

*Full Length Research Paper*

# Technological innovations in Malaysia's wooden furniture industry: Knowledge and linkages

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**This study seeks to explore the specific trends of technological innovation in Malaysia's wooden furniture industry from two dimensions, namely knowledge and the process of learning as well as actors and linkages. In order to achieve this goal, empirical evidence for the study was derived from a case study of the Muar furniture cluster, which is known as the furniture capital of Malaysia. The main findings from the study indicate that there is no clear distinction between the large manufacturers and SMEs (small and medium enterprises) in terms of technological capabilities. The success of the cluster is largely due to the collective effort of all the innovation actors in the industry, particularly those that belong to the immediate business environment. In general, the industry is business driven and emphasizes on the industrial dynamics. There is a strong social capital and mutual understanding amongst the practitioners to see each other as partners in their quest for competitive development.**

**Key words:** SMEs, low-tech, innovation systems, cluster, Malaysia.

## INTRODUCTION

Most innovations are non-directional, dynamic, recycling between stages, jumps out of sequence, and messy (Tidd, 2006). According to OECD (1997), technological innovations comprise technologically new products and processes implemented and significant technological improvements in products and processes. A single technological innovation is a trajectory that consists of many small events, and the result of a lengthy process involving many interrelated innovations (Kline and Rosenberg, 1986; Mowery, 1995). The success of technological innovation no longer depends on individual actors but on systemic laboratory research, an educated workforce, and a knowledgeable management who integrates techno-science, market, as well as socio-economic factors in a complex combination (Grønhaug and Kaufmann, 1988; Köhler, 2008; Malecki, 1997). In other words, a successful technological innovation always relies on the nexus among different activities, and the keyword for this interaction is integration. Such interdisciplinarity, according to Betz (2003), is basically drawn

from the nature of technological innovation that bridges two very different worlds; the technical world which runs on laws of nature and the business world which runs on laws of economy.

The interplay among various actors in the innovation process suggests that in most cases the systemic approach rather than the focus exclusively on individual innovation has been applied in innovation studies. In this regard, the systemic views on innovation, or innovation systems, are currently in the mainstream of innovation studies (OECD, 1997, 2005). To be more precise, innovation systems is a systemic view of the innovation process that explicitly recognises the potentially complex interdependencies and possibilities for multiple kinds of interactions between the various elements of the innovation process (Edquist and Hommen, 1999). The literature on innovation system is extensive (Freeman, 1987; Lundvall, 1992; Nelson, 1993; Carlsson, 1995; Breschi and Malerba, 1997; Cooke et al., 1997), and there is a trend where innovation systems have been defined at different levels for different purposes of analysis (Markard and Truffer, 2008). Grounded on the innovation systems theoretical framework, the sectoral innovation systems suggests that innovation and technology change show different rates, types and

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trajectories depending on the sector in which they take place, and these changes can be studied based on three main building blocks, that is, knowledge and technological domain, actors and linkages, and institutions (Malerba, 2005).

Based on this standpoint, technological innovation is sector-specific and the formulation of science, technology and innovation (STI) related policies and strategic thrusts have to be tailor-made to suit the specific needs of the sector as well as the country (Köhler, 2008; Malerba, 2002; Pavitt, 1984). However, many such sectoral studies have been undertaken in the developed world and largely focused on high-tech sectors. There has been a bias in policy towards science-based innovation and high-tech industries and the low-tech and medium-low-tech (LMT) sectors have received less explicit political attention and support by the policymakers (European Commission, 2006; Hirsch-Kreinsen, 2008a, 2008b). Literature on sectoral-level innovation studies shows that LMT industries are still relevant sources of innovation in the economy. Besides playing an important role in growth and employment generation (European Commission, 2006), the capability of LMT industries to advance and use new technologies should not be underestimated (Cox et al., 2002; Hirsch-Kreinsen, 2008a, 2008b). The LMT industries have been a set of active contributors, rather than passive adopters, of crucial cluster of contemporary paradigm-changing technologies (Mendonça, 2009). LMT, indeed, plays a significant role as a “carrier industry” by incorporating new technologies into the making of new products or implementation of new manufacturing processes (von Tunzelmann and Acha, 2005).

This study seeks to explore the specific trends of technological innovation in a LMT industry in a developing country, Malaysia. In order to achieve this goal, empirical evidence for the study was derived from the case study of Malaysia’s wooden furniture industry. The wooden furniture industry is the major downstream activity in Malaysia’s timber industry which contributed to 30.3% of the total export value of the timber industry in 2008 (MFPC, 2009; MPIC, 2009). As the sector has long been recognised for its quality in the world market, an interesting research question that merits attention is how this home grown industry which has always been categorised as low-tech, labour-intensive and imaged as “3D – dirty, dusty and dangerous” has been able to achieve such an impressive performance globally without much support from the government. The industry certainly has some valuable experiences that it can offer and share with other industries, particularly in terms of its industrial dynamics, quality of social capital and linkages among the innovation actors.

