

Chapter 7 Conclusions and Implications

7.1 Introduction

This final chapter attempts to draw together the key findings of the innovation survey and case study to provide a comprehensive insight into the technological innovation patterns in Malaysia's small and medium-sized wooden furniture manufacturers. The main findings are presented as responses to the research questions of this study. Issues pertaining to the technological innovation in the industry as well as its implications to the sectoral policies are also addressed in the discussion. The limitations of this research as well as the possible future direction of research in this area are addressed at the end of this chapter.

7.2 Implications for Theory

The role of SMEs in the SIS of the furniture industry in Malaysia is vital. Generally, the overall results of this study tend to support earlier studies by Tidd, et al. (2005), Rothwell & Dodgson (1994), OECD (1993), Malecki (1997), and Woolgar, et al. (1998) regarding the nature of technological innovation among SMEs; and studies by Cox, et al. (2002), European Commission (2006), Hirsch-Kreinsen (Hirsch-Kreinsen, 2008a, 2008b), Mendonça (2009) and von Tunzelmann and Acha (2005) on innovation patterns of LMT industries by providing useful empirical evidence.

In the following parts of this chapter, the major findings of this study are presented as responses to the research questions determined in Section 1.3 of this study.

a) *What are the main characteristics of the innovators?*

Evidence from the innovation survey indicates that the majority of the innovators are fully Malaysian owned SMEs. They are mainly home-grown enterprises and the influence of FDIs seems to be insignificant or extraneous. The industry's own determination and efforts have enabled it to compete in the competitive global marketplace. In terms of the industry structure, most of the manufacturers are in the category of SMEs. The number of micro-sized firms is limited because most of them are not able to survive in the intensely competitive market. Although large-sized manufacturers might have advantages in terms of capital, workforce and production volume, they are not flexible in terms of their responses to changes in production line. This is clearly reflected in the Muar industry structure where there are only seven large enterprises out of a total of 300 furniture manufacturers. Relatively, the younger SMEs show a greater likelihood of innovation than the older enterprises. As the Muar furniture industry has shown, most of the manufacturers are currently under the stewardship of second generation entrepreneurs. These findings concur with the studies of Rothwell & Dodgson (1994) and Tidd, et al. (2005) which draw attention to the innovatory advantages of SMEs in comparison to the large enterprises. Also, this finding is in accordance with the observation made by Pavitt (1984), Malerba & Orsenigo (1997), European Commission (2006) and

Hirsch-Kreinsen (Hirsch-Kreinsen, 2008a, 2008b) on the major role played by small firms in innovation activities in LMT industries.

The majority of the innovators are active in both technological product and process innovation. This is in line with Stoneman (1995), Chiesa (2007) and OECD (1997) standpoints that product and process innovation in the real world go hand-in-hand. However, as a whole, it was found that there were more enterprises engaged in product innovation compared to those engaged in process innovation. This finding differs from studies that were conducted by Pavitt (1984), European Commission (2006) and Hirsch-Kreinsen (2008a, 2008b) on innovative activities in the traditional sectors and LMT industries, which postulated that a relatively bigger proportion of innovative activity in these industries is devoted to process innovation.

The logical explanation for this trend, as evidenced by the case study, is that the development of product design is a key technology trajectory in the furniture industry. Thus, imitate and modify available designs (which is the minimum entry for technological innovation) are the key to competitive advantage for the furniture industry. In other words, besides categorised as ‘supplier-dominated’ firm in Pavitt’s taxonomy on innovating firms, furniture industry also has the characteristics of ‘specialised-suppliers’ firms which are commonly active in product innovations.

Exploring the correlation between the innovators' profiles (such as age, annual sales, market structure, number of employees, and quality of the workforce) and their innovation activities diversity is an interesting and challenging task. The diversity in the case of this study is defined simply as the ability of the innovators to perform various types of key innovation-related activities (such as in-house R&D, acquisition of external R&D, purchase of external knowledge, acquisition of machinery, equipment and software, all design functions, market preparation, and training). It is interesting to note that the results of correlation tests indicate that the innovators' profiles generally do not establish significant correlation with their innovation activities. If there is any, the significance level would be very low. One of the possible interpretations of these findings is that there is no particular trend in the technological innovation activities among the innovators in Malaysia's wooden furniture industry as different innovators might have their own preferred strategy. In fact, this is also can be viewed as the dynamics of the industry.

