Research on Innovation Promoting Policy for SMEs in APEC: Survey and Case Studies

APEC Small and Medium Enterprises Working Group

December 2006

A Research on the Innovation Promoting Policy for SMEs in APEC: Survey and Case Studies

2006. 12.

APEC SME Innovation Center

Korea Technology and Information Promotion Agency for SMEs

Prepared by
Korean Technology & Information Promotion Agency for SMEs
www.apec-smeic.or.kr

for
APEC Secretariat
35 Heng Mui Keng Terrace Singapore 119616
Tel: (65) 67756012 Fax: (65) 67756013
Email: info@apec.org Website: www.apec.org

APEC#206-SM-01.3

Forward

As the 21st century progresses, we have witnessed dramatic changes in today's business environment: high technologies such as IT, BT and NT have been developed; innovative start-ups and spin-offs have been created; and enterprise innovation has been taking place. Particularly, innovative SMEs in member economies in APEC and OECD are playing pivotal roles in leading economic development of innovative SMEs. In an effort to achieve the 1994's Bogor goals, APEC member economies have built common ground to strengthen SMEs' innovative capacities with the recognition of the importance of SME innovation. In the Bogor goals, developed economies agree to accomplish free and open trade and investment no later than the year 2010 and developing economies no later than the year 2020.

These phenomena have served to remind member economies of the significance of SME innovation policies. Consequently, the APEC Economic Leaders and SME Ministers have adopted declarations on collaborative actions for SME innovation every year since 2000.

The APEC SME Innovation Center, thus, proposed a research project that contains surveys, analysis and synthesis, and comprehensive investigations on SME innovation policies among APEC economies in order to meet various needs of SME innovative policies. The main focus of the research project is placed on mutual learning, the establishment of cooperation network and efforts to reduce impediments to SME innovation. The center has undertaken the research partially funded by APEC after the approval of member economies.

To accomplish the goal of the research proposal, the APEC SME Innovation Center reviewed SME innovation theory through literature survey and has produced the research framework of SME innovation policy survey that covers six policy areas such as marketing, human resources, technology, financing, management innovation and clusters. Then, it has carried out survey questionnaires and on-site interviews of the current status of SME innovative promotion policies and related practices, targeting ten member economies in APEC.

As part of its ongoing programs, the APEC SME Innovation Center also held the APEC SME Innovation Policy Forum by inviting 25 experts on SME innovation policy at home and abroad as well as inviting policy makers from seven APEC member economies. Finally, it has conducted the study of analysis, comparison and typology of SME promotion policies and best practices and it has produced a comprehensive research report that presents implications, impediments and suggestions.

Overall, the research report contains policies of six areas and best practices from ten APEC member economies. Taking this opportunity, I would like to extend my sincere gratitude to the APEC secretariat and ten member economies including Australia, Canada, China, Japan, Korea, Malaysia, Mexico, the Philippines, Chinese Taipei and Thailand who greatly contributed to the successful completion of this report.

Finally, I want to wholeheartedly thank our TIPA research staff including *Dr. Kim Joo Yong, Dr. Yang Hun Wha, Mr. Ryu Dong Kyu and Ms. Kim Soohyun* as well as invited researchers including *Dr. Lee Woo Sung, Dr. Hwang Jung Tae and Dr. Lee Sung Cheol* for their tireless efforts and dedication. I also would like to express my sincere thanks to the advisory committee members for their extraordinary support to make this report possible.

I hope that the research report will offer a valuable source of information to policy makers, researchers in institutions for SME innovation and experts related to SME innovation.

Thank you.

Yang Hae Jin, President
Korea Technology and Information Promotion Agency for SMEs (TIPA)

Executive Summary

APEC Leaders and Ministers set the Bogor goals in 1994, "free and open trade and investment in the Asia-Pacific by 2010 for developed economies and 2020 for developing economies," and recognized that innovation is the driving force of economic growth to meet the goals. APEC Leaders and Ministers recommended innovation policies for start-ups to have access to a variety of financing resources, research and development, commercialization, and marketing tools. They subsequently emphasized cooperation in building appropriate environments for SMEs in APEC.

As part of follow-up actions, the 2005 APEC SMEMM agreed upon the *Daegu Initiative* that member economies should voluntarily review Individual Action Plans (IAPs) about their economic and policy environments for SME innovation, both individually and collectively. Another follow-up action initiated establishment of the *APEC SME Innovation Center* which serves as the foundation for sharing policy experiences to effectively enhance the innovation capacity of SMEs in APEC. The APEC SME Innovation Center accordingly commenced with this survey research of SME Innovation policies in APEC early 2006.

The objectives of the research are set as follows: to develop an SME innovation policy framework and identify best practices for policy makers in APEC; to bring up a coherent environment scheme conducive to SME innovation at national, regional, local and firm levels; and to suggest joint efforts and cooperative activities by which to resolve impediments to SME innovation encountered by governments and firms in APEC.

The work has been carried out based upon surveys. The literature review and internet search has been made on innovation-related theories which include SME innovation in the knowledge-based economy, innovation systems and clusters, and trends in APEC, OECD, and EU for SME innovation. Questionnaire and interview surveys to member economies were conducted for collecting information about SME innovation policies, case studies for best practices, and impediments and difficulties in SME innovation.

The research framework contains following items for comparison and identification of best practices: innovation environment in place conducive to SME innovation; promotion programs in marketing, HRD, technology, financing, management innovation and cluster policy; and best practices associated with specific promotion programs.

SME Innovation Policies of Member Economies

Australia

The Australian government has the priority in promoting the commercialization and high-tech start-ups in SME innovation policies. Because of high risk embedded in high tech new start-ups, market failures could occur in creations of venture firms and commercialization activities. The Australian government has a priority and focus on high technology new start-ups and commercialization. This priority and focus can vitalize SME innovation especially in high-tech industries such as BT and IT and also eliminate governmental budget inefficiency. The institutional environments are friendly and effective for the SME innovation processes. Australia experienced significant institutional changes during 1990s improving national competitiveness, overall economic and regulatory/governmental efficiency in labor market, financial market and final goods market is quite advanced compared to other member economies. The regulatory environments for SMEs and new start-ups are especially suitable and friendly for high- tech industries development, which requires various and lively business experimentation. For efficiency of policy intervention, the Australian government entitled the operations of equity investment strictly to private institutions, and do not intervene in government-sponsored incubators' operations and investments. Despite of these strengths, Australian economic environments have several weaknesses in promoting SME innovation such that Australian economy does not possess large-sized global players in high tech industries and thus has very low business R&D intensity compared to other advanced economies. The Australian government may need to consider a strategic development plan for specific technologies or industries.

Canada

Canada is a high-income member economy that boasts a high population of R&D performing SMEs. The flagship program is carried out by the largest government research institution, NRC. It is named as NRC-IRAP program, which has long history of fostering innovative SMEs. NRC-IRAP and strong R&D tax credit policy underlies behind the innovative SMEs research and development. In addition, the well-developed human capital and venture capital resources enable to fund SMEs that engaged in emerging technologies. The strength of Canadian system can be also identified with the well-woven support from both federal and provincial governments. In many cases, these supports can be delivered through not-for-profit organizations. These organizations play a critical role in building high value added cluster of

SMEs, such as the medical research cluster in Montreal, Québec. As Canada has a relatively strong link with US economy through NAFTA, the strong support for SMEs can attract the US high-technology SMEs. Canada has to attract high-value added facilities of foreign MNCs as well. However, inviting R&D centers of MNCs demands further incentives to attract talented personals regardless of nationality. Therefore, it would be plausible to consider a special tax rate for those who work in R&D. In fact, Québec has already started the personal income tax credit for foreign researchers, which provides implication for other provincial governments.

