

The Sustainable Technological Innovation among SMEs in South East Asia Countries: A Case Study

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ABSTRACT — South East Asia (SEA) region is characterized by economies of vast disparities in natural resources, capabilities and development levels. Key issues for Small and Medium Enterprises (SMEs) in globalizing economies in the region continue to financing, marketing, technology, human resource and external environment including policy framework. SMEs are currently going through a transition phase and process of restructuring for competitive growth, in the fast technological changes, among other factors. The increasing influx of transnational corporations (TNCs) and foreign direct investment (FDI) in manufacturing and services in the region have opened up large business opportunities and also threats, needing more advanced technological inputs, and absorptive and innovative capabilities for enhancing and efficiency of SMEs. This paper describes the technological innovation, provide information, and discuss the technological innovation issues in selected SEA countries.

Keywords: SEA, case studies, SMEs, technological innovation.

1.0 INTRODUCTION

Among policy-makers and academics the current consensus suggests that innovation is a crucial factor in generating economic growth and development in the developed world [1,2]. Traditionally, the importance of innovations is ascribed to the new competitive landscape stemming from increased economic globalization, new types of regulation of international trade, and improved ICT-technologies. Technology and innovation capacities are closely related to each other but may not sufficient by themselves for competitiveness and growth unless tuned with other policies and mechanisms at enterprise and national levels, especially in the context of globalization and knowledge-based economies under the emerging world trade rules.

Technology capacity building for SMEs is largely influenced by the overall national Science and Technology climate and policies, mechanisms and support structures, though there are specific policies and mechanisms for SMEs, within the overall framework. SMEs would continue to play a significant role in national industrial and social development, and are presently passing through a transition phase and process of restructuring due to need for enhancing global competitiveness and faster technological developments. The new world trade rules and increasing operations of TNCs are opening business opportunities as well as posing challenges for SMEs, including active role in international supply chain management, rural development, innovation management, service sector, etc.

2.0 THE IMPORTANCE OF SMES

The importance of SMEs to world economies is well documented [3,4]. SMEs (firms with 200 or less employees) make up the largest business sector in every world economy [5], and governments around the globe are increasingly promoting and supporting SME growth as part of their overall national development strategy [6].

While they dominate in terms of absolute numbers, SMEs are also important because they are key drivers of employment and economic growth. At a macro level, SMEs have created the majority of new jobs in OECD countries since the 1970s [7] and their collective contributions to respective GDPs (e.g. approximately 30% in Australia and New Zealand, 51% in the UK and USA, 57% in Canada and Japan, 76% in Luxembourg) belie their individual small size [8]. At micro level, SMEs are popularly looked upon by governments as a keystone to regional economic and community regeneration. Since the early 1980s, considerable restructuring particularly in large firms (e.g. rationalizing, downsizing, outsourcing and job exporting) has seen a general shedding of Jobs [9]. It is primarily through the growth of SMEs that employees made redundant by large firms have been absorbed back into the work force [9, 10]. Through a multiplier effect, this employment provides income to regions which stimulates local economic activity which in turn, drives wealth and further creation of employment [11].

In contemporary commerce, SMEs dominate many important industry sectors such as retailing, service and construction; and form crucial forward and backward links in the supply chain of large scale capital intensive manufacturing industries such as automotive, mining, marine and defense [12, 13, 14]. Additionally, their presence alongside large firms provides important competitive and structural balance to industries and marketplaces that would otherwise be dominated by a few large players [7, 15]. In terms of entrepreneurial activity, SMEs often occupy fragmented or niche markets which large firms either cannot economically enter or are reluctant to enter because of 'unattractive' risk-return considerations [16]. And despite their generally limited capacity for research and development (R&D) investment, SMEs contribute positively and disproportionately to innovative activity [17]. For example, Peacock [7] reported that SMEs in Australia contributed 54% of all 'significant technological innovations' even though their share of R&D investments represented about 20% of technical innovation expenditure. Perhaps as a result of the association with entrepreneurial activity and innovation, SMEs serve an important 'seedbed' role for the growth of new industries and the establishment of future large companies [18].

3.0 CHARACTERISTICS IN TECHNOLOGICAL INNOVATION WITH PARTICULAR FOCUS ON SELECTED SEA COUNTRIES

This section focus on the cases of technological innovation in selected SEA Countries. The cases are minor illustrations and their complexity cannot be dealt within its totality.

