman, Roth, & Michel, 2006).

b) As a more developed country, the furniture industry in Spain however, has not reached the minimum level of financial effort required to set up effective R&D and innovation activities contributing to the creation of effective endogenous

technologies. Hence, the innovation strategy followed by many firms has been essentially focused on the acquisition of embodied technology available in international markets instead of on the development of in-house technology (Diaz-Balteiro, Herruzo, Martinez, & González-Pachón, 2006). On the other hand, the incidences of environmental and quality strategies in firms have been determinant factors of innovation (Alfranca, Diaz-Balteiro, & Herruzo, 2009).

c) For South Africa, the furniture producers are only hanging onto the market by virtue of price competitiveness, which is delivered by a continuously depreciating exchange rate. Since their quality and delivery reliability were poor, they were distant from final markets and showed little capacity to develop related capabilities in other sectors. The domestic value chain has been dominated by large firms. This is because firms which grew under the protectionist mantle of import-substituting industrialisation tend to serve a wide domestic market, the range of products which these firms made was relatively large. Consequently, they tended to be unable to concentrate on areas where they had distinctive competences, a first and important step in the upgrading trajectory. Thus, these firms failed to develop the capacity to design and change their product portfolios (Kaplinsky, et al., 2002).

d) The Cebu furniture cluster in Philippines provides employment to many people with sophisticated skills but limited formal education. The majority of the workers have learned their skills through informal mechanisms, with only a small number of workers depending on formal training for their knowledge and skills. Many furniture exporters have a strong foothold in the informal sector

through the outsourcing of work to small contactors and home-workers. Workers in the lower strata of the production hierarchy do not have much access to formal upgrading of skills and the development of tasks. The opportunity to accumulate knowledge is limited in such a low technological position (Beerepoot, 2004a, 2004b).

e) China, although currently the largest furniture exporter in the world, has not developed its original design and innovative capabilities. The lack of their own brand and updated technology has hampered their efforts to move upward along the value chain and thus they cannot sustain a more competitive industry in the long run. The low prices of the Chinese wooden furniture have also triggered antidumping investigations by European Union countries. Apart from the tariff barriers, more and more technical barriers and international certification standards call for cleaner production and greener products, which are restricting the expansion of the Chinese manufacturing sector (Han, et al., 2009). According to Robb & Xie (2003), most Chinese furniture firms are very labour intensive. The average furniture manufacturer has limited technology, but there are significant exceptions, particularly among foreign-invested firms. However, increased automation and the emergence of private companies have markedly improved labour productivity over the past decade. Despite these gains, labour productivity remains comparatively low.

Table 3:5 Summary of the spatial agglomeration studies on the furniture industry

Locational situation	Literatures	Countries / clusters	Perspectives / Approaches	Main Findings / Recommendation
More developed countries	Lindman, et al. (2008)	Italy	New product development in low-tech SMEs.	Italian firms typically are design-oriented, which aims at strong product uniqueness and new design forms. In doing so, they apply open new product strategy by willingly entering into cooperation with any useful actors and knowledge holders and/or generators. Open design strategy has eventually lead to high export performance. Also, high design innovation leads to high product competitiveness.
	Drayse (2010)	Canada (Ontario, and Québec[24])	Continental and global integration for innovation in matured industry.	Most firms recognise that their success depends on their ability to exploit markets. These external connections have stimulated internal innovation. Given the limitation posed by a small economy, 'Open Industrial Model' is especially appropriate in the Canadian case, in which successful firms are able to take advantage of local assets and expand into external markets. Geographical differences in innovative cultures and government business relations are shown in the case of Ontario and Québec firms. In this respect, Ontario firms exhibit greater export intensity, and are thus more sensitive to fluctuations in the US market. Québec firms give a higher priority to innovation and government assistance than Ontario firms.
	Asheim & Coenen (2005)	Denmark (Salling[25])	The learning economy and industrial knowledge bases of clusters and RIS.	Vertical networks between producers and their suppliers (in collaboration with existing suppliers or by reshuffling inputs from other suppliers) and through horizontal networks (e.g. matching product designs in order to offer fuller product lines) are the primary sources of innovation. Furniture firms have hardly any systematic learning relationship with players outside the cluster. Technical schools and cabinetmakers guilds play an important role in sustaining the patterns of localised inter-firm learning
	Carpano, et al. (2006)	U.S.	Resource based view, international mobility barriers and changes in matured industry.	As a result of the entry of foreign competition in a domestic market, the industry's mix of strategic resources changes, often leaving domestic firms with obsolete resources and the difficulties associated with generating new ones. Consequently, the performance of domestic firms that do not adapt to the new environmental conditions suffers.

[24] In Canada, Ontario and Québec accounted for 80% of sales in 2005, and 73% of employment in 2006. Québec specialises in the more labour-intensive household furniture segment, while Ontario is divided between household and office furniture segments (Drayse, 2010).

[25] Salling is a Danish peninsula located in the north-west of the larger Jutland peninsula.

	Gupta and Subramanian (2008)	U.S. (Greater Grand Rapids)	Modularization and global configuration of the value chain is creating new regional clusters.	There is a sign of declustering drive, in which the advent of container shipping technology allowed efficient shipment of quality materials to China for low cost production, and shipment of assembled pieces to various markets, thereby weakening the home-base diamond linkages.
	Diaz-Balteiro, et al. (2006)	Spain	Relationship between productive efficiency and innovation activity.	The innovation strategy followed by many firms has been essentially focused on the acquisition of embodied technology available in international markets instead of on the development of in-house technology. This is because most firms may have not reached the minimum level of financial effort required to set up effective R&D and innovation activities contributing of to the creation of effective endogenous technologies.
	Alfranca, et al. (2009)	Spain	The positive impact of Environmental Management System and Quality Management System on firm innovation	The incidences of environmental and quality strategies in firms have been determinant factors of innovation. Environmental and quality strategies tend to exert positive effects on the specific innovation activities of firms, in spite of the fact that a substitution relationship was found between the existence of quality management systems and R&D subsidies.
Less developed countries	Kaplinsky, et al. (2002)	South Africa	Global furniture value chain and factors (particularly the global buyers) affecting firm upgrading.	South African producers are only hanging into the market by virtue of price competitiveness, which is delivered by a continuously depreciating exchange rate. Since their quality and delivery reliability were poor, they were distant from final markets and showed little capacity to develop related capabilities in other sectors. The domestic value chain has been dominated by large firms. This is because firms which grew under the protectionist mantle of import-substituting industrialisation tend to serve a wide domestic market, the range of products which these firms made was relatively large. Consequently, they tended to be unable to concentrate on areas where they had distinctive competences, a first and important step in the upgrading trajectory. Thus, these firms failed to develop the capacities to design and change their product portfolios.
	Berry, et al. (2002)	Indonesia (Jepara[26])	The role of clusters, subcontracting, and strategic alliances as factors in the evolution of SMEs.	In Jepara furniture industry is driven by the strength of subcontracting relationships with foreign investors and buyers as well as agglomeration economies achieved by clustering. Technological change is more likely when the clusters are linked to urban or international markets. In this regards, subcontracting has been crucial to harnessing traditional skills for export production. Private channels have been the dominant mechanisms for acquiring technological capabilities.

[26] Jepara is a small town in the province of Central Java, Indonesia. The furniture cluster in Jepara employs over 40,000 permanent workers in more than 20,000 small enterprises and 100 large and medium ones scattered across 80 villages (Berry, et al., 2002).

Beerepoot (2004a, 2004b)	Philippines (Cebu)	Learning process in small enterprises.	The industry provides employment to many people with sophisticated skills but limited formal education. The majority of the workers have learned their skills through informal mechanisms, with only a small number of workers depending on the formal training for their knowledge and skills. The furniture cluster in Cebu is a low technological industry. Many furniture exporters have a strong foothold in the informal sector through the outsourcing of work to small contactors and home-workers. Workers in the lower strata of the production hierarchy do not have much access to formal upgrading of skills and the development of tasks. The opportunity to accumulate knowledge is limited in such a low technological position.
Han, et al. (2009)	China	Rising cost, technology gap, escalating international trade barriers, unfavourable macroeconomic environment as intensifying pressures to industry competitiveness.	Chinese wooden furniture has not developed their original designs and innovative capabilities. The lack of their own brand and updated technology has hampered their efforts to move upward along the value chain and thus they cannot sustain a more competitive industry in the long run. On the other hand, the low prices of the Chinese wooden furniture have also triggered antidumping investigations by EU countries. Apart from the tariff barriers, more and more technical barriers and international certification standards call for cleaner production and greener products, which are restricting the expansion of the Chinese manufacturing sector.
Robb & Xie (2003)	China	Manufacturing strategy and technology in furniture industry.	Most firms are very labour intensive, the average furniture manufacturer has limited technology, but there are significant exceptions, particularly among foreign-invested firms. However, increased automation and the emergence of private companies have markedly improved labour productivity over the past decade. Despite these gains, labour productivity remains comparatively low.