## METHODS

The narrative case study method has been employed in collecting

empirical evidence in this study. According to Hakim (2000), a case study can provide a richly detailed ‘portrait’ of a particular phenomenon. Yin (2003) has proposed three purposes of case study research-exploratory, descriptive and explanatory. The exploratory case study seeks to explore any phenomenon in the data which serve as a point of interest to the researchers. Second, descriptive case studies set out to describe the natural phenomena which occur within the data in question. Third, explanatory case studies examine the data closely both at a surface and deep level in order to explain the phenomena in the data. In the case of this research, all these three types of case study research were employed.

The subject for the case study is the Muar wooden furniture cluster in Malaysia which is known as the furniture capital of Malaysia because it has more furniture factories than any other location in the country. The main objective of the case study was to study the process of technological innovation amongst wooden furniture manufacturers there, particularly in terms of (1) knowledge and learning process, and (2) linkages among the main actors of technological innovation in the industry. The third dimension of sectoral innovation system, that is, the institution is also incorporated in the discussions on (1) and (2) earlier.<sup>1</sup> Intensive interview sessions were conducted with representatives of some of the main actors in the industry, such as the furniture enterprises, supporting industries, training institutions, local authorities, and furniture association.

## RESULTS

### Background of Malaysia’s furniture industry and the Muar wooden furniture cluster

Malaysia’s furniture industry is largely wooden and cane based. The industry is highly fragmented, and the predominance of the small and medium-sized enterprises (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 in year 2005, that is, firms with total number of fulltime employees less than 150 people, or total annual sales turnover less than MYR 25 million. Statistics published by Department of Statistics (2009) show that the SMEs constitute almost 95% 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.

In 2008, wooden furniture accounted for about 79.4% 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

<sup>1</sup> According to Malerba (2004), agents’ cognition, actions, and interactions are shaped by institutions, which include their norms, routines, habits, established practices, rules, laws, standards, and so on. Similarly, Storper (1998) suggests that institutions are persistent and connected sets of rules, formal and informal, that prescribe behavioural roles, constrain activities and shape expectations. They give order to expectations and allow actors to coordinate under conditions of uncertainty.

“ready-to-assemble” or “knock-down” form (MTC, 1998a, 1998b). In 2008, Malaysia’s furniture export reached USD3.5 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 (MPIC, 2009).

Ratnasingam (2002) asserts that the level of technology employed by the Malaysian furniture industry is on par with other furniture manufacturing countries, if not higher. MTC (1998a, 1998b) states that most of the country’s furniture manufacturers have invested considerably in machinery and equipment. Such investments may 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 the traditional wood working mills and carpentry shops. More than 95% 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% of the technology for the furniture industry is sourced from Taiwan, 28% from Italy, 19% from Germany and the remaining 17% from other countries. Besides, there are local modified machines such as presses, table saw, bench drills, band saw and jump saw.

The Muar wooden furniture cluster is located in the Johor State in Peninsular Malaysia. The Muar district is about 150 km southwest to the Malaysian capital Kuala Lumpur, and 180 km northwest of Singapore. The Muar furniture industry has been around for more than three decades. Across 30 years, it has witnessed not only the rise of furniture manufacturers, but the upstream and downstream industries as well. It all began with the first backyard furniture workshops in the furniture villages. The majority of these furniture firms are owned by the local Chinese community. Unpublished statistics by the department of statistics show that almost 94.5% of investments in the industry are local investments. In terms of size, almost 80% of the enterprises are SMEs. Many of the SMEs do not manufacture complete products; they specialise in making certain components or performing certain processes. An in-depth analysis by Ratnasingam and Wagner (2009) on 387 furniture manufacturers located in the Muar furniture village revealed 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 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). The majority of the small-scale manufacturers sell furniture in an unfinished form to ‘traders-cum-finishers’ (Tong, 1984). Today, the Muar cluster contributes 40% to Malaysia’s furniture industry exports (MFA, 2008).