3.1 Malaysia

SMEs have a significant presence in Malaysian manufacturing sector. Around 90% of the total establishments in the manufacturing sector are SMEs. Acknowledging the importance of SMEs to the manufacturing sector, the Malaysian government has made some effort to promote the development of SMEs in the sector. In the Eighth Malaysia Plan (2001-2005) about 42% (or RM1.09 billion) of the development allocation for industrial development was allocated for SME development [19].

In the late 1990s, the complex economic factors such as rising China, Asian currency crisis, and the prevalence of supply chain management made Malaysia aware of the importance of industrial linkage and competitive local SMEs. Therefore, the characteristic of the SME innovation policy in Malaysia is mainly focused on marketing by integrating local SMEs into the global supply chain of multi national companies (MNCs). As a main way of innovating SMEs, the government introduced the Industrial Linkage Program (ILP) and the Global Supplier Program (GSP) initiated by Small

and Medium Industries Development Corporation (SMIDEC). They aim at enhancing SMEs participation as reliable and competitive suppliers and parts and components or services to MNCs. In other words, they develop the capability of SMEs to meet the requirement of MNCs by providing skills development or training programs.

The government's emphasis has been developing more resilient SMEs via the transformation from labor intensive operations to ones based on capital, knowledge and technology, including the ability to innovate, design and develop new products and processes. Some of the government programs that have been implemented to bring about this transformation include the following:

- The Industrial Technical Assistance Fund (ITAF) to provide incentives for product and process improvement.
- The Technology Acquisition Fund.
- ICT Grants where a matching grant of up to RM500, 000 per company was provided for purchase of hardware and the accompanying software.

Such emphasis on technology upgrading of SMEs is not unique to Malaysia. The role of SMEs in national innovation systems and the importance of technological change and innovation in creating opportunities for SMEs are explicitly recognized in the Bologna Charter on SME Policies (which was adopted on 15 June 2000). More specifically, the Bologna Charter calls for governments to consider implementing SME policies that will:

- improve SMEs' ability to manage innovation,
- reduce financial barriers to innovation in SMEs, and
- improve SMEs' access to national and global innovation networks.

The main SME innovation policy in Malaysia enhance the technology capability of local SMEs to cope with the demand of MNCs by letting participated in the GSP manage all training program for SMEs. Also, it shows that industrial linkage between MNCs and local SMEs could be more developed by bottom-up activities than top-down activities.

3.2 Indonesia

Indonesia has the most complicated ethnical structure and serious political problems, partly because of the latter. The technological foundation of the country is weak, as the capital goods sector is underdeveloped. The country's ability to absorb and improve imported technologies is also weak, particularly when it comes to complex technologies. Traditionally, Indonesia SMEs have focused on the domestic market, where quality standards were low and requirements in terms of design were often not fitting international market. Indonesia Institute of Science (LIPI) showed that the factors influencing the innovative capacity and competitiveness of SMEs are:

- government policy
- skills of managers and employees
- linkage between S&T producers and SMEs
- networking
- innovation ability: product and process innovation
- to establish innovation centre for SMEs
- development of entrepreneurship and human resources
- enhancement of possible market for SMEs products
- enhancement of SMEs access to financing source
- Granting tax incentives

3.3 Singapore

Singapore is one of the most advanced countries in Asia Pacific and has started to implement large-scale changes in its knowledge and information sectors as they are expected to become the most important factors for future economic growth. Singapore has declared its desire to turn the nation into a knowledge-based economy.

In the post-crisis period, Singapore has implemented policies to strengthen the domestic innovation and invention climate and to promote industrial innovation activities through grants and tax incentives. Singapore has also decided to train a large number of high-level researchers. However, foreign expatriates continue to play a dominant role in domestic R&D [1].

From the report by Spring Singapore, the current state of Singapore SMEs is as follows [24]:

- Knowledge: SMEs don't understand what Technologies are available and how they can be applied to their businesses;
- Capability: SMEs have limited internal ability to develop and manage technology;
- Affordability: SMEs can't afford new Technologies and licensing costs;
- Information: no consolidated directory of technology support infrastructure and services available;
- Emphasis: Existing technology support provides do not focus on commercialization and SMEs need.