In this section, a brief review on global trend, market structure and value chain of the furniture industry is presented. The recent developments in sectoral patterns of innovation are highlighted due to its relevance to the research framework on SIS established in this study. Taking this as a starting point, the following section reviews the current status of wooden furniture industry in Malaysia.

3.3 Background of Malaysia's Wooden Furniture Industry

This section provides a brief note on the background of Malaysia's wooden furniture industry. It begins with the classification and components of the industry and followed by the emergence of the industry in Malaysia. The structure, export market and the location of Malaysia wooden furniture industry are presented next. Some account of the technological capabilities in the industry is provided at the end of this section.

3.3.1 Classifications and Components

MSIC 2008 is a classification of all Malaysia's economic activities which conform closely to ISIC. [27] According to MSIC 2008, Malaysia's furniture manufacturing activities can generally be classified into four main items as shown in Table 3:6.

[27] This framework groups producing units into detailed industries based on similarities in the economic activities, taking into account the inputs, the process and technology of production, the characteristics of the outputs and the use to which output are applied (United Nations, 2008). In the case of Malaysia, for the purpose of international comparability, MSIC conforms closely to the ISIC, with some modification to suit national requirement. The principle used in MSIC is a classification of kinds of economic activities and not a classification of goods and services or a classification of occupations (Department of Statistics, 2008).

Table 3:6 Classification of manufacture of furniture in Malaysia

DIVISION 31 : MANUFACTURE OF FURNITURE Group 310 : Manufacture of Furniture		
Item	Description	MSIC 2000
31001	Manufacture of wooden and cane furniture	36101p
31002	Manufacture of metal furniture	36102p
31003	Manufacture of mattress	36109p
31009	Manufacture of other furniture, except of stone, concrete or ceramic	36109p

Source: Department of Statistics (2008)

Malaysia's furniture industry is largely wooden and cane based. As shown in Table 3:7 and Figure 3:7, wooden and cane based furniture have contributed significantly to the overall furniture industry in terms of number of establishments, value of gross output, value added, number of employees, salary and wages, and value of asset (Department of Statistics, 2009).

Also, the Malaysian furniture industry is highly fragmented, and the predominance of the SMEs in the industry is very significant. As one of the manufacturing sectors, the industry has adopted the standard definitions of SME that have been approved by the Central Bank of Malaysia (or *Bank Negara*) in year 2005, that is, firms with total number of fulltime employees less than 150 people, or total annual sales turnover less than RM25 million.[28]

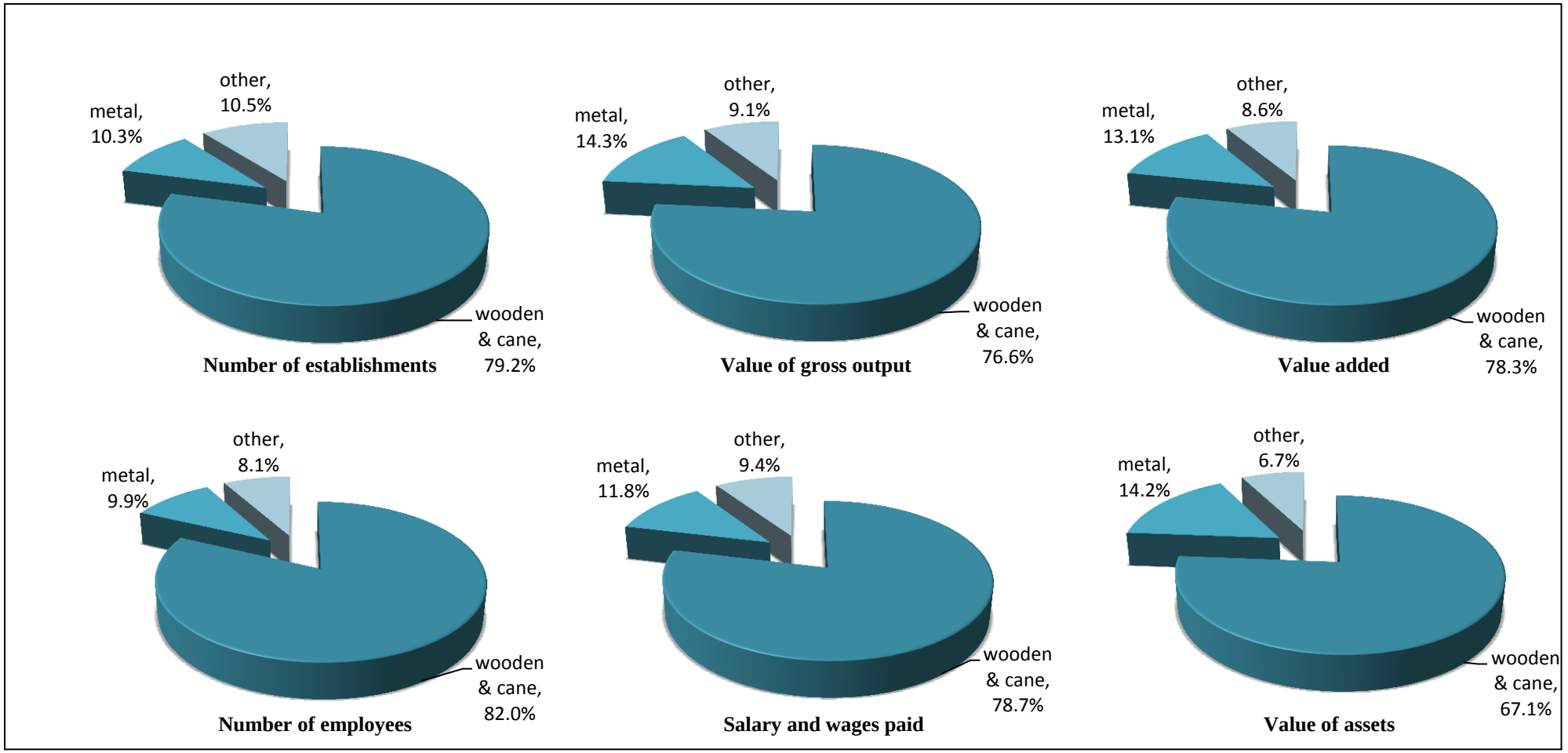
[28] Please refer to Table 1.2 in Chapter 1 of this thesis for approved definitions of SME in Malaysia's manufacturing sector.

Table 3:7 Principal statistics of Malaysia's furniture manufacturing industries, 2007

Group and industry description (Group code)	No. of establishments	Value of gross output (RM '000)	Value added (RM '000)	Total number of persons engaged during December or the last paid period	Salary and wages paid (RM '000)	Value of asset owned as at 31st December 2007 (RM '000)
Manufacture of furniture (Total)	2,070 (100.0%)	11,799,014 (100.0%)	2,643,007 (100.0%)	104,484 (100.0%)	1,532,558 (100.0%)	3,973,057 (100.0%)
- Manufacture of wooden and cane furniture (36101)	1,640 (79.2%)	9,040,367 (76.6%)	2,070,658 (78.3%)	85,707 (82.0%)	1,206,733 (78.7%)	2,666,712 (67.1%)
- Manufacture of metal furniture (36102)	213 (10.3%)	1,684,548 (14.3%)	345,721 (13.1%)	10,332 (9.9%)	181,384 (11.8%)	563,383 (14.2%)
- Manufacture of other furniture, except of stone, concrete or ceramic (36109)	217 (10.5%)	1,074,099 (9.1%)	226,628 (8.6%)	8,445 (8.1%)	144,441 (9.4%)	267,170 (6.7%)

Source: Department of Statistics (2009)

Figure 3:7 Structure and performance of Malaysia's furniture industry, 2007



Source: Department of Statistics (2009)