China

China has favorable environments for SMEs innovation such as 1) huge-sized domestic markets, *i.e.* high consumer purchasing powers, 2) basic research capabilities of PRIs and universities in high technology areas, and 3) a large number of high quality human resources. These favorable economic environments are all conducive to SMEs innovation. Based on these favorable economic environments, the Chinese government has chosen cluster-based SMEs innovation policies. National clusters and incubators, which were established by the central government and local governments, provide diverse supports for spin-offs and high-technology start-ups. Since these clusters and incubators are closely located with PRIs and universities with high technology capabilities, new start-ups and SMEs can have technological supports. Incubators provide consulting and financial network services for SMEs innovation. Clusters can also provide natural networks with other competitive firms, information flows and financial networks. Even though China possesses high potential of basic researches and high technology, these capabilities are only confined to small portion of total Chinese SMEs. Most of Chinese SMEs are still in low-skilled, labor-intensive industries based on cost-competitiveness. The upgrading of overall competitiveness of Chinese SMEs is challenging tasks for the Chinese government. Moreover, Chinese policy measures for SMEs innovation are still in infancy, which only started in the late 1990s. Compared to other advanced member economies with long history of SMEs supports, Chinese SME innovation policy measures are small in size and in extents.

Japan

The Japanese government has the foremost comprehensive and extensive supports for SMEs innovations and competitiveness acquirements. The financial supports, especially through direct loan programs and guarantee programs for SMEs innovations, are quite enormous in a way that governmental direct loans to SMEs consist of more than 10% of total outstanding lending to SMEs in Japan. Financial guarantees for SMEs liabilities are more than 10 times of direct loans

programs. These financial supports for SMEs have a long history more than 40 years. Management consulting services, on which recently Japanese government has a policy priority, even dispatches the fulltime-hired-specialists and -consultants to SMEs in a specific time period. Concerning SMEs technological innovation promotion, the Japanese government introduced US-styled SBIR programs to enhance governmental efficiency in technology supports. Beside these substantial governmental supports for SME innovation, the existence of a large number of global players in high tech industries such as in the areas of electronics, automotives, engineering and information technology is certainly favorable to SMEs innovation. With technological collaboration and, sometimes, fierce competitions with global business groups, Japanese SMEs are inevitable to innovate and upgrade competitiveness for survivals. On the contrary, the governmental supports for SMEs still have the tendency of supporting weak SMEs to sustain its financial viabilities. The governmental intervention beyond market-failures can result in lagging industrial restructuring and overall economic inefficiencies and also to SME innovation.

Korea

The characteristics of SME support policy in Korea lie in a government's unified system, in which SMBA, as a strong policy executor, is responsible for both establishing and implementing the SME support policy. In 2005, SMBA laid out and pushed for a strategy that helps SMEs develop into innovative SMEs. The Korean government has also introduced certification systems of innovative SMEs. *Venture business certification*, introduced in an effort to overcome the 1997 financial crisis, *technology innovation certification* and *management innovation certification* are major certification systems that are being implemented. In case of SME support program, the government and SMEs are providing a program in a way that is equivalent to the type of matching grants. With the development of Korean e-business, the government has established the online system from the application to ex-post monitoring and provided support programs which help improve conveniences for SMEs.

Malaysia

For more than four decades Malaysia's economic growth has been sustained through an open global trading environment. In particular, Malaysia strives to sustain itself as an attractive investment location for FDI. 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 MNCs. As a main way of innovating SMEs, the government introduced the Industrial Linkage Program (ILP) and the Global Supplier Program (GSP) initiated by SMIDEC. They aim at enhancing SMEs participation as reliable and competitive suppliers and parts and components or services to MNCs. In other words, they are to develop the capability of SMEs to meet the requirement of MNCs by providing skills development/ training program. 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.

Mexico

Mexico has upgraded its policy for SMEs significantly in terms of both institutional aspect and the amount of subsidy. Mexico realized the high value added economy cannot be achieved just by simply clinging to the previous strategy of utilizing '*maquiladoras,*' the assembly MNCs. Although MNCs are critical in vitalizing Mexican economy, a new approach must be added. The increased incubation activities and recently unfolding of TechBA program exhibits the confidence of Mexico in generating new knowledge economy. TechBA is a package program that provides international business acceleration centers for SMEs. The Mexico government may consider the types of SMEs that apply for the package. Many of them are high-growth SMEs - 'would be' large firms in the future, but some could be niche players. Therefore, differentiated cares for the different types could be considered. Mexico has potential to exploit double positioning of Latin America and North America. Innovative products can be mixed with cultural advantage. Fostering IT based SMEs will provides the opportunities for developing technology-based service SMEs. For the purpose, the development of human resource with multi-lingual capability is critical.

Philippines

The strength of Philippine's SME policy lies in the integrated approach as can be observed in the *Margna Carta for SMEs*. Under the law, the subsequent development of strategic plans has been written down, and the Philippines government has implemented diverse policy measures covering wide areas including marketing and financing. However, the resources are too limited to produce visible impact. The institutional structure is sound, but the investment in research and development is still far short of provoking sizable business clusters of technological

innovation. The concentration of R&D personnel in university and government research institutes reflects weakness of technology-based SMEs. To encourage innovative SMEs, the current tax incentive schemes and debt-financing oriented strategy needs to be reviewed. The Philippines has to build infrastructure to attract the foreign direct investment. The infrastructure development policy must address the educational infrastructure as well as the construction of road and other physical infrastructures. As for technological innovation, the low share of science and engineering graduates is reported. What kinds of skill are in need to attract foreign investment can be surveyed and targeted for future HRD policy. In addition, a special incentive scheme to link MNCs and local suppliers is preferable to foster value-added suppliers and to create jobs.

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 non-performing 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 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.

Chinese Taipei

The most apparent characteristic of Chinese Taipei is that the economy has been dominated by SMEs, rather than large enterprises. It enabled Chinese Taipei to have little suffering from Asian financial crisis. However, during the 1990s the significant increase in the outward FDI of

Chinese Taipei has led to the increase in unemployment rate. Thus, the government has made great efforts to reduce it by nurturing new technology start-ups and expanding the scope of SME business operations. Toward this end, the Chinese Taipei government has focused on the establishment of BIs as one of foundation of economic development. The strategy for the development of BIs comes from the "Challenge 2008 National Development Plan." In particular, Asian Entrepreneur Development Center (AEDC), one of the elements of the plan, has played a critical role in building a high quality incubation network that stimulates start-up and innovation activity. The main SME innovation policy in Chinese Taipei shows that the role of BIs has been critical in stimulating the knowledge production and technology innovation of tenant SMEs by intermediating between all kinds of resources and the tenants, rather than providing only simple financial and space assistances.

Comparison Analysis of Six Policy Areas

Marketing

The elements of comparison in marketing policy are government procurement, export promotion and integration of SMEs into the global supply chain of MNCs. First of all, in terms of government procurement, three of the ten APEC member economies, Australia, Canada and Korea, have mainly considered it as a measure of SME innovation policy. The Australian government procurement process is transparent and open, and not to discriminate against. In the case of Korea, public institutions are required to purchase SMEs' technological products that have been approved for performance by the government, thereby promoting technology development of SMEs. Unlike two member economies, the Canadian government has not directly promoted procurement for SMEs and instead stimulated it by having SMEs seek local subcontracting contracts. Secondly, the commonality of marketing policies in the ten APEC member economies can be attributed to the focus on export promotion. The export promotion policy for SMEs could be divided into financing, information and consulting, and brokerage supports. The focus of export promotion in China and Chinese Taipei is on financing supports such as loan guarantee and grants. The focus in Korea and Japan is on information and consulting services that enable SMEs to participate in the global market. In the Philippine, the main focus of export promotion is on brokerage supports that link SME exporters and foreign buyers. Finally, as a way of marketing, the inclusion of SMEs in the supply chain of MNCs and their indirect involvement in exporting activity can lead to the significant diffusion of technology and more efficient business models, thereby raising the international competitiveness of SMEs in the global market. This policy is dominated in member economies

in which their economy is mainly dependent on MNCs. The representative member economy is Malaysia.