b) *What is the status of knowledge and technology as well as its learning process in the industry?*

It is interesting to note that, despite being recognised as one of the leading competitors in the global furniture market, the percentage of fulltime employees with science and engineering degrees is extremely low. In fact, the majority of innovators do not have employees with science and engineering degrees in their enterprises. Since the furniture industry is categorised as a low-tech industry by the OECD (2007), we can understand that it doesn't require a large number of

science or engineering graduates as compared to some of the high-tech cutting edge industries such as biotech, pharmaceutical, automotive, aerospace etc. Although degree holders might play a role in the success of the industry, it is the skilful carpentry that is striking. Their skill and tacit knowledge that is accumulated over time can't be acquired from the universities and colleges. In addition, most of the production processes in the wooden furniture industry are automated and computer programmed. This can be observed in Muar furniture industry where many foreign workers have been trained to become supervisors to operate the automation machines.

All the interviewees contacted as part of this study were convinced that Malaysia's wooden furniture industry employs one of the best technologies available in rubberwood furniture making, and they don't think other countries can claim their technology is superior to Malaysia. In fact, Malaysia is one of the earliest nations to have introduced rubberwood to replace the solid wood tropical forest in furniture making. As there is a limited number of local machinery manufacturers, most of the machines are imported from countries such as China, Taiwan, Germany and Italy. In terms of knowledge and technology capability divide between the SMEs and large enterprises, this study shows that there is no distinct gap between the two. In other words, what can be produced by the large enterprises can also be produced by the SMEs. The advantage of large enterprises is mainly in terms of volume of production as they have bigger space, more capital and larger workforce. This is evident from the survey results which revealed that most of the SMEs are the main developers of their innovations. Besides, they do not face serious problems in their innovations, such as projects

seriously delayed, not started or abandoned. The survey results clearly indicated that innovators consider internal knowledge and technology as most important for their innovation activities.

Almost all the staff training is in-house on the job training. Skills and knowledge is accumulated through experience gained from everyday work in the industry. This trend is clearly observable from the sustainability development of the Muar furniture industry. In Muar, when an apprentice joins a new workplace, he is generally guided and trained by the senior staff. After gaining sufficient experience, some of them will become supervisors in the enterprises. Those who have sufficient capital will start their own factories and the similar cycle will be repeated. One commendable trait of the Muar community is that they are always ready to share their experience and knowledge. One good example is the furniture vocational programme that used to be organised by Pei Hwa High School in 1988-2002, where the programme was fully supported by the collective efforts of the community.

Most of the innovators feel reluctant to send their fulltime staff for skill upgrading and other training programmes. Although various institutions and agencies have been established by the government to provide such training to the industry, the take up rate for these public-funded programmes are very disappointing. One such example is the case of ILP Ledang. Although the institute is located next to Muar District, the comprehensive training programme that it offers is not able to attract the interest of the furniture manufacturers. WISDEC faces a similar predicament. As formal training institutions are not the

main agency for human resources development for the innovators, the immediate business environment has emerged the most important source to obtain the latest market trends, designs and techniques. In this regard, sources such as clients, customers, retailers, support industries act as important sources of knowledge and technology for the industry. Meanwhile, the furniture fairs and exhibitions serve as platforms that gather together all those agents. A more detailed account of the contributions of these agents or innovation actors is provided next.

- c) *What types of actors have contributed most to the success of the industry? How are they linked to each other?*

The success of the wooden furniture in Malaysia is due to the collective effort of all the innovation actors in the industry, particularly the immediate business environment. The suppliers, for example, provide the manufacturers with what is needed in the furniture manufacturing process, such as machinery and equipment, and wooden materials. Retailers are crucial for the marketing purposes while the customers are the recipients of the furniture products. On the other hand, the supporting industries such as fabric, painting, varnishing, finishers, foams and adhesives provide support in terms of added value to the value chain of the furniture manufacturing. All these four pillars of the immediate business environment are crucial. The results support the view by Pavitt (1984) and Tidd, et al. (2005) that the wood product industry is a supplier-dominated industry, with their suppliers of production inputs as their main source of new technologies.