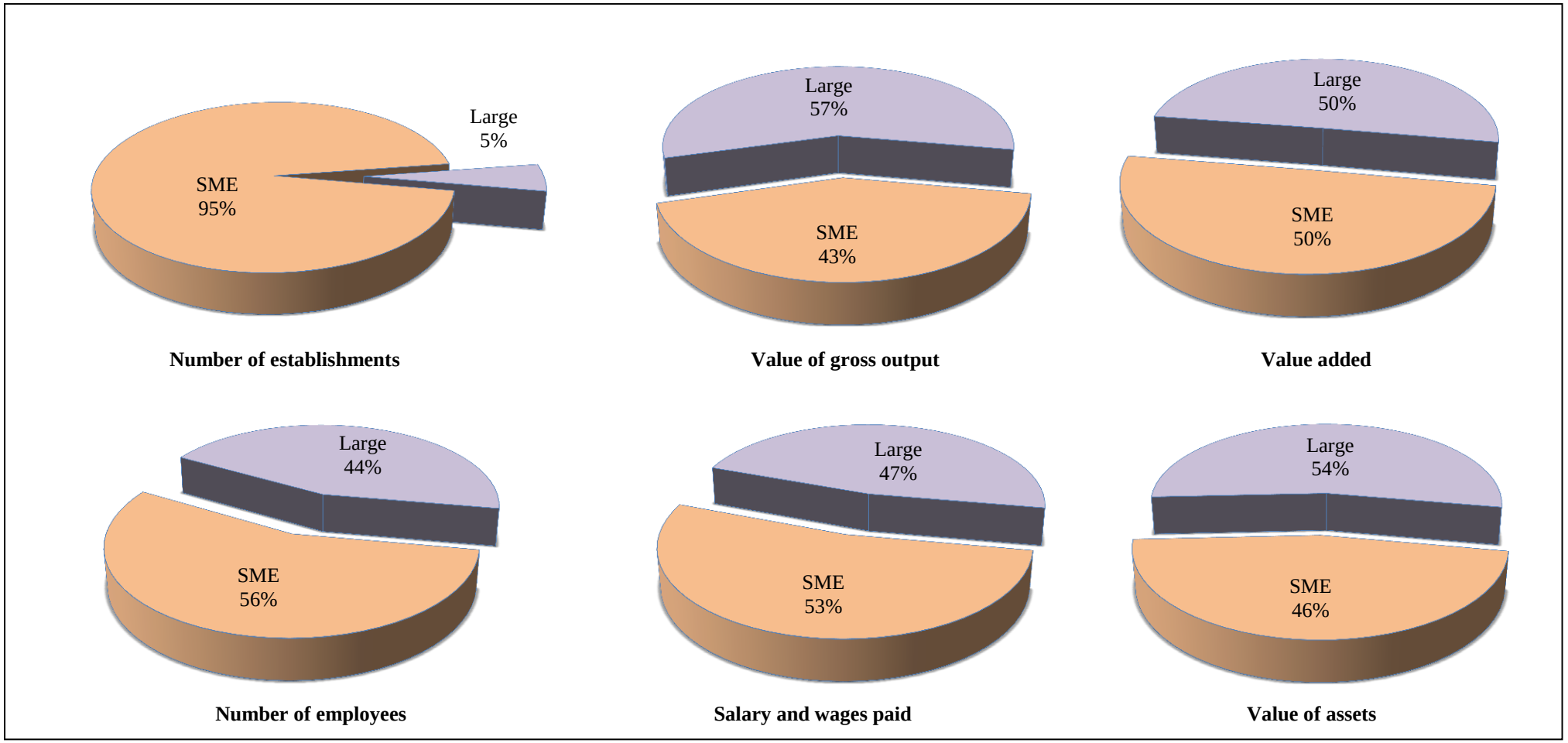
Statistics published by Department of Statistics (2009) show that the SMEs constitute almost 95 per cent of the total establishments in the furniture industry. However, from the perspective of performance of the industry, both SMEs and large enterprises produce an equal share in terms of value of gross output, value added, employment, salary and wages, and value of assets. Table 3:8 and Figure 3:8 provide a detailed analysis of the structure and performance of Malaysia's furniture industry based on the size of the enterprises.

Table 3:8 Principal statistics of Malaysia's furniture manufacturing industries based on size of enterprise, 2007

Group and industry description (Group code)	No. of establishments	Value of gross output (RM'000)	Value added (RM'000)	Total number of persons engaged during December or the last paid period	Salary and wages paid (RM'000)	Value of asset owned as at 31st December 2007 (RM'000)
Manufacture of furniture	2,070 (100.0%)	11,799,014 (100.0%)	2,643,007 (100.0%)	104,484 (100.0%)	1,532,558 (100.0%)	3,973,057 (100.0%)
SMEs	1,965 94.9%	5,055,730 42.8%	1,312,358 49.7%	58,145 55.6%	809,994 52.9%	1,846,346 46.5%
Large	105 5.1%	6,743,284 57.2%	1,330,649 50.3%	46,339 44.4%	722,564 47.1%	2,126,711 53.5%

Source: Department of Statistics (2009)

Figure 3:8 Structure and performance of Malaysia's furniture industries based on size of enterprise, 2007



Source: Department of Statistics (2009)

3.3.2 Emergence of the Industry

Although furniture has been produced in the country before the pre-war years, its development as an export industry has been relatively new compared to other timber sectors (MTC, 1998a). It is believed that the industry began with the craftsman-carpenter known for their craftsmanship during the Malacca Sultanate. However, the industrialisation of furniture making activities only started after Malaysia's independence in 1957 due to the increasing demand from the local market catalysed by the public, institution and government (JETRO, 1999). Almost the entire furniture market during those earlier times catered for domestic demand and this trend continued to the mid 1970's. During the late 1970's, the furniture industry started to embark into the international market because of the saturation of the local market. This created a major shift amongst the manufacturers and furniture making was transformed from a backyard cottage industry to sizeable manufacturing plants equipped with some of the latest technologies and expertise (Mohd Aridd Jamaludin & Abdul Hamid Saleh, 2004).

The 1980s witnessed impressive growth for the country's furniture industry. Two main factors have been identified for this impressive run. The first factor is the drastic change in the raw material for furniture production from tropical timbers such as *meranti*, *nyatoh*, and *sepetir* to rubberwood (*Hevea brasiliensis*) (FDM Asia, 2000; JETRO, 1999; MTC, 1998b; MTQ, 1999). Rubberwood has proven to be a versatile, affordable and well accepted raw material for furniture production. Moreover, rubberwood has strong machining properties such as sawing, planning, drilling, gluing and sanding. It

has a light colour and can be altered to resemble other types of wood.[29] The advent of rubberwood as a raw material is an advantage because rubberwood is abundantly available in the country.

The second factor is the availability of a pool of low cost skilled workforce in the industry. This has enabled Malaysia to tap the shift in comparative advantage from traditional exporters like Taiwan which began to experience higher cost of production from increased labour and foreign exchange movements. As MTC (1998a) notes:

> Another factor has been the shift in comparative advantage from traditional exporters like Taiwan which began to experience higher cost of production from increased labour and foreign exchange movements resulting in Taiwan losing its competitiveness particularly in the middle to the lower end market segments. This enabled other countries in the region including Malaysia, Thailand and Indonesia with their own raw material resources and cheaper labour costs to compete in these market segments in the US and Japan. (p. 8)