HRD

As for the general education, HRD policy is not specifically designed for SMEs. However, the training programs that target SME employees can be observed in many member economies. SMEs do not have resources to provide well-designed internal training programs. Therefore, trade associations may work in collaboration with SMEs to build common training centers with the subsidy of the government. The investigation on training programs revealed the direct and indirect training programs in member economies. Chinese Taipei, Malaysia, Mexico, Philippines and Korea have reported direct training programs. Australia and Canada have rather indirect training programs by utilizing private training facilities. Japan has shifted from direct to indirect. China and Thailand reported no significant direct training programs, thus categorized as utilizing the indirect training. Direct training program is not in exclusive relation with indirect programs. When private education institutes do not function well, the government needs to act strongly, but if not it needs to act complementarily.

Technology

Technology policy has been reviewed mainly on the level of R&D tax treatment. It would be possible to divide member economies into groups based on the weighing between R&D tax treatment and R&D programs. Mexico has not invested enough in R&D to provide the growth momentum, considering the level of Mexican economy. It recently set up strong R&D tax credit policy. Canada has a reasonable level of R&D programs but strong R&D tax credit policy outweighs the government R&D program. Australia's main tool is R&D tax credit. The second group, Japan, Korea, and Chinese Taipei belong to the group with high R&D investment and with balanced level of R&D program and R&D tax treatment. China, Malaysia, Philippines, and Thailand are biased to R&D program. Malaysia's R&D tax credit is mainly for pioneering large firms and foreign MNCs, thus grouped in this category. The policy measures must consider the appropriate policy for development stage. The mixture of direct and indirect R&D subsidy for SMEs depends both on financial resources and on the strength of business R&D. R&D tax credit is critical to encourage business R&D but a precedent direct R&D program to fostering technology-based entrepreneurs could be required as the 'seeds.' In the similar manner, technological collaboration also needs to be conditioned depending on the situation. The relative

strength of public research is to be checked before importing a successful foreign policy.

Financing

The ten APEC member economies are diverse in their economic development stages and financial market systems, and thus the methods of financing policies are inevitably various. The SME financing policies of ten APEC member economies can be divided into two broad groups, while still possessing diversities even within the groups: 1) investment-focused group and 2) loans-focused group. The investment-focused group shares the characteristics that government does not provide or provide only small proportion in recent years for systematic direct loan facilities. These economies do not have special banks or credit guarantee institutions for SMEs, but directly involve in creating venture capital funds to provide investments for innovative SMEs, or actively participate in the network formation of venture capitalists with start-ups. The loans-focused group shares the characteristics that governmental financing programs are centered on special banks or guarantee institutions to operate for systematic loans and guarantee services to SMEs. Only in recent years, these economies (except the Philippines) have created equity investment programs in recent years especially targeting at high-tech innovative SMEs. But still the loan programs are the main channel of financing support to SMEs. Japan, Korea, and Chinese Taipei have the longest history of governmental loan programs while Malaysia and the Philippines have relatively newly established the public loan systems after the Asian crisis.

Management Innovation

Support policies for management innovation include provision of policy information, SME counseling, spread of an innovative mindset and e-business support programs. As for management innovation, member economies' support policies are varying depending on the development of economies and support systems. In general, Canada, Australia, Japan, Korea and Chinese Taipei are categorized as economies that implement strong support policies of management innovation. Our study shows that, among ten member economies, nine economies considered as weak in building an internal capacity of SMEs have established and offered consulting programs in order to enhance management innovation. In addition, Australia and Canada that have adopted an indirect support system have offered a direct support system for a SME consulting support program. This indicates that government's active involvement(as types of a free or grant program) is needed to support SMEs which fail to build an innovative capacity by themselves. Meanwhile, lack of a systematic organization has made SMEs vulnerable to collect information on government support programs. An effective way to address such a problem SMEs face is to support SME e-business and to establish an integrated policy

information system which can provide one stop service of government's SME support program or business activities. Australia, Canada and Korea have built and operated an integrated policy information system, while Chinese Taipei has established an e-learning portal site to enhance knowledge base regarding SME management innovation. In case of e-business, Canada, Australia, Japan, and Korea have created a strong support policy. Even Australia that has adopted an indirect support system has a direct support system of paying part of the costs when establishing infrastructure for cooperative e-business. This clearly shows that government's active support is a must in building infrastructure, such as broadband services or e-business systems, in which SMEs are successfully conducting e-business.

Clustering and Networking

BIs in the ten APEC member economies could be classified into 4 types; public sponsored, private enterprise, multi-invested and transitional type. Along with the organizational forms of BIs, they could be classified into the range of their functional supports from hardware supports centering on real estate (offering affordable space and facilities) to highly specialized software supports related to technology transfer services, linking global R&D community and the significant level of technology capacity. Public sponsored incubators are well presented in member economies such as Thailand, Malaysia, Mexico and Canada. In Thailand, Malaysia and Mexico, although there are a number of incubator programs, the performance has been limited in terms of institutional reach and collaboration between tenants and academic institutes since most of BIs are in the early and pilot stage of development. Unlike these three economic members, the representative feature of BI policy in Canada is the strategy for strengthening collaboration between SMEs and research institutes by attaching an incubator into each of the institutes within NRC. A private enterprise model could be found in the Philippines and Australia. Philippine encourages private BIs by providing a number of special fiscal and tax incentive (tax holiday, tax credit, etc). In Australia, the federal government is not involved in the operation of BIs. Instead, it provides supports for the self-reliance of BIs mainly in high tech industries. Multi-invested cooperation model could be found in Japan. Although MITI is the nodal agency for incubators promotion in Japan, most of BIs are joint efforts of local governments along with private corporations. The transitional model could be found in China, Chinese Taipei and Korea. In reality the dominant type of all of these three member economies is still public sponsored model. However, the recent BI policy direction of them has been placed on multi-invested cooperation model to make self-reliant operation possible.

Analysis of Best Practices of Member Economies

The selected best practices are 1) Australia, COMET (Commercializing Emerging Technologies) program, 2) Canada, IRAP (Industrial Research Assistance Program), 3) China, Business Incubator of Zhongguancun Haidian Science Park, 4) Japan, SME support centers, 5) Korea, SME Technology Innovation Development program, 6) Malaysia, ILP & GSP (Industrial Linkage Program & Global Supplier Program), 7) Mexico, TechBA (Technology Business Accelerator) program, 8) Philippines, Financing Program Magna Carta, 9) Chinese Taipei, Business Incubator of Asia Entrepreneurial Center, and 10) Thailand, ITAP (Industrial Technical Assistance Program).

Australia, Canada and Mexico operate the extensive consultation program with financial grants, which provide technological and managerial consultation to SMEs and start-ups. These programs, among which Canada's IRAP program has the longest history while the others has been recently established, are renowned for their success in stimulating SMEs' innovation and commercialization. The combinations of financial supports and customized-consultation services are identified as the critical factor in their successes.

The selected best practices of Japan and Thailand are both the consultation services to SMEs, but Japanese consultation services focus on the management side while Thailand's ones focuses on technological capabilities developments.

The selected best practices of China and Chinese Taipei are both the incubator policy focusing high-tech start-up companies. Both economies' SME innovation policies focus on the innovative high tech start-ups, and thus the governmental financial resources and policy focus are centered around the business incubators that facilitate the creations of technology-based start-ups and spin-offs from PRIs or universities. Both economies share the commonality that PRIs have technological capabilities to disseminate scientific researches into domestic SMEs and or to promote high-tech spin-offs. With this strength of National Innovation Systems in both economies, the business incubator policies were highly successful in nursing and stimulating high-tech start-ups.