Due to these problems, 5-year Technology Innovation Programme is implemented to increase SMEs adoption of technology innovation. Figure 1 shows the Singapore Technology Innovation Programme for SMEs.

As referred to Figure 1, the Singapore Technology Innovation Programme catalyse the SMEs by promoting technology awareness and give the incentive technology innovation projects. The programme also setup laboratories and central of innovation (COI). There are three institutions involved as COI, namely, Ngee Ann Polytechnic, Singapore Polytechnic and Singapore Institute of Manufacturing Technology. The COI is providing technology infrastructure for local SMEs. Singapore government also provides funding to build the capabilities of SMEs as well as to catalyse an impactful technology innovation projects. The Singapore SMEs can benefit through the setting up of COIs, technology consultation and funding for project development. The programme also developed the database of technology resources for SMEs. To build the capabilities of technology innovation, the programme encourage the attachments of experts to SMEs, promote the internship of institution of higher learning student to SMEs as well as to setup technology innovation talent database.

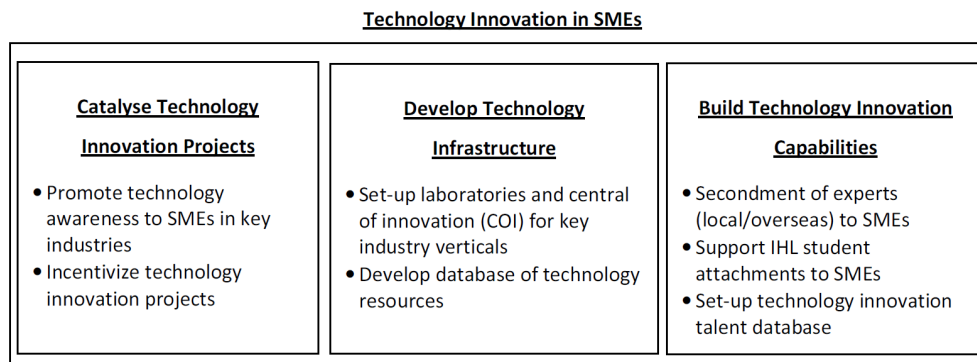


Figure 1: Singapore technology innovation programme (Figure modified from [24]).

3.4 Thailand

The SME innovation policy in Thailand is the reflection of economic structure problems resulted from the strong reliance on foreign capital not involved in indigenous technology development during the last three decades. In addition, huge foreign debt and high nonperforming loans (NPLs) of large enterprises were one of the main reasons for the 1997 economic crisis in Thailand. Therefore, the government has emphasized the innovation of SMEs as an alternative engine for economic recovery and sustainable economic development. As a way of innovating SMEs, the government has focused on the indigenous technology capability development of

SMEs in specific sectors such as automotive, food, tourism and software sectors. In terms of building indigenous technology capability, one of the main policies is the industrial Technology Assistance Program (ITAP) launched by the National Science and Technology Development Agency (NSTDA). The main contents of the program are composed of industrial consultancy and technology acquisition service by linking technology experts and SMEs, and providing SMEs with the opportunity to obtain first-hand information on technology advancements and innovations through arranging overseas technology trips. The main SME innovation policy in Thailand shows that the indigenous technology development has been mainly based on the paradigm shift of role of government research institutes from a knowledge source to a knowledge intermediary by providing SMEs with indirect services that enable them to enhance technology capability [20].

4.0 TECHNOLOGICAL INNOVATION STRATEGIES

This section discusses about the Korea and Taiwan strategies for technological innovation.

Korea adopted strategies like interventionist, nationalistic, strategic and high tech to enhance their industry technology development. The Korea strategy can be summarized as follows [20]:

- Industrial policy dominant- strong, clear leadership commitment to competitiveness
- Import protection: high, prolonged but selective
- Offset by strongly export-orientation, with 'push' detail targeting and pressures
- Heavy investment in human capital
- Directed and subsidized credit
- FDI tightly restricted- until financial crisis. Outward FDI promoted.
- Support for SMEs R&D
- Taiwan aims to build a high-tech SMEs by implementing the following strategies:
 - Selective protection, subsidized and directed credit
 - Strategic technology targeting
 - Human resources: education and training
 - Strong public R&D, incentives for contract R&D, venture capital, public R&D spin-offs
 - Government 'orchestration' of technology: import, adaptation, diffusion and innovation
 - Development of Science Park and technology clusters.