## Knowledge and learning

The interviews with the industry practitioners indicate that there is no clear distinction between the large manufacturers and SMEs in terms of technological capabilities in the Muar furniture cluster. What can be produced by the large enterprises can also be produced by the SMEs. The advantage of large enterprises is merely in terms of volume of production as they have bigger space, more capital and bigger workforce. Also, most of the interviewees do not view the use of automation and Computer Numerical Control machinery as guaranteeing better product quality. For them, although it is true that such high-tech machines are able to increase the production volume, the nature of the furniture industry which is heavily based on the bond between art and industry is not suitable for the implementation of such high-tech machinery. Machinery enables an increase in production but fails to democratize style. The value of furniture is determined on the quality of aesthetic appeal and the craftsmanship of the furniture makers. This observation is in accordance with studies by Ettema (1981) and Ratnasingam (2004) which have suggested 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.

There is no shortage of proficient sales personnel in the country but there is a critical shortage of design and research personnel. Most of the enterprises do not have their own in-house professional design teams. Their creations are from the experience and information gathered during exhibitions in and out of the country. In this regard, the Muar Furniture Association (MFA) has met with the renowned design colleges in Malaysia to discuss ways to grow the industry. Another reason why most of these furniture manufacturers are reluctant to invest heavily in designing their own furniture product is because of the nature of the industry; the designs of the products are easy to copy and replicate. Although the industry realises that design innovation is a crucial consideration to manufacturers that focus on the niche market, however, in the real world based on open market, there is a tendency for competitors to follow the trend of a successful market, which in turn erodes the uniqueness of the original design. Moreover, it takes time for a new design to be tested before it could be launched in the market. This explains why most of the products exported from Muar are ultimately rebranded and sold under the brands of foreign distributor. Most of the training in the Muar furniture cluster are by in-house on the job training. Knowledge is accumulated through experience gained from everyday work in the industry. For instance, when an apprentice joins a new workplace, he will be guided and trained by the senior staff. After gaining sufficient experience, some of them will become supervisors in the enterprise. Those who have sufficient capital will establish their own factories and the cycle will be

repeated. One of the commendable attitudes of the Muar people is that they are always ready to share their experience and knowledge. There is little jealousy amongst the industry practitioners. More importantly, most of the parents, especially during the earlier days strongly encouraged their children to join the furniture industry. This explains why the in-house on the job training is so successful in Muar.

Furniture fairs are the best channels for the industry to market their products and keep up to date with the latest trends in the industry. An exhibition is not only an avenue for keeping abreast of the market, but also a key segment in the entire sales cycle. The exhibition is not just about showcasing products. The communication process and service attitude displayed during the exhibition plays a vital role as well. The Muar furniture industry is able to benchmark their products with their competitors. Although there are some institutions that are currently offering courses relevant to the needs of the furniture industry, for instance Universiti Putra Malaysia and LimKokWing University, most of the industry practitioners are not able to benefit from those courses. Among the main reasons is that the entry for those courses require some academic pre-requisites. Another reason is that the majority of the Muar furniture industry workers are from Muar itself. They are reluctant to leave their families behind to study in institutions located in the Klang Valley and Kuala Lumpur. As discussed in the earlier part of this article, most of the enterprises prefer to provide their workers in-house on the job training. This might also be due to the mind-set of the owners of the enterprises who are afraid that on completion of the training course, the workers won't return to their employers. Thus, they prefer the higher education institutions or the vocational schools in the county to train the school leavers before sending them to the industry, rather than the industry sending their workers for training in the institutions. This might explain why although there is a vocational training school located in Muar, the furniture enterprises there seems to have no interest in the programme.

### **Actors and networks**

The furniture manufacturers, both SMEs and large enterprises are at the centre of the "network universe". They are linked closely to their immediate business environment such as customers, machinery and material suppliers, retailers and exporters, and supporting industries. On the other hand, linkages between the furniture manufacturers and other actors including the government services and municipalities, training and research institutions are limited. In short, whilst some of the actors have established close relationship with the manufacturers, others lie outside of the manufacturers' attention (Boon-Kwee and Thiruchelvam, 2010).

The relationship between the SMEs and the large Muar furniture manufacturers is symbiotic and mutually

beneficial. Through the sub-contracting arrangement, the large enterprises rely on the SME in terms of parts, components, and semi-finished furniture. For the SMEs, establishing a close relationship with the large enterprises enables them to survive in the competitive market. In fact, one of the dominant assets of the furniture industry in Muar is its social capital in the form of cooperative spirit, trust and loyalty among the industry practitioners. The manufacturers have no problem in sharing their knowledge, technical know-how, even business opportunities with others. This is mainly because Muar is a small town and most of the manufacturers have been there for generations. They know each other and their trustworthiness is high. All the furniture manufacturers, regardless of whether they are large or SMEs work collectively for the success of the industry.