As shown in Figure 6:6, the furniture manufacturers which are largely SMEs together with a few anchor large enterprises are in the centre of the innovation system. The anchor enterprises are able to secure big orders from overseas buyers. The SMEs are also able to secure orders from the foreign retailers, or they become the parts and components suppliers to the large enterprises through sub-contracting projects. As the survey results show, partnership arrangement under the category of external market and commercial are the most preferable among the innovators to obtain knowledge and information. The role of the public sector as sources of knowledge and technology was least significant in the perception of the innovators. A similar trend is observable in terms of external sources of funding where government funding and financial aid are underutilised. In short, as most of the interviewees stressed, the success of the furniture industry, particularly in the case of Muar, is due to the nature of the industry that is business driven and emphasizes on the industrial dynamics.

d) *What types of routines that are commonly practiced by the industry?*

Most of the innovators rely on their in-house resources for their innovation. For instance, they are the main developers of their innovations, and conducting in-house training for their workforce. In terms of innovation activities, most of the innovators indicate that they engage in continuous R&D activities, market preparation such as market research and market launch, and training for personnel directly involved in innovation activities. Other common activities

among the innovators were design function which includes industrial, product, process and service design and specification for production or delivery, and acquisition of machinery, equipment and software in connection with product and process innovation. For intellectual property protection, the survey results showed that most of the innovators felt that confidential agreement and trade secrecy are relatively more relevant to them compared to other methods such as trademarks, registration of design, patents, and copyright. This might be due to the fact that the preparation of the confidential agreement is much easier and less cumbersome compared to filing of patents, trademarks and registration of designs.

Since Muar is a small place, the relationship amongst the community (and also the furniture industry players) is close. There is a strong social capital and mutual understanding amongst competitors to see each other as partners on their way to advance to greater heights in the international arena. The achievement of Muar furniture cluster is built upon the collective efforts of the entire Muar furniture industry. They are always ready to share business opportunities and information. In fact, many of the component part suppliers were ex-employees of the bigger companies that retain a considerable amount of trust and loyalty. Moreover, provided the manufacturers have clean financial records, it is always not a problem for the Muar furniture industry to obtain financial loans from the commercial banks as most of the branch managers are well aware of the potential of the industry.

e) *What are the key factors that assist or hamper the technological innovation activities in the industry?*

Evidence from the innovation surveys shows that the main catalyst for innovations is improvement to the product and delivery system followed by increase competition, demand and markets. Again, this strengthens the previous findings that the innovation activities in Malaysia's wooden furniture industry are basically business driven. Besides, the case study provides additional insights into factors that assist the technological innovation activities in the industry. All the interviewees agree that the factors that contributed to this success are the abundance of quality materials, stringent quality control and on-time delivery; these are built upon the collective efforts of the entire Muar furniture industry. They also believe that the growth of the industry, particularly in the case of Muar Furniture Cluster was due to a situation where timing, geographical location and support of people were favourable.

In contrast, among the significant factors that hamper innovation as highlighted in the survey are "cost too high", "excessive economic risks" and "lack of qualified personnel". Other factors that associated to the knowledge base of innovators, such as "lack of information on technology", "staff were burdened with production requirement", "lack of information on market", "difficulty in finding co-operation partners", and "insufficient innovation potential" were highly ranked as impediments by innovators. Overall, the result shows that the cost factor was the main obstacle to the realisation of innovation amongst the innovators. Market factors were ranked second, followed by knowledge factors,

institutional factors, and other factors. Others factors that have hindered the process of innovation as revealed by the case study are inconsistency of government policy, over reliance of foreign workers, lack of industrial lands, and lack of own brand and design. These factors will be discussed in more detail in section 7.3.