Korean SMBA established a basic plan to support R&D project and created the *SME Technology Innovation Development program* in 1997. This program was designed to foster SME technology innovation by partly providing fund to SMEs capable of their own product development so that they can use it for new product development. The government-led program to support SMEs, therefore, is being implemented to enhance SME development capacity and

technology competitiveness.

Malaysia has the strategic focus of SMEs' innovation policies in integrating domestic SMEs into global production networks mainly through MNCs. Thus the selected best practice also emphasizes the technological linkage and technological collaboration of domestic SMEs with MNCs.

Philippines recently established the SME support system, of which the major methodology are the financial loan and guarantee programs. Since the technological capabilities of Philippines domestic SMEs are still in infancy, the targets of governmental SME policies are placed on the creations of jobs and SMEs growth. This job creation role of SMEs can best be achieved by financial provisions such as loan and loan guarantee program. Philippine governments mandate the domestic banks to allocate a designated portion of loans to SMEs.

Typology of SME Innovation Policies

Based on the analysis of ten APEC member economies' economic context in terms of technological capabilities and the dominant players in their economy, and also with survey responses and interview results, the overall strategy and directions of SME innovation policies can be divided into four categories. They are a group of High Tech. Start-Ups Development (HTSUD), a group of SMEs' Competitiveness and Innovation Enhancement (SCIE), a group of Indigenous Technological Capability Development (ITCD), and a Group of Technology Transfer Utilization (GTTU).

The HTSUD can be characterized as the economies in which their governments promote high-technology venture firms, start-ups and spin-offs, which are based on both the basic technology capabilities of universities or PRIs and high entrepreneurship spirit in the society. These economies possess high capabilities of basic research but lack in the ability of leading basic research results to a market success because private sectors' indigenous technological capabilities are neither mature nor existent. Thus, the governments of member economies in this group have focused on the promotion of high tech venture, start-ups, spin-offs. They also focus on commercialization of R&D results, while utilizing high potentials of basic research capabilities. Australia, Canada and China belong to this group.

The SCIE can be characterized as the economies in which government promotes the competitiveness and innovation activities of SMEs. Since these economies already possess substantial groups of innovative actors with indigenous technological capabilities, which are

global players, governmental roles for these innovative actors has been changed to be quite limited. Thus governmental roles have been shifted to more focus on the innovation and competitiveness of SMEs, which can be considered as relatively weak in the supply chains of production compared to domestic global firms. The measures for SMEs innovation policy are also mainly composed of direct supports for SME innovation and competitiveness, such as direct financing and extensive technology/management counseling services. Japan, Korea and Chinese Taipei can be included in this group. Chinese Taipei has little different aspects since the dominant players in the economy are mostly SMEs in global production networks. Chinese Taipei has more focused on the innovation and competitiveness relatively weaker parts of SMEs, which are start-ups and early stages of new business.

The ITCD and the GTTU have commonality in the respect that member economies pursue development of indigenous and adaptive technological capabilities on their own. Even though MNCs, which are dominant players in these member economies, provide employment and economic growth, the economies cannot be guaranteed for future economic growth especially in high tech industries without developing their own indigenous technological capabilities. However, the ITCD and the GTTU are different about the paths or methodologies to achieve indigenous technological capabilities. The ITCD endeavors to focus on the development of R&D capability of domestic SMEs with increase in its own R&D expenditures, while the GTTU promotes the industrial linkages with global MNCs and to utilize the technology transfers from MNCs to domestic SMEs. Thus, the policy measures for the ITCD are relatively focusing on technology financing and investment, while the policy measures for the GTTU are relatively focusing on collaboration with MNCs and direct financial loans support for SMEs. The ITCD consists of Thailand and Mexico, while the GTTU includes Malaysia and the Philippines.

Suggestions for APEC cooperative agendas

Trends and directions of SME innovation activities in each of APEC member economies should be understood ahead of developing an APEC-wide cooperation framework. For the sake of this, holding forums or workshops on SME innovation in APEC are highly important to enhance awareness of stakeholders including governments, intermediaries, and SMEs. It is strongly recommended that the stakeholders should be encouraged to raise their capabilities to become successful entrepreneurs as well. Then, member economies can make joint efforts to substantiate progress in management of innovation and innovation in management at individual, organization, member economy, and APEC levels.

Executive Summary

For APEC member economies to facilitate SME innovation, the following three approaches are proposed and their respective actions are individually suggested as below:

To explore ways to share innovation policies, best practices and outcomes in APEC: APEC-wide benchmarking should be provided with reference to exemplar cases in APEC. It is suggested that funding for the benchmarking should be made available to effectively facilitate the undertaking of industry-specific collaborations among governments, industries, academia, and research institutes in the APEC region.

To cooperate in developing policies for technology and management innovation, and human capacity building: It is suggested to draw a general framework for designing, deploying and assessing SME innovation policies in APEC. The framework particularly needs to focus on commercializing innovation in products and processes. Templates for human capacity building are also suggested to be included in the framework to cultivate innovation specialists.

To build a network of SME innovation policy experts and to support their continued cooperation: All the participants in forums or workshops associated with SME innovation in APEC are suggested to be developed into the *APEC SME Innovation Leaders Club*, a community of SME innovation leaders. The APEC SME Innovation Leaders Club should polish the network further.

Part I: Synthesis of SME Innovation Policies in APEC

Part Ⅱ: Member Economy's Profile of SME Innovation Policies in APEC

Part Ⅲ: Best Practices of SME Innovation Policies in APEC

Part Ⅰ:

Synthesis of

SME Innovation Policies in APEC

Part I: Synthesis of SME Innovation Policies in APEC

Chapter 1: Introduction **1**

1.1 Background 1

1.2 Objective 4

1.3 Research Scope 5

1.4 Methodology 6

1.5 Selection of Ten Member Economies 8

Chapter 2: Literature Review **11**

2.1 SME Innovation in the Knowledge-based Economy 11

2.2 Innovation Systems and Clusters 18

2.3 International Organizations' Initiatives for SME Innovation 25

Chapter 3: Formulation of SME Innovation Policy Framework **35**

3.1 Formulation of Matrix Framework 35

3.2 Marketing Policy 43

3.3 Human Resource Development (HRD) Policy 47

3.4 Technology Policy 51

3.5 Financing Policy 55

3.6 Management Innovation Policy 61

3.7 Clustering and Networking Policy 69

Chapter 4: Analysis of SME Innovation Policies in APEC **73**

4.1 Comparison of Strategies and Priorities 73

4.2 Comparison of SME Innovation Policies in APEC 78

4.3 Analysis of Best Practices and Case Studies 121

4.4 Typology of SME Innovation Policies 127

Chapter 5: Conclusion and Suggestion **137**

5.1 Conclusion 137

5.2. Suggestions for APEC cooperative agendas 147

Reference **157**

Appendix 1 ..... **169**

Appendix 2 ..... **179**

List of Tables

<Table 1.1> Survey Methodology 7

<Table 1.2> Selection Indicators of 10 APEC Member economies 10

<Table 2.1> Types of Innovative SMEs 15

<Table 2.2> Characteristics of Innovative Activity for Different Types of SMEs 22

<Table 2.3> Characteristics of Two Innovation Models 25

<Table 3.1> Market Failure Approach and Government Intervention Rationales 38

<Table 3.2> Disadvantages of SMEs in Innovation 40

<Table 3.3> Elements of Marketing Policy 47

<Table 3.4> Elements of HRD Policy 50

<Table 3.5> Elements of Technology Policy 55

<Table 3.6> Elements of Financing Policy 61

<Table 3.7> Management Strategies and Innovation 63

<Table 3.8> Management Strategies and Support Systems 64

<Table 3.9> Elements of Clustering and Networking Policy 71

<Table 4.1> Percentage of Population Who Attained Tertiary Education for the Age Band of 25-34 84