For Japan, in order to promote the SMEs technological innovation, the Japanese government adopted Small Business Innovation Research (SBIR) programs to enhance the efficiency of government support on technology for SMEs. Next, the technological collaboration between high tech industries and SMEs also promotes the SMEs innovation. Lastly, the financial support from Japanese government is vital to weak SMEs to survive [25].

5.0 CONCLUSION

The paper has highlighted SMEs technological innovation issues in some SEA countries. Technological innovation strategy has taken in different forms in Asian countries. Recent trends in growth rates of developing economies tend to indicate the need for a relook at the various aspects of technological developments and applications. It appears that innovation capabilities and new business models are emerging important factors for growth and competitiveness, mainly based on acquired technologies. It is to propose that SEA countries should harness the cooperation potential to mutual advantage through collaborations and partnerships, for technology capacity building of SMEs in Asia.

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29th CAPEO 2011

Room 1: Research, Innovation and Professional Development

Date: 30 November 2011

First Session: 8.15 am – 10.00 am

Paper Code	Title of paper	Speaker	Country
P 21	Peat as a Potential Candidate for Treatment of Industrial Effluents: Removal of Methylene Blue Dye from Synthetic Waste Water	Chieng Hei Ing	Brunei
P 47	The Sustainable Technological Innovation among SMEs in South East Asia Countries: A Case Study	Chee Fai Tan	Malaysia
P 48	Stabilization of Clay Soil Using Waste Paper Sludge Ash (WPSA) Mixtures	Norazlan Khalid	Malaysia
P 53	CCWA Steel Fabric Reinforced Concrete Wall Panel under Fatigue Compressive Load	Mohd Suhelmiey bin Sobri Nurharniza Abdul Rahman	Malaysia
P 60	Failure Analysis of Carbon Fiber Reinforced Polymer (CFRP) Bridge Using Maximum Stress, Maximum Strain, Tsai-Wu and Tsai-Hill Failure Theories	Agusril	Malaysia
P 64	Procurement of Relational Contract in Malaysia: Problems and Challenges	Syuhaida Ismail	Malaysia

Second Session: 10.30 am - 12.00 pm

Paper Code	Title of paper	Speaker	Country
P 67	Innovative Construction as a Modernizing Practice in Malaysia	Neza bin Ismail	Malaysia
P 73	An Online Anti-Macrofouling System for Seawater-Cooled Industrial Heat Exchangers - Case Study	Hui Beng Hong	Singapore
P 75	Usage Spectrum in Fatigue Life Analysis	Zheng Guoying	Singapore
P 104	Multiple Intelligence and Manipulative Skill of Chemistry Students: Roles, Challenges and Opportunities in Developing Future Chemical Engineer	Nurdiana Abdullah	Malaysia
P110	Prediction of Ultimate Load and Moment of Precast Beam-Column Joints with Corbels Using Direct Displacement Based Design	Kay Dora binti Abd Ghani	Malaysia
P111	Development of Road Accident Hotspots Identification and Prioritization Techniques Incorporating the Newly Established Brunei Hotspot Statement Definition	Hj Supry Hj Ag Ladi	Brunei



Room 1 – Research, Innovation and Professional Development

Paper code: P 47

The Sustainable Technological Innovation among SMEs in South East Asia Countries: A Case Study

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RESUME OF SPEAKER

Ir. Dr. C.F. Tan graduated in Mechanical Engineering with honours, Master of Science in Manufacturing Systems Engineering from Universiti Putra Malaysia and PhD in Industrial Design Engineering from Eindhoven University of Technology, the Netherlands. He is a Senior Lecturer at Department of Design & Innovation, Faculty of Mechanical Engineering, Universiti Teknikal Malaysia Melaka. He actively involved in teaching and learning, consultation as well as research and development activities. He is a member of Institution of Engineers, Malaysia and registered Professional Engineer with Board of Engineers, Malaysia. In IEM, currently he serves as member in Standing Committee on Examination and Training, Standing Committee on Qualifications and Admissions, Engineering Education Technical Committee, and Mechanical Engineering Technical Committee. His experience covers the aspects of advanced mechanical engineering design, industrial design engineering, smart system, multidisciplinary design and human-technology interaction design.