f) ***What is the role of SMEs in the success of the industry?***

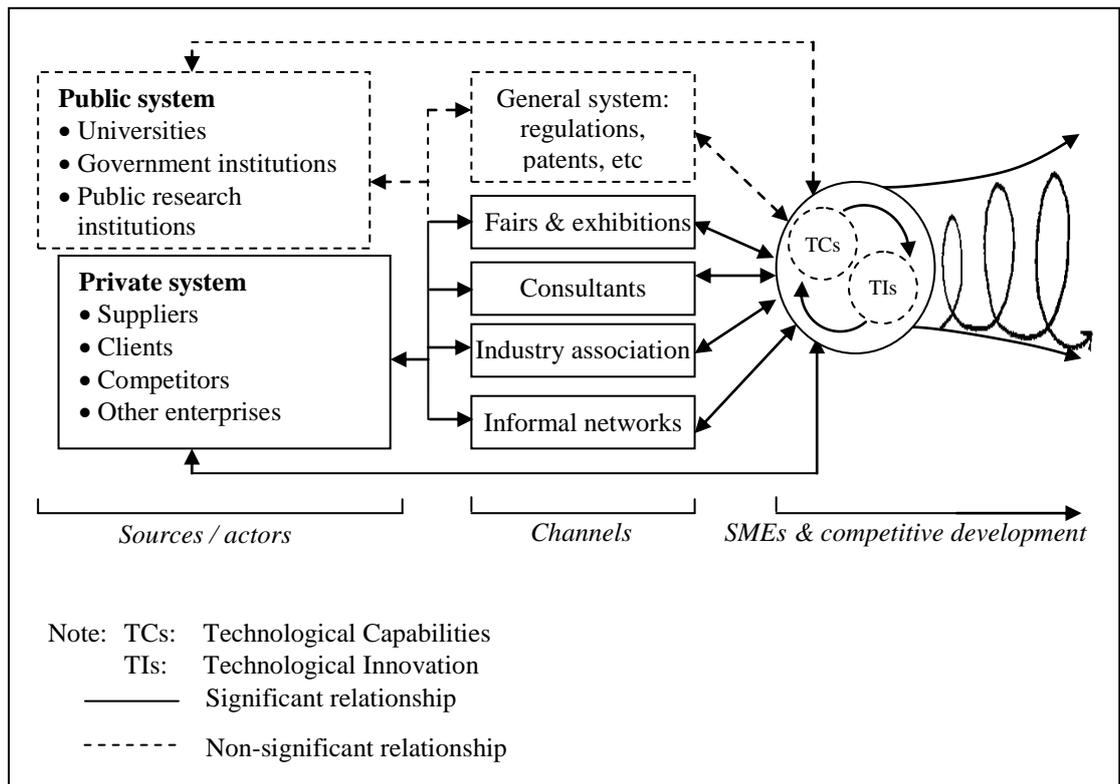
Besides performing a crucial role in generating opportunities for employment, providing potential sources of increasing total savings in the economy, SMEs in Malaysia, as in many other countries, are widely acknowledged as an important element in innovation. They create a resilient platform for continual renewal of international competitive advantages and become a spawning ground for the birth of entrepreneurs. This is also observable in the case of SMEs in the furniture industry in Malaysia.

SMEs make up 95 percent of the total establishments in the industry. They hold equal share with the large enterprises in terms of value of gross output, value added, employment, salary and wages, and value of assets (see Table 3:8 and Figure 3:8). Although these performances might not be impressive when taking into account the number of SMEs, we need to realise that in the real world the performance of the large enterprises is supported by a huge number of SMEs, particularly under the sub-contracting arrangements. In the case of Muar furniture industry, the SMEs supply the parts, components and semi-finished

furniture to the large enterprises. As there is no marked gap between the knowledge and technological capabilities between the SMEs and large enterprises, the large enterprises are assured of the quality of the SME services. This is especially important as the competitive edge of Muar's furniture industry lies on stringent quality control and on-time delivery.

The role and functions of SMEs in Malaysia's furniture industry is illustrated in Figure 7:1. As shown in the figure, the private system such as suppliers, clients, competitors, and other enterprises are the main sources of technological know-how and market information for the SMEs. Furniture fairs and exhibitions, consultants, and informal networks are the main channels for technological know-how and market information. Besides, some of the SMEs obtain knowledge and information directly from the private system. The public systems as well as the general system (such as regulations and patents information) do not play their role significantly. SMEs in this context are functioning as a generator of technological capabilities and innovations to sustain the competitiveness of the industry.