<Table 4.2> Comparison of HRD Policy: General Overview 85

<Table 4.3> Categorization of HRD 88

<Table 4.4> Comparison of Technology Policy: General Overview 89

<Table 4.5> Comparison of R&D Tax Treatment 91

<Table 4.6> Comparison of R&D Grant 93

<Table 4.7> Comparison of R&D Collaboration 94

<Table 4.8> Stock Market Capitalization 102

<Table 4.9> Stock Market Survey 102

<Table4.10> Venture Capital Survey 103

<Table 4.11> Categorization of Financing Policies 104

<Table 4.12> Websites for Policy Information and e-Learning 105

<Table 4.13> SME Consulting Support Policy by Economy 108

<Table 4.14> Management Innovation Policies by Economy 110

<Table 4.15> Type of Support Policies: Management Innovation 111

<Table 4.16> Classification of Business Incubation Policy in the 10 APEC economies 113

<Table 4.17> Classification of Business Incubators in the 10 APEC economies 119

<Table 4.18> Total R&D expenditure 128

<Table 4.19> Total R&D expenditure per capita 129

<Table 4.20> Total R&D personnel 129

<Table 4.21> Business expenditure on R&D 129

<Table 4.22> R&D personnel in business per capita 130

<Table 4.23> Total R&D intensity 130

<Table 4.24> Business R&D intensity 130

<Table 4.25> Scientific articles 131

<Table 4.26> Patents granted to residents 131

<Table 4.27> Two-Dimensional Economic Environment Categorization 133

<Table 4.28> Categorization of the Focuses of SME Innovation Policies 135

LIST OF FIGURES

<Figure 1.1> Research Framework 6

<Figure 3.1> Financing Lifecycles 56

<Figure 3.2> Correlations between SME management strategies and SME support policies 68

<Figure 4.1> Categorization of technology policy in APEC members 96

Chapter 1: Introduction

1.1 Background

1.1.1 Theoretical background

SMEs in Knowledge Economy

The transition to New Economy and knowledge-based economy in the 1990s and early 21st century had created an atmosphere that entrepreneurs and SMEs were crucial engines of economic growth. Brock and Evans(1989) conjectured that such trends were brought about by technological changes, increased globalization, employment flexibility, consumer diversity, deregulation and privatization, and innovation and entrepreneurial activity.

In the model of knowledge production function for the technological changes, firms are engaged in the pursuit of economic knowledge input for innovative output. It was, however, found that the link between knowledge input and innovative output at the firm level becomes weakly positive and even nonexistent or negative (Audertsch, 2004)). SMEs generally do not innovate or develop technologies but often use the existing technologies with modifications and improvements (Agarwal, 1989). The firms that undertake little R&D themselves instead take in economic knowledge from the firm conducting R&D or from the research laboratory of a university as spillovers, and then contribute to considerable innovative activities. Knowledge created in one economic agent becomes commercialized in a new enterprise in the knowledge-based economy.

System Approach to R&D

A R&D model of innovation has been used to explain the link between knowledge and economic performance. In this model, knowledge is discovered in universities, passed on to firms through publications, patents, and other forms of scientific correspondence, and to final customers in the form of products or services. The model represents innovation as a linear process in which technological change is closely dependent upon, and generated by, prior scientific research. Consequently the R&D model is named 'The Linear Model of Innovation,' denoting serial events in time.

Part I: Synthesis of SME Innovation Policies in APEC

The Linear Model suggests that the sequence from research through development to production is a standard path of innovation in both firms and national economies, and no feedback role is built into the system. The Linear Model has also been used as a justification for doing basic research and provides the conventional wisdom which underlies most policy thinking about technology development and economic growth.

The Linear Model has now been replaced by the 'System approach.' Many firms access valuable knowledge both through market exchange (*e.g.* through the purchase of capital or intermediate goods or licensing agreements), and through less formal contracts with suppliers, customers, universities, government agencies and other organizations. It is a well-known fact that firms with little innovative activity may produce a satisfactory economic performance because of the capabilities they acquire from upstream suppliers.

Therefore, the economic environment in which firms operate is crucial for the development of their technological capabilities. In order to analyze the complex webs of interactions between institutions and industries in the innovation process, researchers have introduced the terms 'national systems of innovation' and 'technology systems' (Archibugi and Simonetti, 1998). A system of innovation includes all the important factors that influence the exploration and exploitation of innovations. It can take place in a national, regional or sectoral context.

SME Innovation Policy

The traditional SME policy typically refers to policies implemented by a ministry or government agency charged with the mandate to promote SMEs. It takes the existing SMEs as exogenous and develops instruments to promote their viability. The Small Business Act of 1953 in USA explicitly mandated the role of the Small Business Administration as "aid, counsel, assist and protect […] the interests of small business concerns." By contrast, the SME innovation policy is defined as those measures taken to stimulate more innovative and entrepreneurial behaviour in a region or nation (Lundstrom and Stevenson, 2001). The SME innovative policy includes potential entrepreneurs as well as the existing SMEs. It is also sensible to environmental conditions that affect the decision-making process of entrepreneurs. The environment ranges from the individual to the enterprise, cluster, network, region or nation. However, the traditional SME policy still remains at the core of the SME innovation policy.

1.1.2 Trends in APEC and OECD

Trends in APEC

APEC has been striving to achieve the Borgor goals in 1994 since its inception in 1989; The Bogor goals are "free and open trade and investment in the Asia-Pacific by 2010 for developed economies and 2020 for developing economies." APEC Ministers recognized that innovation is the driving force of economic growth to meet the goals, and urged continuous cooperation in promoting innovation. In 2001 APEC SME Ministerial Meeting (APEC SMEMM), it was agreed upon that economic globalization is in the marketplace, technological innovation is a driving force behind economic development and knowledge is recognized as a core competence. And this in turn relies more and more upon new technologies and new industries, as well as increasing linkages among industries, universities and research institutes. This is the new context and economic environment for SMEs in the APEC region.

Since then, APEC member economies discussed innovation related issues in the SME Working Group and Ministerial Meetings every year. In the 2002 APEC SMEMM, Ministers recommended consideration of innovation policies that provide channels for start-ups to access a variety of financing resources, research and development, commercialization, and marketing tools. In the 2003 APEC SMEMM, Ministers stressed, “Innovation plays a key role in facilitating the creation of high-growth firms and is directly associated with the levels of competitiveness of SMEs and micro-enterprises.” In the 2004 APEC SMEMM, Ministers reached a common understanding that the promotion of entrepreneurship is the most important factor in carrying out innovation, and agreed that innovation is essential for the growth of SMEs in the 21st century. In the 2005 APEC SMEMM, Ministers recognized that innovation is the main driving force that creates dynamic SMEs and sustains growth in the current globalized marketplace. Further, Ministers recognized that SMEs in developing as well as developed economies have the potential to play a vital role in advancing innovation given their flexibility and ability to respond more quickly to current conditions. Ministers emphasized the importance of APEC cooperation in developing appropriate economic and policy environments for the APEC SMEs to reach their full innovative potential.

Trends in OECD

The 2nd OECD SMEMM of 2004 had the theme of “promoting Entrepreneurship and Innovative SMEs in a Global Economy.” Ministers reaffirmed the need to support the development of the best set of public policies that will foster the creation and rapid growth of innovative SMEs.

This requires: Policies and an institutional framework that contribute to a business environment that is conducive to entrepreneurship and facilitates entry, growth, transfer of ownership and smooth exit of enterprises. These should be coherent at international, national, regional and local levels; SME assistance and development programs which are clear in terms of their rationale, objectives and beneficiaries; and Policies that contribute to mobilizing human resources in order to promote entrepreneurship.