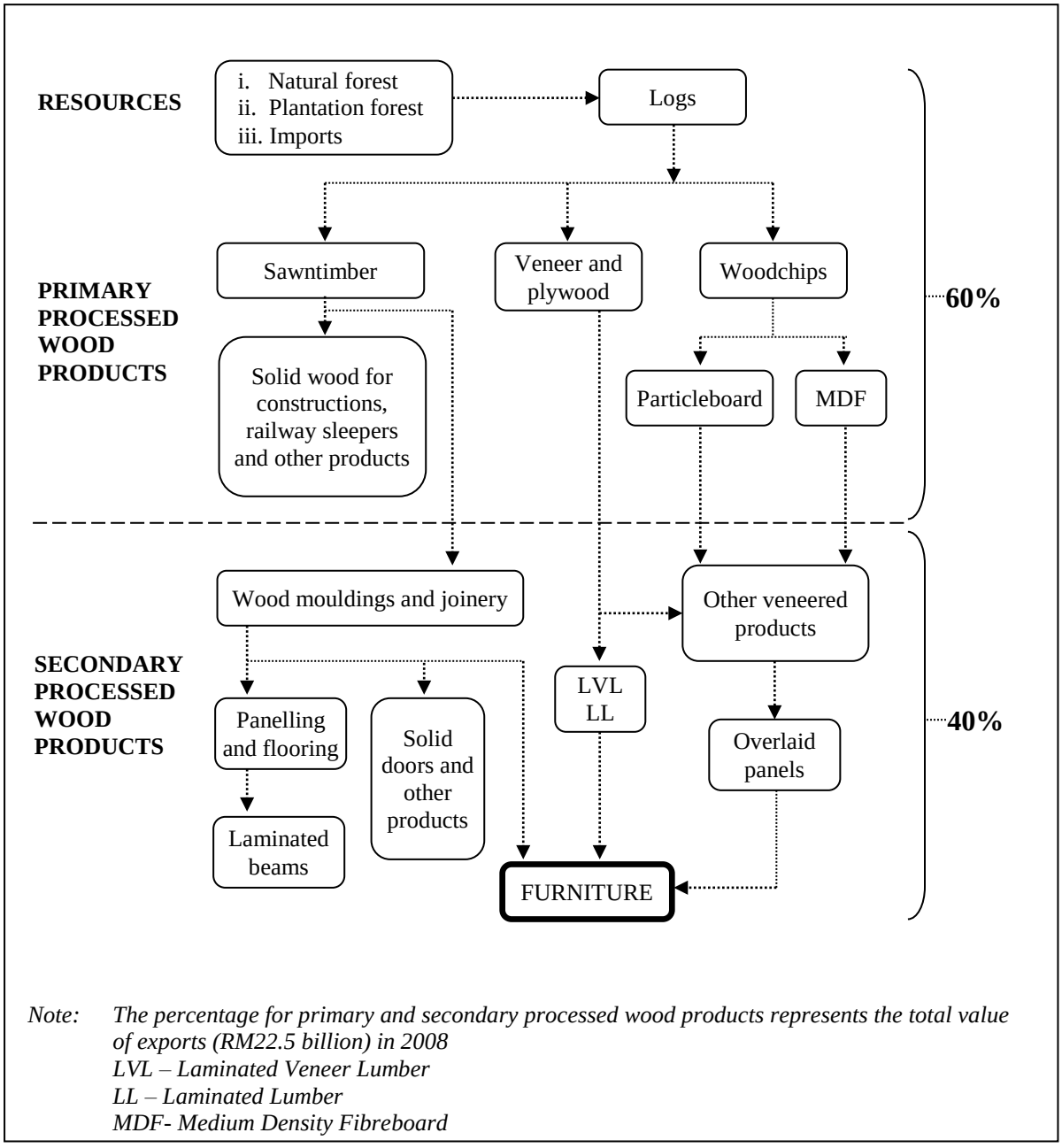
Since 2000, Malaysia's furniture exports have been in the upward trend. With remarkable expansion into overseas market, the exports surged from RM 317 million in 1990 to RM 8.7 billion in 2008. Currently, Malaysia is the 10th largest exporter of furniture; third in Asia and second in the ASEAN region (MFPC, 2009; MPIC, 2009).

[29] Another advantage of rubberwood is that, as a plantation wood, it can be categorised as environmentally friendly in terms of sustainability. On the prospects of Malaysia's furniture industry in an environment of intense global competition, it is to be the country's advantage that it has adhered to international rules and agreements on tropical timber (MTQ, 1999).

3.3.3 Structure, Export Markets and Location

Furniture manufacturing activities started in Malaysia with a natural advantage of abundant forest resources and a pool of skilled labour. It forms part of the downstream activities of the larger wood-based product industry, which comprises of sawn timber, panel products including plywood and particleboard, moulding and joinery, and paper products (Mohd Aridd Jamaludin & Abdul Hamid Saleh, 2004; Turbang, 1998). According to MPIC (2009), 60 percent of the export value is derived from the primary processing activities which consist of logs, sawn timber, plywood, veneer, fibreboard and particleboard. On the other hand, the secondary processing activities contribute 40 percent of the export value. Furniture, builders; joinery and carpentry, moulding, flooring, laminated veneer lumber, laminated timber, and other engineered woods are examples of secondary processing products. Figure 3:9 illustrates the role of the furniture industry as downstream activities within the current structure of Malaysia's timber industry. The percentages in the figure indicate the contribution of the activities to the total export value of Malaysia's timber industry in 2008.

Figure 3:9 Current structure of Malaysia's timber industry



Note: The percentage for primary and secondary processed wood products represents the total value of exports (RM22.5 billion) in 2008
LVL – Laminated Veneer Lumber
LL – Laminated Lumber
MDF- Medium Density Fibreboard

Source: MPIC (2009)

In 2008, wooden furniture accounted for about 79.4 percent of Malaysia's furniture exports to overseas markets (MFPC, 2009). The major types of furniture which are exported are kitchen furniture, bedroom sets, upholstered furniture and wooden office furniture (MITI, 2006). The furniture which is intended for export is often made in "ready-to-assemble" or "knock-down" form (MTC, 1998a). In 2008, Malaysia's furniture export reached RM 8.72 billion despite the weakening external demand in the latter part of the year. This makes Malaysia the tenth largest exporter in the world, the third largest in Asia and the second largest in the ASEAN region. Currently, Malaysian furniture is exported to more than 160 countries worldwide. The top five destinations in 2008 were the USA, Japan, the UK, Australia and the United Arab Emirates (MFPC, 2009). About 80 percent of the furniture exports are manufactured from Malaysian rubberwood. Wooden furniture is the main contributor to the total export earnings, as it contributed to 30.3 percent of the total export value of the timber industry in 2008 (MPIC, 2009). Table 3:9 shows the positive growth of Malaysia furniture export performance from 2001 to 2007.

Table 3:9 World's major suppliers of furniture in terms of value, 2000-2007

No	2000		2001		2002		2003		2004		2005		2006		2007	
	Billion USD															
	World	**50.8**	**World**	**48.5**	**World**	**53.5**	**World**	**61.9**	**World**	**74.1**	**World**	**80.0**	**World**	**89.7**	**World**	**106.5**
1	Italy	8.3	Italy	8.1	Italy	8.3	Italy	9.3	Italy	10.5	China	13.4	China	17.1	China	22.0
2	Canada	4.4	Germany	4.2	China	5.4	China	7.0	China	10.1	Italy	10.1	Italy	11.1	Italy	12.4
3	Germany	4.2	Canada	4.1	Germany	4.5	Germany	5.3	Germany	6.2	Germany	6.5	Germany	8.0	Germany	10.0
4	China	3.5	China	4.0	Canada	4.0	Canada	4.1	Poland	5.0	Poland	5.3	Poland	6.0	Poland	7.1
5	USA	2.8	USA	2.4	Poland	3.0	Poland	4.0	Canada	4.3	Canada	4.4	Canada	4.5	Canada	4.2
6	Poland	2.0	Poland	2.4	USA	2.1	USA	2.3	USA	3.0	USA	3.0	USA	3.2	USA	3.6
7	France	2.0	France	2.0	France	2.0	Denmark	2.2	Denmark	2.5	Denmark	2.4	France	3.0	Vietnam	3.1
8	Denmark	1.7	Denmark	2.0	Denmark	2.0	France	2.1	France	2.3	France	2.4	Denmark	2.5	France	3.0
9	Taiwan	1.7	Indonesia	1.4	Indonesia	1.5	Austria	2.0	Austria	2.0	Malaysia	2.0	Vietnam	2.4	Denmark	2.8
10	Malaysia	1.6	Belgium	1.4	Malaysia	1.4	Indonesia	1.5	Malaysia	2.0	Indonesia	2.0	Malaysia	2.2	Malaysia	2.5
11	Indonesia	1.5	Malaysia	1.3	Austria	1.4	Belgium	1.5	Belgium	2.0	CzechRep	2.0	CzechRep	2.0	Sweden	2.3
12	Belgium	1.4	Austria	1.2	Belgium	1.4	Malaysia	1.5	Indonesia	1.7	Austria	2.0	Sweden	2.0	CzechRep	2.2
13	Spain	1.3	Spain	1.2	Spain	1.2	Spain	1.4	Spain	1.5	Vietnam	2.0	Indonesia	2.0	Austria	2.2
14	Mexico	1.2	UK	1.1	UK	1.1	Sweden	1.3	Sweden	1.5	Belgium	2.0	Austria	2.0	Spain	2.0
15	Sweden	1.2	Mexico	1.1	Mexico	1.1	CzechRep	1.2	CzechRep	1.5	Sweden	1.5	Belgium	2.0	Belgium	2.0

Source: CSIL Centre for Industrial Studies, cited in MPIC (2009)

The wood-based industry is conspicuously different from other industries in Malaysia. It is largely domestic owned and shares the center stage within the SMEs category. Tan (2000) remarks that there are limited large enterprises and most of the furniture manufacturers are SMEs. Most of the furniture mills are concentrated along the coast of the central region, northern states and Muar district in Johor in Peninsular Malaysia. Through its landmark study entitled "*A Report on Performance Study of Wooden Furniture Industry in Malaysia"*, JETRO (1999) notes that the majority of furniture manufacturers are located in non-industrial lands which are close to the place of residence of the manufacturers. This is because less capital is required since the production is located in personally owned premises.[30] High density population areas and availability of raw materials are also factors that influence the concentration of furniture manufacturers. For instance, Muar and Batu Pahat in Johor are traditionally known for the wooden furniture and panel based items whereas Sungai Buloh in Selangor is the new concentration for panel based and metal based furniture. Today, there are three major furniture clusters in Malaysia, namely Muar in Johor, Klang Valley and Penang-South Kedah Clusters.