Figure 7:1 SMEs in Malaysia furniture industry: Schematic representation of knowledge flow



7.3 Implications for Policy

The issues pertaining to technological innovation activities are summarised below:

Inability to attract local young talent and over reliance on foreign workers – All industries need to attract young talents in order to sustain its development. Despite the high degree of mechanisation, the furniture industry in Malaysia still faces labour problems as the industry is perceived as a 3Ds industry – dirty, dusty and dangerous. This is a major problem in attracting the younger generation as most of them are not interested in working in the production line of furniture manufacturing compared to those high-tech industries such as semi-conductor, electrical etc. As a result, there is an

over reliance on foreign workers. For instance, about 60 percent of the Muar furniture industry workforce is from foreign countries. Such dependence poses risk for the development of the industry, particularly when the immigration policy on the recruitment of foreign workers is inconsistent.

Inconsistency of policy directions – The furniture industry in Malaysia is greatly influenced by policies and direction of four government institutions, i.e. the MITI, MPIC, Ministry of Human Resources (MOHR), and Ministry of Home Affairs (MOHA). The policy directions of these ministries are self-contradicting. For instance, both MITI and MPIC are strongly urging the furniture industry to upgrade their production level as it can generate more income for the country. However, MOHR and MOHA are, at the same time, trying to reduce the intake of foreign workers by doubling the levy on foreign workers. This is damaging to the furniture industry as the industry is heavily labour intensive. Another example is that while the country has ambitious plans to be a high-income economy under the New Economic Model, the MOHR is stopping the intake of the foreign workers and urging the industry to employ more local workers in the low salary category.

Inappropriate policy directions due to lack of understanding of the nature of the industry – The current government policy continues to perpetuate the use of automation and computerised machinery in the furniture manufacturing. Moreover, courses and programmes offered by the training centre are biased toward automation, robotic and ICTs. The fact that the use of such technology and automation machinery might increase furniture production but fail to democratize style, and also the value of furniture is subjected to the quality of aesthetic appeal and the craftsmanship of the

furniture makers does not seem to get serious attention from the policymakers. The actual urgent need of the industry is for design and branding personnel, not graduates with degrees in engineering and ICT. Another example is that the government's efforts to set up furniture clusters (or villages) have not achieved its desirable objective. This is because these policy created furniture villages do not possess the intimate bonding among the actors as evident in the Muar furniture cluster.

Lack of industrial land and illegal factories – This issue is particularly significant in the case of the Muar furniture industry as they currently face about 30 percent shortage of industrial land. As a result, the relocation of the illegal furniture manufacturers operating on the agricultural and residential land to the industrial zone, or the so-called “Bleaching Programme” is hampered. The limited industrial land has hindered the upgrading of the small enterprises. Many of the furniture firms have to set up their factories on illegal land which do not have proper access roads and fire safety facilities. The process of converting the agricultural and residential land to industrial land is time consuming. This is why there are still a huge number of small enterprises operating on the residential and agricultural land that is not gazetted for industrial activities.

Lack of own brand and design – Although Muar furniture is popular in the world market, the majority of the manufacturers are still in the category of OEM as many of the manufacturers are not keen in developing their own original design. They appear reluctant to invest money and time to develop their own brand or design because it would be easy for others to copy their works. Hence, most of the enterprises do not have a professional design team in the company. Moreover, the market is short of furniture

design talents. As some of the interviewees emphasised, the market is flooded with marketing and sales personnel, but not designers.

Poor take up rate of public support and facilities – In order to upgrade the technological capabilities of the industry, the Malaysian government has constantly provided support and facilities such as wood-working training centres, vocational institutes, funding schemes, standard testing laboratory, etc. However, such facilities are underutilised. The most significant reason is the lack of awareness of the available facilities and no promotion on such services. Moreover, the majority of manufacturers are reluctant to use the public system as they perceive the procedures involved as full of tedious paperwork and time consuming.

Drawing upon the significant issues pertaining to technological innovation activities in the wooden furniture industry, this research suggests the following policy directions:

- a) *Enlarging the pool of available skilful workers* – Specific woodworking training institutions such as WISDEC, together with other general vocational training centres such as *Institut Latihan Perindustrian* (Industrial Training Institute) and *Institut Kemahiran Belia Negara* (National Youth Skills Institute) will have to increase their capacity to produce more skillful workers for the industry. Besides, to attract quality workers, the industry will have to provide the enabling environment in terms of cleanliness and safety. Hence, sufficient industrial zones capable of providing a comprehensive infrastructure for more efficient

manufacturing is a must in ensuring a more conducive working environment to attract local young talents.