Ministers recognized that while priorities in terms of specific elements of SME policies vary greatly among participants due to their differing stages of development, political contexts and institutional arrangements, several key themes stand out as being of particular importance: 1) The need to reduce barriers to SME access to global markets; 2) The need to improve access to financing for SMEs on reasonable terms; 3) The need to develop a strong *"evaluation culture"* in ministries and agencies responsible for SME polices and programs; and 4) The need to strengthen the factual and analytical basis for policy making so that policy makers can make decisions in an informed manner based on empirical evidence.

Daegu Initiative and APEC SME Innovation center

APEC SME Ministers in the world emphasized the importance of cooperation in developing appropriate economic and policy environments for the APEC SMEs. The Daegu Initiative adopted in 2005 APEC SMEMM provides a framework, including Individual Action Plans (IAPs) for member economies to review and improve their economic and policy environments for SME innovation, both individually and collectively. In 2005 APEC SMEMM, Ministers welcomed the Korea's proposal for the *APEC SME Innovation Center* that would link SMEs with supporting organizations of member economies. The APEC SME Innovation Center will also serve as the foundation for sharing policy experiences to effectively enhance the innovation capacity of APEC SMEs.

1.2 Objective

The objective is promoting innovation in the products, processes, marketing and organizational efficiency in order to increase productivity and enhance competitiveness of SMEs in APEC. The more specific objectives are set as follows: 1) To develop an SME innovation policy framework and identify best practices for policy makers in APEC; 2) To bring up a coherent environment scheme conducive to SME innovation at national, regional, local and firm levels;

and 3) To suggest joint efforts and cooperative activities by which to resolve impediments to SME innovation encountered by governments and firms in APEC.

1.3 Research Scope

The scope includes: 1) To collect information on promotion policies of APEC member economies for SME innovation in the products, processes, marketing and organizational efficiency; 2)To identify SME innovation policies and their characteristics in the firm's growth stages such as start-up, development and maturity; 3) To develop an SME innovation policy framework in which the survey results can be stored and which can be referenced by APEC policy makers for their innovations; 4) To collate policies and practices by which innovations have been succeeded for SMEs together with case studies about beneficiaries; and 5) To make comparison analysis of APEC SME innovation policies and suggest recommendations for impediments and difficulties in APEC SME innovation.

Prior to the collection of SME innovation policies, there is a review on the related works with SME innovation, including: 1) SME innovation in the knowledge-based economy; 2) Innovation systems and innovation clusters; and 3) Trends and activity analysis in APEC, OECD, and EU for SME innovation.

The collection of SME innovation policies can be detailed as follows: 1) Status of SME innovation policies together with clusters are assembled for each member economy to be surveyed. The additional information is SME innovativeness, policy trends and types, intermediary roles, and others. 2) There is an in-depth survey on case studies of selected policies and practices in each member economy. For the case studies, one or two SMEs will be visited. 3) The survey on awareness programs of SME innovation in each member economy to be surveyed is conducted including the training and counseling programs, related education and training institutions, and others.

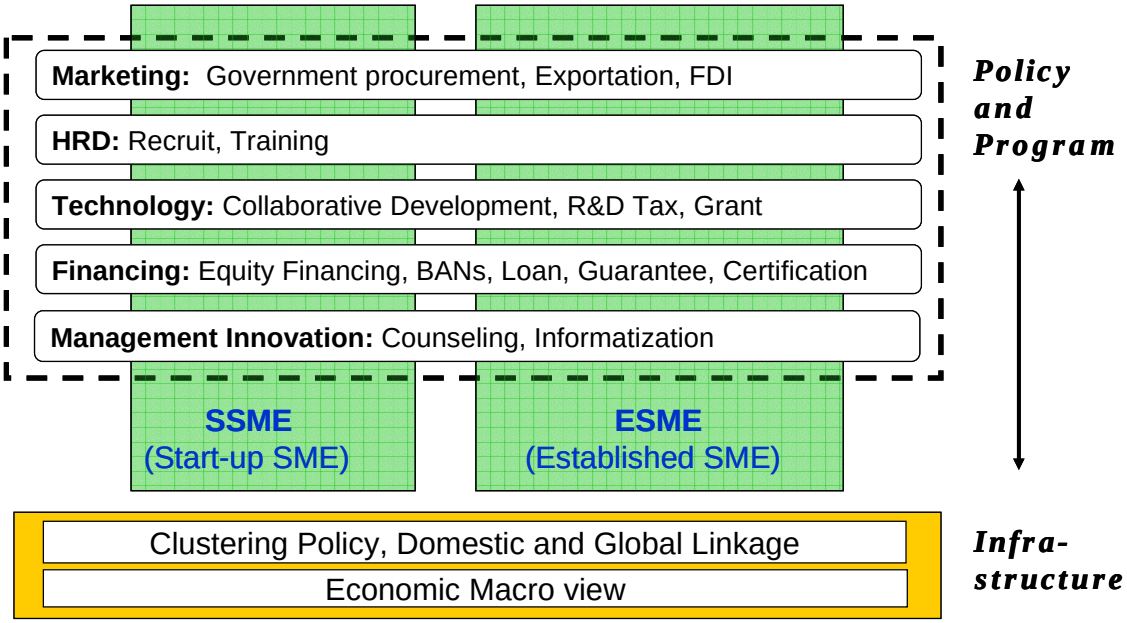
The SME innovation policy framework contains following items for comparison and identification of best practices: 1) Innovation environment in place conducive to SME innovation. This ranges in the economy, regional, local, and firm levels. 2) Promotion programs in place for accelerating SME innovation. The initial categorized items are marketing, HRD, technology, financing, management innovation and cluster policy. 3) Best practices associated with specific promotion programs. Those policies recommended by the member economies are sorted out into the above categories for later simple reference.

The survey targets in the member economies are divided into two: primary and secondary. The primary survey target is a public sector including government agencies dealing with SME innovation or intermediaries introduced by the government agencies. The secondary survey target is for in-depth study and includes: 1) Public or private service providers for counseling and training with their own programs; and 2) One or two SMEs which are excellent in innovation.

1.4 Methodology

1.4.1 Research Framework

The research framework has been drafted to facilitate the comparison of SME innovation policies and the identification of best practices. It has been identified as having two parts for research: infrastructure and policies.



<Figure 1.1> Research Framework

The infrastructure, which includes clustering policies and linkages, is investigated to find out how much conducive it is to SME innovation. The policies to be compared for SME innovation focus on five areas- marketing, human resource development, technology, financing and management innovation policy as you see in Figure 1.1. Due to the limit of time and budget, only a few items in each area will be delved into details. The study is carried out for both SSME (start-up SME) and ESME (established SME).

1.4.2 Survey methodology

The work has been carried out based upon surveys: indirect and direct. Indirect surveys were made by literature review and internet search. Researchers visited member economies for direct surveys. The indirect surveys included theories related to SME innovation, policies implemented by member economies, activities in OECD and EU, and others. The direct surveys included additional and updated information about the member economy's SME innovation policies, case studies for best practices, and impediments and difficulties in SME innovation.

The literature review and internet search has been made on innovation-related theories. The Innovation related theories include: 1) SME Innovation in the knowledge-based economy, 2) Innovation systems and clusters, and 3) Trends in APEC, OECD, and EU for SME innovation.

The direct survey via questionnaire sheets and visit interviews has been conducted based upon the following principles: 1) Member economies as survey targets needs to properly selected so as to enable effective benchmarking not only between the developed and developing ones but also between the developed ones. 2) The question items should be structured well enough to enable proper comparisons to be made among member economies. 3) Case studies of specific innovation policies should include the analysis of influential factors such as under which circumstance, with what measures, and evidences.