Apart from the clusters, there are also furniture villages set up by the government as part of the government's efforts to gather furniture manufacturers in one designated area. The main concept is to appoint an established furniture company to be the anchor – because they have the ready market – and a few others as its vendors. A furniture village provides basic facilities such as roads, electricity, water, preservation plant, kiln drying, raw material storage, and transport. However, these areas do not interest a majority of furniture manufacturers and the occupancy rate in these villages are low due

[30] Examples can be seen in places such as in Kampung Baru, Sungai Buloh and Muar where there is lack of competitive infrastructure and accessible roads, but manufacturers are able to operate productively.

to high relocation cost, lack of supporting services and non-strategic location (JETRO, 1999).[31]

Also, according to JETRO (1999), similar problems surfaced when the government set up industrial areas for furniture manufacturers. Furniture manufacturers are reluctant to locate their factories in industrial areas designated by the government mainly due to high initial and operating costs. Even though there are complete infrastructure facilities, regulations imposed by the local authorities and government bodies require manufacturers to invest on costly machines for waste disposal, pay higher land taxes, and others. They also have to comply with all the regulations related to industrial-gazette land set by the government.

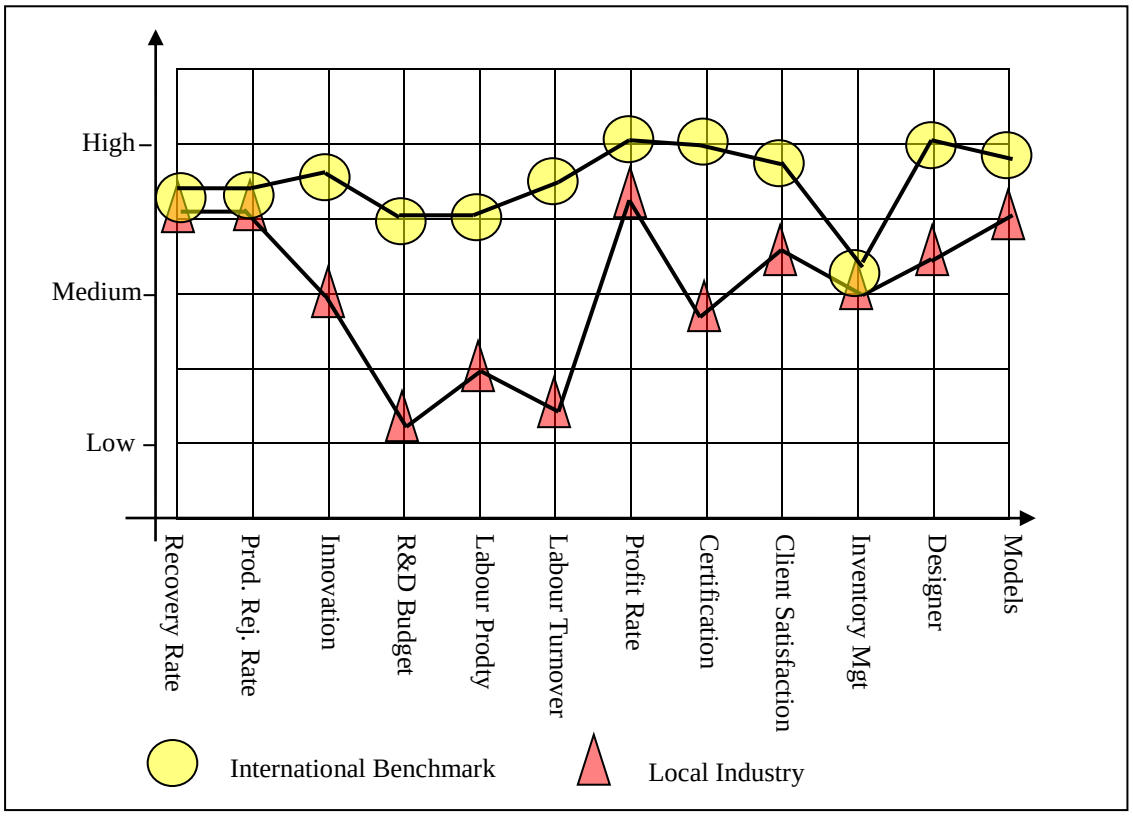
3.3.4 Technological Capabilities

Ratnasingam & Thomas (2008) assert that the level of technology employed by the Malaysian furniture industry is on par with other furniture manufacturing countries, if not higher. MTC (1998a) states that most of the country's furniture manufacturers have invested considerably in machinery and equipment. Such investment maybe not be impressive by the standard of other high-tech industries such as the electronics sector, but the amount invested nevertheless indicates that the industry has gone beyond being the traditional sort of wood working mills and carpentry shops.

[31] Over the years, the government of Malaysia has set up numerous furniture villages such as those in Olak Lempit (1985) and Ulu Yam (1990) in Selangor, Setiu (1990) in Terengganu, Senawang (1990) in Negeri Sembilan, Kuantan and Temerloh (1990) in Pahang, Bukit Selambau (1990) in Kedah, Mukim Blanja (1990) in Perak and numerous others in different stages of development.

The *National Technology Mapping Programme II* on Malaysia's wood based industry has benchmarked the furniture industry with international standard. The result shows that the furniture industry is internationally competitive in terms of recovery rate, product reject rate, profit rate and models. However, the performance of the furniture industry in terms of R&D budget, labour productivity and labour turnover is considered under par in comparison to international standard (EPU, 2002). Figure 3:10 provides an overview of the benchmarked competency gap between Malaysia and the international furniture industry.

Figure 3:10 Benchmarking local industry with international furniture industry



Source: EPU (2002)

JETRO (1999) also provides an excellent overview of the evolution of technology in Malaysia's furniture industry. The report reveals that the industry has been exhibiting their wood working machineries around the country and within the Asia region in order

to keep abreast with the changes in woodworking machinery. More than 95 percent of the machines used by the industry are imported and the local fabrication of machines is only in the finishing system. In the same vein, Ratnasingam (2005) states that 36 percent of the technology for the furniture industry is sourced from Taiwan, 28 percent from Italy, 19 percent from Germany and the remaining 17 percent from other countries. Besides, there are local modified machines such as presses, table saw, bench drills, band saw and jump saw.[32] To this end, MITI (2006) asserts:

> The sub-sector has improved its processes in the areas of spraying and drying, especially hot air drying. It has adopted new technologies, such as computerised numerical control (CNC) and computer-aided manufacturing (CAM). For export oriented companies, computer-aided design (CAD) is widely used in designing. These efforts have resulted in improved product quality and enhanced productivity. (p. 430)

Meanwhile, Ratnasingam (2000) asserts that the machining process is the most important value addition operation in furniture production, as it converts the raw material into a profiled component that is eventually assembled into the final finished product. The effectiveness of the gluing and finishing operations is also dependent on the quality of the machining process. Furthermore, the machining processes also influence the structural rigidity of the furniture, as poorly machined components cannot be jointed and fastened tightly. It is for this reason that machining processes, especially through the use of automated machinery, has often attracted a lot of research interest.

[32] Ratnasingam (2005) has further revealed several salient reasons that have contributed to the slow development of indigenous woodworking machining technology, namely (i) the lack of a competitive tool, die and foundry industry; (ii) the lack of metallurgist or trained professionals in this field; (iii) the lack of a viable machine technology industry that is capable of supplying parts and components for the machining industry; and (iv) the lack of skilled workforce to support the industry.