- b) *Leveraging local designing and branding capacity and capability* – Industrial design courses need to be offered in institutions such as UPM, UiTM, and Limkokwing University. The existing programmes on design and branding in training institutions such as WISDEC need to be strengthened. 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 industrial associations to provide consultancy services to the furniture manufacturers.
- c) *Fostering effective public-private partnership* – The government has provided various incentives as well as supporting infrastructure to stimulate the technological capabilities of the industry. However, 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&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. The simplification and user friendliness of government policies and procedures should be emphasised in the process of policies formulation and implementation in the country.

d) *Initiating cluster and network development* – Creating a cluster is currently an important new direction in economic policy. Thus, efforts should be focused on leveraging the interconnection and dynamics of all the related actors based on its geographic concentration. Both horizontal and vertical networks within and outside the cluster need to be strengthened by initiating an atmosphere of trust within a cluster. Horizontal networks are built between firms that compete for the same market such as a group of producers and competitors; and vertical networks are alliances between firms belonging to different levels of the same value chain, such as a buyer assisting its suppliers for upgrading.

e) *Deepening knowledge of the industry* – 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 design and implementation of inappropriate policies 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.

- f) *Ensuring the availability of an accurate and accessible up-to-date databases –* Accurate information on the number of wooden furniture manufacturers in the country would help the government and policymakers to put in place sound strategies for the development of the industry, particularly in terms of providing sufficient industrial zones for re-allocation of the “illegal” furniture manufacturers. This is also to ensure the success of the “Bleaching Programme”, or the relocation of the illegal furniture manufacturers operating on the agricultural and residential land to the industrial zone of the State Government.

7.4 Research Limitations

When selecting the sample it would be ideal to randomise the entire population of Malaysia’s SMEs in wooden furniture manufacturing sector as this would be a more robust sample for statistical analysis. The responses, thus obtained, would provide a reliable indicator of the level of technological innovativeness of the sector. However, in the case of this research, the random sampling method was not applied because knowing the exact number of SMEs in wooden furniture manufacturing sector is next to impossible. Hence, this study is designed as an attempt only to explore the technological innovation patterns of SMEs that are innovation active. This research is thus not aimed at measuring the level of technological innovativeness of Malaysia’s wooden furniture sector as a whole. Moreover, it is a difficult to get good response rate from the survey.

On the other hand, there are various actors of innovation in the context of SIS each with their own functions and practices. For a PhD research with limited resources and time, it is impossible to incorporate all these actors. Moreover, if more actors are included in the research it will increase the complexity and length of the survey questionnaire used to obtain the primary data. Having a complicated questionnaire will certainly affect the responses rate of the survey. Due to these reasons, this study only selected the SMEs in the wooden furniture manufacturing sector as the focus of its research. This selection was made because the big majority of the wooden furniture enterprises in Malaysia are categorised as SMEs. It is important to take note that although other innovation actors, such as large enterprises, PRIs, universities, government machinery etc, were not selected as the main object in this research, their role in supporting the advancement of technological innovation activities of SMEs is still crucial for the discussion of this research.

7.5 Proposed Future Direction of Research

All the objectives determined at the beginning of this research have been achieved. The patterns of technological innovation amongst the SMEs in Malaysia's wooden furniture industry have been explored by looking at the empirical evidence gained from the innovation survey and narrative case study in Muar furniture industry. The trends of three building block of SIS in the industry have been identified, together with the key problems and challenges that are currently facing the industry. The contributions of SMEs as an innovation actor has also been examined and recommendations for future policy directions have been given.

For future research, it is suggested that a similar investigation be conducted to examine the technological innovation patterns in the large enterprises in Malaysia's wooden furniture industry. This is because it is widely hypothesised that the patterns of innovation are different due to the size of the enterprises. Besides, as has been constantly stressed by the SIS, the innovation activities are highly idiosyncratic at the sectoral-level. Thus, it would be interesting to conduct a comparative study of the patterns of technological innovation in wooden furniture industry with selected high-tech industries, such as pharmaceutical, automotive, bio-technology etc by employing similar research strategies and tools.