<Table 1.1> Survey Methodology

	Indirect survey	Direct survey
Targets	- Theories related to SME innovation - Activities in APEC, OECD and EU - Policies of member economies	- Additional and updated information of SME innovation - Best practices and case studies - Impediments and difficulties in SME innovation
Means	- Literature review - Internet search - Questionnaire survey	- Interviews with government agencies, intermediaries and SMEs - Expert forum with researchers
Contents	- Theories of statistics of APEC SMEs, SME Innovation in knowledge-based economy, innovation systems, trends in APEC, OECD and EU - Economy's profiles of economy and industrial structure and SME position, SME Innovation Policies, and Overall assessment.	- Business strategies and CEO's direction - Innovation activities - Success factors and obstacles - Implications

An expert forum on innovation policy has been specially prepared for a better quality of the research result. In the forum the interim report was presented so that its contents could be beforehand verified by the invited government policy-makers. A forum presenter was given a chance to introduce his or her SME innovation policies being confronted with a similar or different situation from the others. Then, all the participants discussed and shared their own views, and concluded in an objective manner.

Member economy profiles are described in the following sequence: 1) Economy and industrial structure and SME position, 2) SME Innovation Policies, and 3) Overall assessment.

1.5 Selection of Ten Member Economies

1.5.1 Basic Principles of Selection

Ten member economies among twenty one APEC member economies are chosen for this research of SMEs innovation policies. Because the member economies of APEC shows so much diversity in their characteristics of economic structure, industrial structure, firms' level of competitiveness and national innovation systems, moreover, the size of the economies and the populations, there exists limitation in optimal selection of ten member economies. Several criteria were considered to select ten member economies, which are suitable for the general purposes of this research.

First of all, since this research focuses on the benchmarking and the possibilities of their applicability to developing member economies, both developed economies and developing economies should be included for the analysis in a balanced proportion, but underdeveloped member economies without any industrialization bases should not.

Secondly, since this research mostly deals with manufacturing innovation rather than service industries' innovation, the object member economies for this study should possess a certain level of private manufacturing industrial capacity.

Thirdly, since this research intends to render with possible application to SMEs innovation policies in industrial bases, the economic and population size of the member economies can matter. Thus the member economies below a certain level of economic and population size are excluded from this research.

Fourthly, since the object of this research is SMEs in APEC member economies, the competitiveness of SMEs are considered to exclude the member economies below a certain level of SMEs competitiveness.

Lastly, since this research plans to categorize member economies according to the characteristics of their SMEs' innovation policies, each category of this research's typology has to contain relatively equitable number of member economies. If there exist multiple member economies in the same category of the typology, some of the member economies in the category are excluded, considering continental balance.

1.5.2 Selection of Candidate Member Economies for the Research

According to the above selection rules, first of all, among twenty one APEC member economies, the small sized countries in terms of populations are excluded from the analysis of this research, which are Brunei Darussalam, Hong Kong China, Papua New Guinea and Singapore.

In order to check manufacturing capabilities of member economies, the high-tech exports of World Development Indicators (WDI) 2005 are referred. This analysis resulted in excluding Chile and New Zealand, which showed the high tech exports under 1 billion US$. Even though Peru, Vietnam and Chinese Taipei did not record the amount of high tech exports, Peru and Vietnam were excluded from the analysis while Chinese Taipei is included in the analysis. It is because Peru showed one of the least high tech exports ratio among manufactured exports in WDI 2005, and Peru's GDP (US$ 78.2 billion) and Vietnam's GDP (US$ 51.0 billion) are respectively below than US$ 100 billion, which are right next to the Papua New Guinea's GDP (US$ 3.5 billion), and Brunei (US$ 5.7 billion).

Among the thirteen APEC member economies, which are not excluded from the above analysis, SME competitiveness is referred to for further narrow-down. Among the thirteen APEC member economies, three economies (Indonesia, Mexico and Russia) are recorded the least SME competitive below 4.0 in 10.0 scale index. Moreover, these three countries recorded the least funding for technological development, which are below 3.5 in 10.0 scale index.

However, since Mexico shows high records of high-tech exports more than Thailand, Philippine, and Australia, Mexico is decided to remain in the analysis. Meanwhile, since the USA shares many commonalities with Canada and Australia, the USA is decided to be excluded in this analysis for the sake of SME innovation policies typology analysis.

Thus, from this analysis, the ten member economies for SME innovation policies analysis are

selected, which are the Australia, Canada, China, Japan, Korea, Malaysia, Mexico, Philippines, Chinese Taipei, and Thailand.

<Table 1.2> Selection Indicators of 10 APEC Member economies

	2005 2003		2003	2003	2005	latest years	latest years
	SME Competitiveness	High-tech exports (mil.US$)	High-tech exports (% of manufactured exports)	Total expenditure on R&D (mil.US$)	Funding for technological development	GDP per capita (US $)	GDP (US bil. $)
HongKong,China	8.13	1,845.37	12.65	1,097.98	6.91	25,006.00	174.00
USA	8.10	160,211.70	30.80	284,584.30	7.71	41,815.00	12,365.90
Chinese Taipei	**7.78**			**6,996.92**	**6.99**	**14,857.00**	**335.20**
Australia	**7.44**	**2,760.31**	**13.77**		**5.77**	**33,629.00**	**692.40**
New Zealand	7.04	471.11	10.20	929.41	5.64	26,373.00	108.70
Canada	**6.56**	**23,129.04**	**14.02**	**16,704.64**	**6.94**	**33,648.00**	**1,084.10**
Chile	6.41	109.94	3.38	504.36	4.79	6,807.00	105.80
Singapore	6.34	71,420.85	58.74	1,965.60	7.90	27,180.00	116.30
Malaysia	**5.22**	**47,042.21**	**58.41**		**6.15**	**4,989.00**	**129.40**
Japan	**4.68**	**105,454.40**	**24.05**	**135,315.72**	**6.58**	**36,841.00**	**4,694.30**
Thailand	**4.66**	**18,203.16**	**30.20**	**373.61**	**4.81**	**2,736.00**	**178.10**
Philippines	**4.55**	**23,942.09**	**73.59**	**0.00**	**4.18**	**1,088.00**	**95.60**
Korea	**4.52**	**57,160.71**	**32.14**	**16,010.58**	**6.16**	**16,897.00**	**819.20**
China	**4.42**	**107,543.32**	**27.09**	**18,600.94**	**3.92**	**1,416.00**	**1,851.20**
Indonesia	3.86	4,580.33	14.46		3.25	1,237.00	280.90
Mexico	**3.78**	**28,733.68**	**21.34**	**2,542.17**	**3.15**	**6,920.00**	**734.90**
Russia	3.48	5,327.40	18.86	5,767.81	2.91	5,015.00	719.20
Peru			1.82			2,798.00	78.20
Vietnam						610.00	51.00
Brunei Darussalam						15,764.00	5.70
Papua New Guinea			39.42			585.00	3.50
Average	5.70	41120.98	26.94	35099.57	5.51	14581.48	1172.55

© IMD WORLD COMPETITIVENESS YEARBOOK

(IMD competitiveness index 2005, World Development Indicators 2005)

Chapter 2: Literature Review

2.1 SME Innovation in the Knowledge-based Economy

The term knowledge-based economy has been highlighted because the new growth is facilitated mainly by intangible knowledge assets rather than by traditional inputs of production such as physical labour and capital. The characteristics of knowledge have been keys to the new growth (Romer, 1986; Lucas, 1988; Grossman and Helpman, 1991). To paraphrase, knowledge is not exogenous but endogenous - how knowledge is combined with other inputs explains different performance in production. The externality of knowledge contributes to other firms outside original innovators, and hence this invisible non-exclusive input creates an increasing return to the economy. Inside a firm, how to incorporate external knowledge and information to generate new knowledge inside the firm attracted interests of scholars. The knowledge-based economy acts both inside and outside of the firm to generate, diffuse, and utilize the knowledge.