The furniture manufacturers form a close partnership with their immediate business environment, that is, suppliers, customers, retailers, and support industries. The suppliers provide what is needed in the furniture manufacturing process, such as machinery and equipment, and wooden materials. Retailers are crucial for marketing purposes while the customers are the product recipients of the furniture manufacturers. The supporting industries such as fabrics, painting, varnishing, finishers, foams and adhesives provide support in terms of adding value to the value chain of the furniture manufacturing. All these four pillars of the immediate business environment are crucial. The absence of any party will lead to the failure of the industry.

In terms of industry association, the role of the MFA is most significant. Through the MFA, the manufacturers have on numerous occasions worked with furniture associations and organisations from other countries to develop the local industry. The exchange programs and the interactions promote advancement in management skills, technology, as well as design, know-how and have helped the industry become more competitive. For instance, in 2001, the MFA worked with the German Furniture Dealers Association to discuss the development of the industry in terms of the design of the products, sales trends and trading information. In 2003, it saw the association interacting with the Ghana authorities to promote bilateral trading. The MFA sent a delegation to Western China in 2005 to study the development of the furniture industry. The MFA hopes to promote more of these international exposures in the future so that its members can be kept updated on the latest developments around the world.

### **DISCUSSION AND POLICY IMPLICATIONS**

In summary, the findings of the case study of the Muar furniture cluster reveal the following:

1. The furniture industry is largely dominated by the SMEs and the value of furniture is determined on the quality of aesthetic appeal. There is no clear distinction between the large manufacturers and SMEs in terms of technological capabilities. However, there is a limited number of local machinery manufacturers, most of the machines are imported from countries such as China, Taiwan, Germany and Italy.

2. The firms' owners feel reluctant to send their fulltime staff for skill upgrading and other training programmes organised formally by public training institutions. Almost all the staff training is in-house on the job training. Skills and knowledge are accumulated through experience gained from everyday work in the industry. Also, there is a strong social capital and mutual understanding amongst the manufacturers to see each other as partners on their way to advance to greater heights in the international arena. The supports from the collective efforts of the community and the readiness for the practitioners in the cluster to share experience and knowledge are the main drivers of the learning process of the cluster.

3. Brand building is still lacking in the industry. There is no shortage of proficient sales personnel in the industry but there is a critical shortage of design and research personnel. The nature of the industry where the designs of the products are easy to copy and replicate has discouraged the manufacturers to invest in designing and branding.

4. The success of the furniture industry, particularly in the case of Muar, is due to the nature of the industry, that is, it is business driven and emphasizes on the industrial dynamics. The furniture manufacturers form a close partnership with their immediate business environment, namely suppliers, customers, retailers and supporting industries. There were limited linkages between the industry and government machinery, public research institutes and universities.

Based on the above findings, this paper suggests the following policy directions:

1. Strengthening local designing and branding capacity and capability; Industrial design courses need to be offered in most of the higher research institutions. The CAD/CAM courses have to be offered by more training institutions. In order to promote the design culture within the industry, design related competitions can be organised by the relevant related agencies. Also, "Design Clinics" can be held in the major furniture clusters in Malaysia with the collaboration between MFPC and industry associations to provide consultancy services to the furniture manufacturers.

2. Fostering effective public-private partnership: The development of the Muar furniture cluster was achieved despite minimal government assistance. The lack of effective cooperation and mutual understanding between

the government and the industry has resulted in poor take up rate of these government assistances, particularly in terms of R and D and technology upgrading funding as well as human capital development programmes. Hence, efforts should be made to foster effective government-private partnership, and this partnership must be based on mutual trust and continuously active exchange of information and views rather than just formal hosting of dialogues, conducting workshops, or ad-hoc round-table discussions. In addition, the government agencies as well as the trade associations need to undertake awareness programmes on a regular basis to update the industry on the latest incentives, financial assistance and grants provided by the government.

It is important for the government agencies to accumulate sufficient knowledge and information of the industry in which the government intends to intervene. This is to avoid the implementation of inappropriate programmes as well as political interferences which could de-motivate the industry players. Policymakers should go the extra mile to acquire the practical knowledge of the industry to make intelligent and well-informed decisions. It is also important to bear in mind that knowledge can initially be sourced from private experts, academicians or donors, but unless it is scrutinized by policymakers themselves the quality of industrial policy cannot be assured.

3. Enhancing the role of industry associations in industry development: One of the key success factors for the Muar furniture cluster can be attributed to the dynamic role played by the MFA in championing the cluster's performance as well as advancing its business potentials. The MFA has the support of all the members; SMEs and large firms as well as its complete trust. The dynamic roles played by an industry association such as the MFA can be used as a model for the government to strengthen and promote the industry associations.

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