However, most of the machinery purchased is special function machinery which is aimed at reducing the labour content in the manufacturing outfit, with the ultimate aim of reducing manufacturing cost or unit cost. This is to be expected as the industry is labour intensive in nature, and there is increasing reliance on foreign-contract workers within the industry (Ratnasingam, 2005). The status of machines and technology of the furniture industry are outlined in Table 3:10.

Table 3:10 Status of machines and technology development of Malaysia's furniture industry

Aspects of Technology	*Status*
Level of technology	The level of technology used is medium type. Even so there are exceptions depending on the furniture type produced. In order to be able to complete in the international market, productivity, and quality are main factors for success. The use of the most current technology is needed. Approximately 60 percent of furniture manufacturers still use manual machines due to its ease in operating and does not require skilled workers. With CNC technology, the quality and product is increased. About 30 percent of furniture manufacturers in Malaysia have only begun investing in increasing their level of technology
Modification of technology	The modification of technology is required in terms of methods of production with local products. The cheapest modification of technology is by using jigs and fixtures to improve productivity and safety to the workers. The modification of machinery is only at the lower end of the machinery technology. This is due to no specific R&D activities in the area of technology modification and machines process study. The normal modified machinery by local manufacturers is press assembly, cold press; table saw jump saw, drill press and finishing systems.
Machines and technology acquired through transfer technology	Since there is no specific institutions in Malaysia which carry out R&D activities in the field of wood working technology, there is no 'real' party that can be given the task of adopting the imported technology. The modification is only being done at the request of the manufacturer. But the government is very supportive in importing high tech machinery and the industry is given incentives and no sales tax imposed on the high tech machines.
Furniture Testing	Currently, Forest Research Institute Malaysia (FRIM) offers various testing and certification services and facilities. They include the Furniture Testing Laboratory (FTL). FRIM is currently the sole furniture-testing laboratory in Malaysia. Tests are based on Malaysia Standard, British Standard, International Organisational of Standardisation (ISO) and other related standards. These performance testing include test such as static test, impact test, and stability test. Local manufacturers are increasingly becoming more aware about the quality of their products. Manufacturers usually only test products that are involved in big contract projects. Many do not test products for the general consumer market. The length of time for testing is considered quite long due to testing requirement such as strength, stability, fatigue and fire-resistance. If FRIM is not able to do the testing, they will refer manufacturers to the Furniture Industrial and Research Association (FIRA) in the UK.

Source: JETRO (1999)

As postulated by Malerba (2004), an innovative sectoral systems consists of heterogeneous actors connected in various ways through market and non-market relationships. These actors could be organisations such as firms and non-firms; or individuals such as customers, entrepreneurs or scientists. Such a framework is evident in Malaysia's wooden furniture industry as described below:

a) *Government Machinery* – The formulation and implementation of STI related policies for the wooden furniture industry fall under the ambit of various ministries, namely Ministry of Plantation Industries and Commodities (MPIC), Ministry of International Trade and Industry (MITI), and Ministry of Science, Technology and Innovation (MOSTI). Besides planning, legislating and implementing policies and strategies for the development of the industry, these ministries supervise departments, agencies and statutory bodies, which fall under them to ensure the smooth implementation of those policies. The number of these departments and agencies is large and they include FRIM, Malaysian International Furniture Fair (MIFF), Malaysian Timber Council (MTC), Malaysian Furniture Promotion Council (MFPC), Malaysian Industrial Development Authority (MIDA), Malaysian External Trade Development Corporation (MATRADE), SME Corporation Malaysia, Malaysian Technology Development Corporation (MTDC), and Malaysia Design Council (MRM).

The spatial and physical administration systems at the state level as well as the local authorities also play a crucial role in supporting the development of the furniture industry. Through the State Structure Plan, the Department of Town and Country Planning regulates the policies and proposals for the development and use of land. At the district level, the local authorities prepare the District Local Plan to detail the land use plan that incorporates the national as well as the state development policy.

b) *Manufacturers, Suppliers and Clients* – As highlighted above, Malaysia's furniture manufacturers can be categorised into micro, small, medium and large scale based on the number of fulltime employees and annual sales turnover. The number of SMEs is extensive and they consist of nearly 85 percent of the total number of furniture establishments in the country. However, the contribution of the large manufacturers can't be underestimated because although only account for 15 percent of the establishments in the industry, they contribute 65 percent of the total industrial output (Ratnasingam & Wagner, 2009).

According to Tan (2000), large furniture firms have seen the benefits of outsourcing, where they are relieved of the need to manage labour and its attendant problems, such as high turnover, absenteeism, the hassle of providing transport, social problems, and having to deal with the authorities for foreign labour permits. Outsourcing, a feature of the cluster-based concept, is already a key feature of the Muar furniture industry. The Muar Furniture Association (MFA) estimates that 90 percent of firms in Muar are SMEs, and quite a few are subcontractors to the few large firms. Besides, Tan (2000) points out that

suppliers have been an important source of new technology. And as firms invest in new and sophisticated technologies to improve productivity and product quality, they need certain R&D capabilities, such as exploring new alternative raw materials, product development, product performance evaluation and testing, waste management and assessing new technologies.

c) *R&D and Industrial Development Funding* – After the restructuring exercise of all R&D funding schemes in the country by MOSTI in 2005, there are two R&D funds that the furniture industry is eligible to apply. The first is the TechnoFund for commercial proof of concept, commercial ready prototype, pilot plant, up-scaling, or clinical trials. The second is the InnoFund for the improvement of quality, reduction of cost of existing products, technologies and development of new products and technologies through recombination, integration, fusion and other forms of innovation. Furthermore, MITI through its agencies is offering various types of grants, soft loans and venture capital to the industry. This includes the Commercialisation of R&D Fund and Technology Acquisition Fund.

In addition to the public financial assistance schemes, the private sector also offers financial assistance, particularly for SMEs. These private sector organisations are banking institutions, development financial institutions, leasing and factoring companies, and venture capital companies. This financial assistance is aimed at encouraging companies to focus more on R&D activities towards higher value-added innovation as well as the commercialisation of research findings.

d) *Education and Training* – Various institutions and agencies are currently offering programmes to develop local skilled and semi-skilled workers for the timber industry. These training centers could be vocational schools, institutes of higher learning, government agencies, furniture associations and companies, and professional and private.

e) *Innovation Support* – R&D support from the industry is provided by a number of research institutions such as FRIM, Malaysian Palm Oil Board (MPOB), and universities such as Universiti Putra Malaysia (UPM), Universiti Sains Malaysia (USM), Universiti Teknologi MARA (UiTM) (MPIC, 2009). Besides, the design development activities are also progressing fast. Since 1987, the Malaysian Timber Industry Board (MTIB) has been organising an annual furniture design contest at national level. The overwhelming response from students, professionals and individuals has led to the establishment of the Malaysian Furniture Design Center in 1998 (JETRO, 1999).

In terms of furniture testing, certification and standards, currently only FRIM provides this facility through the establishment of the FTL Unit. The FTL services were established in 1994 after accreditation by FIRA, United Kingdom. The FTL was set up to provide services to the furniture industry, especially in Malaysia. Through the testing facilities in FRIM, the local furniture industry will have easy access to information, and R&D activities to enhance the quality of product design. The FTL also supports all furniture manufacturers, especially

designers to identify the strength and durability of furniture and also the weaknesses of products through testing which will improve the quality of product design. The ability to prove the strength and endurance of products through testing will give added confidence to the customers. Product testing ensures that manufactures provide consistent quality (Mohd Aridd Jamaludin & Abdul Hamid Saleh, 2004).

This section provides an overview of Malaysia's wooden furniture industry. Based on the fact that SMEs constitute nearly 85 percent of the total number of furniture establishment in Malaysia (Ratnasingam & Wagner, 2009) and are well recognised as an important component of the furniture industry, the following section will provide supporting literature on the nature of small and medium-sized wooden furniture manufacturers in Malaysia.

3.4 Small and Medium Wooden Furniture Manufacturers and their Roles

The focus of this section will be on the small and medium-sized manufacturers in Malaysia wooden furniture industry. It begins with an introduction of the nature of Malaysia's small and medium-sized furniture manufactures and followed by some key technological issues and challenges in the industry. Development policies pertaining to the development of technological and innovation capabilities of the industry are elaborated at the end of this section.

3.4.1 Nature of Malaysia's Small and Medium Furniture Manufacturers

As with SMEs in other manufacturing sectors, SMEs subcontracting is a bridgehead to competitiveness in Malaysia's furniture industry. Many of the SMEs do not manufacture complete products; they specialise in making certain components or performing certain processes (Tan, 2000). He writes:

> The furniture industry is therefore, not unlike the other industries, such as the automobile and electrical and electronics industries which have only a relatively small number of big mills. These big mills, generally manufacture for the export markets, are supported by a large number of SMIs as contractors and sub-contractors supplying parts and components, completing certain processes or providing certain specific services.

An in-depth analysis by Ratnasingam & Thomas (2008) on 387 furniture manufacturers located in the Muar furniture village reveals that most of these SME subcontractors are ex-employees of the large manufacturers and they are supported both in terms of finance and business, by their previous employers. Hence, sub-contracting is very client-specific in the industry. SMEs are responsible for supplying finished products or components to the anchor companies for the export market or to be assembled into finished products (MTQ, 1999). Ratnasingam (2002) makes his points explicitly:

> The rapid expansion of the manufacturing base has been attributed to the extensive networking or sub-contracting activities prevailing in the industry. Such a practice enables economies of scale and a spread of overhead, which provides cost competitiveness. Although networking is extensive in the industry, the activity is confined to the supply of semi- finished components/parts and finishing and services. Most of these sub-contractors are ex-employees of the large manufacturers and they are supported both financial and business wise by their previous employers. Hence, sub-contracting is very client-specific in the industry.

The role of SMEs in the furniture industry is quite similar to those in the electronics industry as observed by Hobday (1999). According to Hobday, there are two groups of SMEs. The first group includes the few firms which have spun off from the large corporations by forming their own operations. They often supply their former employers and tend to be pulled forward technologically by large corporations. The second group of SMEs is traditional based and largely oriented towards the domestic market.

Although Ratnasingam & Thomas (2008) argue that the level of technology employed by the Malaysian furniture industry is on par with other countries which manufacture furniture, if not higher, Tan (2000) acknowledges that enterprises of different sizes have different levels of technology. In general, bigger enterprises are said to have higher technological capabilities compared to the smaller ones.

Tan (2000) postulates that most of the small mills can be considered as cottage industries that manufacture for the low-end segment of the domestic market or as subcontractors to bigger factories. These mills are more like furniture workshops equipped with only basic machines such as simple manual cross-cut saws, panel saws,

planer jointer and single spindle drill. Most of these mills do not have adequate or appropriate finishing facilities and sanding is usually carried out manually. Spray booths and conveyor systems are generally non-existent and spraying is done in the open. Machines are typically haphazardly installed without any proper layout. Waste disposal is done manually. Tong (1984) describes this scenario:

> A major segment of the furniture industry consists of small workshop characterised by limited capital equipment and low output volumes. These small workshops are handicapped by non-availability of finance for expansion or modernisation. They also lack technical know-how especially in matters pertaining to furniture design. (p. 160)

According to Tan (2000), the medium-sized furniture factories are better equipped with more sophisticated machines and adapt to mechanised production processes such as the use of six-head moulder, copy router, and multi-spindle borer. Some of these machines are equipped with loading and unloading devices to further increase throughout. Sanding machines, spray booths with water curtains and conveyor systems for items to be sprayed are common facilities in their finishing section. Many of these mills have installed their machines following some form of layout with ancillary facilities such as pipelines for compressed air and ducting for dust extraction. A number of these mills have also introduced or are already practicing some form of good manufacturing practices, including establishing quality assurance programmes.

However, due to inadequate information, the SMEs are poorly understood in terms of their level of technology used, manpower structure and product differentiation. There is indeed a great disparity within their ranks. The lowest end belongs to backyard producers, producing for the domestic market. The majority of the small-scale manufacturers sell furniture in an unfinished form to 'traders-cum-finishers' (Tong, 1984).

3.4.2 Technological Issues and Challenges

Issues and challenges pertaining to technological innovation developments in the industry can be viewed from three major view points, namely high cost of technological innovation, shortage of knowledgeable and skilled workforce, and inaccessibility of public incentives as elaborated below:

a) *High cost of technological innovation* – Currently, there is a great emphasis on mechanisation and automation in material handling, and also in the use of CNC machines that allow flexibility in production activities. Nonetheless, technology investments in the furniture firms are made to increase the scale of production, rather than in the knowledge parts of the industry. Machinery maintenance, if the spare parts are imported, can be costly. Moreover, the relative cost of imported technology, especially in US dollars, has made it more expensive (MTC, 1998b). The cost of foreign machines has been prohibitive with the current forex peg of the ringgit (Tan, 2000). Thus, firms have to rely on the current installed technology and put off their investment decisions. That explains why many

small manufacturers will continue to rely on simple, inexpensive machines and hand tools for production (MTC, 1998a).

Moreover, as the majority of the SMEs that operate on small areas such as residential areas which is developed around them over time, their “illegal” status cannot be resolved. One of the consequences for being in “illegal zoned land” is that financial institutions are unwilling to accept such land as collateral for loans. The recent economic crisis with the attendant non-performing loans and the inability to cash out the collateral has not made this situation any easier (Tan, 2000). As a result, there is insufficient capital for further expansion among the furniture enterprises, particularly for the SMEs.

Even though there is investment in the industry, as Ratnasingam (2005) pointed out, most of the investments have gone towards manufacturing capital build-up rather than productivity enhancement. Capital expenditure, such as erection of new buildings and facility took up 58 percent of the total investment, while machinery accounted for 29 percent and the balance went to auxiliary needs. The main characteristics of investment in wood industry are shown in Table 3:11.

Table 3:11 Characteristics of investment in the wood industry in Malaysia

Type of investment	% of total	Characteristics
Capital expenditure	58	Building, infrastructure
Machinery / Technology	29	80 percent are special function machines, while the balance 20 percent is multi-functional machines
Human Capital	4	Training, education
Others	9	Marketing and R&D

Source: Ratnasingam (2005)

b) *Shortage of knowledge and skilled workforce* – The wooden furniture industry, as in all wood-based industries, is facing serious problems in recruiting and retaining their workforce. The industry has been relying heavily on foreign labour to meet production targets and orders because the wood-based industries have been perceived by the public as a 3Ds job, that is, dirty, dusty and dangerous. Moreover, local workers tend to be choosy about jobs and have high wage expectations (MTC, 1998b). Skills, in terms of knowledge in technical areas, are generally lacking amongst workers, and training is often on the job rather than a formal process (Tan, 2000). Moreover, almost all managers are production oriented. For Tong (1984), too often there is a preoccupation with the present and very few have any philosophy for the long-term. Currently, the industry is highly labour intensive with low level of technological application. Only a few manufacturers have introduced adequate procedures for quality control, such as microchip control devices (Turbang, 1998).

In addition, there is a significant mismatch between local labour availability and demand for work in the industry. Ratnasingam (2005) affirms that wood machining is not extensively taught at the institutes of higher learning, with the exception of the Wood Machining Research Unit at UPM. He writes:

> In fact, the field of woodworking is also being discarded by most of the vocational training institutes, as woodworking is not perceived to be a preferred career option among the young school leavers. On this account it is no surprise that most of the local machines available are for low-tech users, while the high technology machines are usually sourced abroad. (p. 25)

Another implication of the lack of knowledgeable and skilled workforce can be observed in the resultant dearth of good designs in furniture produced locally. Tong (1984) contends that many manufacturers either share the same elements of design or, in fact, the very same designs. Thus the more popular designs are seen at almost every furniture stockist. This situation has further dampened the marketability of their products as the designs will become ‘common’ at a very rapid pace. Moreover, companies with designers will be reluctant to introduce more original designs as they will be imitated quickly. According to MTC (1998b), quite a few of the local manufacturers have learnt to strip furniture apart and then copy the design. The OEM nature of the furniture industry is evidenced by the fact that 80 percent of the designs are provided by their clients or buyers.

c) *Inaccessibility of public incentives* – MTC (1998b) and Tan (2000) maintain that the majority of the wooden furniture enterprises generally do not utilise government incentives and assistance. This seems to suggest the lack of knowledge of these incentives, and the feeling that there's a lot of hassle in the application. This is perhaps due to the lack of clarity on procedures, conditions and criteria for application. Firms that have used the incentives are those who have done well for themselves in their business, and have good client-bank relationship and good financial record. However, their general comment is that the application procedures for government assistance need to be simplified and greater promotional efforts are needed to reach out to those who have yet to benefit from the schemes and incentives, especially with regard to loans and access to capital. Also, the irrelevant of these programmes to the real needs of the SMEs is also one of the reasons due the poor uptake of the public incentives.

3.4.3 Technology and Innovation Based Development Policies

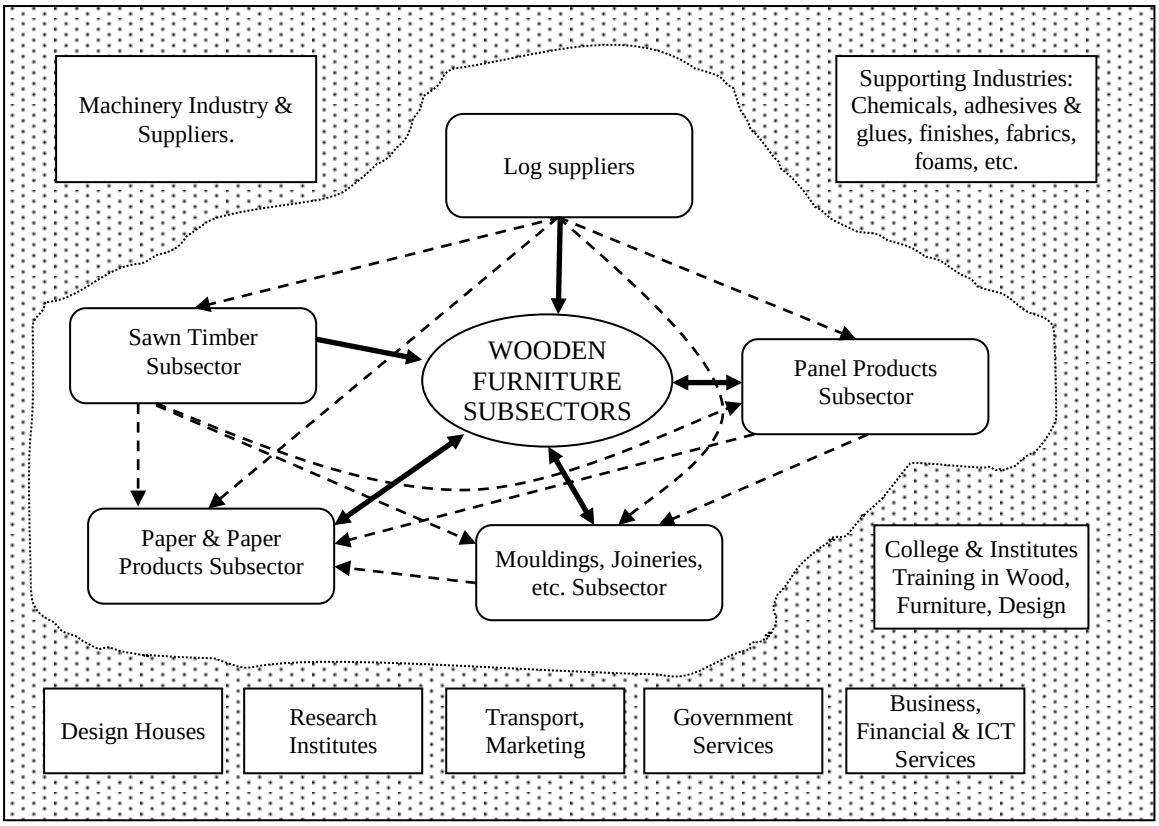
Malaysia's wood industry is a mature industry, but its operational strategies are very much at the infancy stage (Ratnasingam, 2000). Since 1996, through the strategies outlined in the *Second Industrial Master Plan (1996-2005)*, the cluster-based approach has been introduced by the government for the development of the industry, together with other industrial clusters. The cluster-based approach emphasises on the growth of the manufacturing sector, together with the growth of supporting industries, which incorporates the services sector (MITI, 1996).

Figure 3:11 shows an example of furniture cluster in Malaysia. In conjunction with this approach, the government has implemented the Industrial Linkages Programme[33] to integrate SMEs into the mainstream manufacturing sector (Mohd Khairuddin Hashim, 2002). The cluster-based policy formulation places the emphasis both on the strength of the supporting industries and institutions and the links between them and the leading industries. The furniture cluster identified under this policy is the wooden furniture industry situated in Muar, a district in the state of Johor. These cluster-based efforts have been extended to the *Third Industrial Master Plan (2006-2020)*, in which significant emphasis is being placed on an integrated approach to industrial development (MITI, 2006). In line with this strategy, the establishment of the Malaysian Rubberwood Furniture Industrial Park has been proposed in the Eastern Corridor Economic Region (MPIC, 2009).[34]

[33] The Industrial Linkages Programme is aimed at developing Malaysian SMEs into competitive manufacturers and suppliers of parts and components and related services to multinational corporations and large companies. To encourage participation in the ILP, Pioneer Status with tax exemption of 100 percent on statutory income for five years, or Investment Tax Allowance of 60 percent on qualifying capital expenditure incurred within a period of five years are provided to eligible SMEs. For MNCs or large companies, expenses incurred in developing SMEs such as training, factory auditing and technical assistance to ensure the quality of vendors' products, will be allowed as deduction in the computation of income tax.

[34] The Eastern Corridor Economic Region covers 66,736 sq km of land (states of Kelantan, Terengganu, Pahang and the district of Mersing in Johor), which represents 51 percent of Peninsular Malaysia. The objective of this 12 year master plan (until 2020) is to narrow the development disparities among states in Malaysia. Under this master plan, rubber estates up to 100,000 ha to be grown and harvested for their timber. This will in turn enable furniture factories to be set up in the region as rubber wood will be easily available.

Figure 3:11 Wooden-based furniture cluster in Malaysia



Source: SMIDEC (2002)

The industry is both heavily protected and enjoys several investment incentives through the Industrial Master Plan (IMP). Table 3:12 reviews the key strategies employed by Malaysia in developing a cluster based furniture industry.

Table 3:12 IMPs and cluster-based furniture development strategies

Master Plan and Period	*Development Strategies*
Medium and Long Term Industrial Master Plan (1986-1995)	*Establishment of furniture complex –* The idea of a furniture complex is to create a viable mass of manufacturing activity composed of multiple production units in a relatively small area with common facilities utilised on a sharing basis. The furniture complex should provide common service facilities such as kiln dry, treatment plant, tools and parts maintenance workshop, training workshop, sales display centre, testing and quality control laboratory, and warehouse services.
Second IMP (1996-2005)	*Cluster approach towards industrial development –* The cluster-based industrial development approaches of 2nd IMP not only emphasised the growth of the manufacturing sector per se but, more importantly, the concomitant growth of the supporting industries, which incorporate the service sector. A cluster is an agglomeration of inter-linked or related activities comprising industries, suppliers, critical supporting business services and the requisite infrastructure and institutions.
Third IMP (2006-2020)	*Establishment of furniture parks –* In order to promote the industry, facilities have been established in various states: five furniture parks, known as furniture industry parks, have been established by the Ministry of Plantation Industries and Commodities, in collaboration with the State Governments of Terengganu, Pahang, Perak, Selangor and Kedah, for the development of SMEs in the industry. In addition, one furniture finishing centre was established in an existing project in Melaka. Measures will be introduced to encourage the industry shift from the production of OEM furniture products to ODM and OBM furniture products.

Source: MIDA/UNIDO (1985); MITI (1996, 2006)

3.5 Summary

Furniture industry is currently the largest low-tech sector globally. The pattern of innovative activities in furniture industry is consistently in the Schumpeter Mark I camp, in which entrepreneurs and new firms played a major role in innovation activities, and they are mostly supplier-dominated firms. Literature on empirical studies on furniture industry in both developed and developing countries shows that most of the innovation studies on the industry are framed on the realms of spatial agglomeration, that is, the cluster and RIS approaches. This study, which is framed on the SIS approach, hopes to provide an alternative perceptive in examining the innovation patterns of the furniture industry.

In the case of Malaysia, the level of technology employed by the Malaysian furniture industry is considered on par with other furniture manufacturing countries and most of them have invested considerably in machinery and equipment, which is the most important value addition operation in furniture production. The industry is largely formed by the SMEs. Thus, the issues challenges pertaining to technological innovation developments are always in terms of cost, knowledgeable and skilled workforce, and inaccessibility of public funding.

The next chapter presents the research methodology adopted in this research. It provides detailed account of both the research instruments employed, namely the questionnaire survey and narrative case study.