In the knowledge-based economy, the growth potentials are not diminishing. The western countries, which had suffered from low growth for the 1980s, were enthusiastic to exploit the externality of a knowledge asset. Surprisingly enough, the return of high economic growth in the US had coincided with the phenomenon of the revival of innovative SMEs. New start-ups in biotechnology and information technology sectors revived the old economy not only in terms of GDP growth but also in terms of quality. It is plausible to review the role of SMEs in new growth (Acs, 1996).

In 2.1.1, a learning organization is highlighted to understand the core concepts of the knowledge-based economy. The externality of knowledge will be only briefly explored in this part and it will be further examined in the section 2.2 on innovative clusters. This part mainly concerns *internal* aspects. As the firm has become the center of knowledge creation and diffusion in the innovation system, the overall literature review gives insights to examine the role of SMEs as in 2.1.2. The categorization of SMEs is essential to understand the actual contents of the SME role, and the advantage of SMEs is detailed to grasp the contrasting role of SMEs compared with large firms. The final part 2.1.3 raises the issue of specialization, which envisages the possible positive relationship between SMEs and large firms in the new economy.

2.1.1 Knowledge-based Economy

In the knowledge-based economy, the input and output of production includes not only tangible product but also intellectual properties. The value added aspect of the knowledge-based economy generated discussions on the process side of knowledge production (Acs, 2000; Loasby, 1999; Bell and Albu, 1999; Grant, 1996; Mansell and Wehn, 1998; Arora *et al.*, 2002; Gibbons et al., 1994; Nonaka and Takeuchi, 1995). Knowledge related creation, acquisition, and dissemination become central focus of the discussion.

If knowledge is not transferred easily then firms must possess organizational capability to transform information into knowledge (Fransman, 1994). If it is not knowledge that is transferred, the policy that stimulates organizational learning becomes more significant than the simple policy that encourages information flow to increase the organizational capability. Hence, the general role of firms in the knowledge production process is related to organizational learning, which has to be reviewed before we look into the SMEs role in the knowledge-based economy.

Knowledge Creation and Learning

In the knowledge-based economy, the role of firms in creation and diffusion of innovation cannot be emphasized too much. Accordingly the government policy is directed to help firms learn and collaborate with other organizations. However, the appropriate policy must respond to the learning process inside firms to assist the organizational learning effectively.

In fact, since the classic literature on organizational learning focuses on how individual learning can be transformed into organizational learning (Argyris and Schön, 1978), many literatures investigated the issue (Levitt and March, 1988; Gherardi, 1996; Dodgson, 1993; Kim, 1993). The literature on knowledge-creating firm is in line with this tradition and added the crucial perspective on how to deal with individual tacit knowledge.

Knowledge creating companies by Japanese scholars (Nonaka and Takeuchi, 1995) were applauded because their argument contains following aspects. The learning process in *knowledge creating companies* encompasses individual and organizational aspects. It also incorporates the tacit and explicit nature of learning. Finally it reveals the virtual circulation of knowledge production: transformation of information to knowledge and knowledge to information. The process of socialization, externalization, combination, and internalization

indicates tacit individual knowledge to become explicit during socialization and externalization, the combination of external knowledge (information) causes new production of knowledge and it can benefit the individual learning. This learning cycle time can be shortened in efficient organizations. It is presumed that the efficiency can be improved in innovative SMEs.

About the implication about the learning of SMEs, two aspects can be discussed. One is whether the knowledge creating cycle of socialization, externalization, combination, and internalization can be shortened in SMEs. The other is whether employees in a small firm can communicate without intermediate people. There are many academic literatures that comment on the advantage of SMEs in these aspects.

2.1.2 Role of Innovative SMEs

Advantage of SMEs

As small firms have limited human resources, an individual employee can perform two different tasks, which abolish the barrier of communication between the two tasks. However, the learning in large firms requires communication between different individuals in different functional divisions. For instance, the marketing and purchasing departments can be integrated into one department in a small firm, which reduces a burden to transform individual knowledge into organizational knowledge. Furthermore, small firms may have less inertia to overcome core rigidity (Leonard-Barton, 1992) because the large number of employees can yield inertia. Especially, the over-abundance of diverse technical solutions confounded large firms because they cannot pay attention to different solutions (Cohen and Klepper, 1992). Overall review reveals the advantage of SMEs lies in human-embedded learning cycle that promotes integration (Iansiti, 1995). Small scope technology fusion (that combines two or three technologies) and other combinative innovations can be efficiently dealt within SMEs (Hwang, 2006).

In addition, as sharing common knowledge is important in organizational learning, it is noteworthy to check SMEs in innovative clusters. Sharing common knowledge base further encourages the smooth information flow, and the virtuous loop of transformation between information and knowledge reinforces the whole knowledge network. It is frequently noted that SMEs have good external linkages (Rothwell, 1991), and entrepreneur's own personal network is sometimes effective in human-relation oriented business environment (especially in China where *quan-xi*). Learning by collaboration can also diverge into various modes as SME's external relation between public research institutes, universities, and suppliers, and customers can be different. This aspect implies that SMEs in innovative clusters may perform better, and

this will be explored in 2.2.

In sum, the learning in SMEs indicates some virtues of SMEs. The advantage of innovative SMEs can be interpreted internal and external learning. Learning that is less infected by bureaucratic inertia and overcome communication barrier because of inherent size advantage in the learning cycle. SMEs, new start-ups in particular, enter the emerging field in large numbers. The diverse positioning by many small firms (like a ranger in military) can cover diverse fields that cannot be covered by large firms with strategy to concentrate on core competence. These virtues or advantages need to be reviewed to understand the role of SMEs. These virtues are highlighted after the rise of innovative SMEs in the high-technology sector (*e.g.* semiconductor and biotechnology). The phenomenon has reversed the pessimistic view on SMEs.

In an emerging industrial sector, SMEs could catch opportunities instead of large firms. While extremely small firms may be too small to operate efficiently, large firms are also constrained by 1) diseconomies of scale caused by managerial inefficiencies (Penrose, 1959) or bureaucratic hurdles (Holmstrom, 1989; Canback, 2002), 2) difficulties in managing unfamiliar research (Burgelman and Sayles, 1986) due to inertia (Hannan and Freeman, 1989) and 3) poor communications (Canback, 2002). The weakness of large firms can be advantage of small firms. In an empirical research, U-shape curve - high innovation rate in small and large firms and poor performance of middle sized firms - suggests that emerging technological sectors are likely to be populated mainly by innovative SMEs and large corporations (Pavitt *et al.*, 1987). This implies strong activities of new technology based firms and the possible collaboration between small and large firms.

Categorization of SMEs

As the vanguard of SME renaissance is led by mainly new technology based firms, it is meaningful to clarify the category of SMEs to understand the role of SMEs deeply. Kim (2005) indicated the confusion of definition is due to the lack of recognition that all the firms that focus on innovation are not successful in innovation. In this sense, innovative SMEs are only part of innovation type (innovation focused) SMEs. In fact, he divided further innovation type SMEs into technology-based SMEs because the level of intensive focusing on own technological capability can be different. The overall summarization about Kim's categorization of innovation related SMEs is as follows: 1) innovative SMEs: the firm that actually performs innovation and produces output, 2) technology based SMEs: Innovation focused SMEs with heavy technology input, 3) new technology-based firms: new firms that are small in general and engage in emerging technology. 4) high-technology SMEs: high intensity of R&D and engaged in a

certain high-technology sector 5) mature technology based SMEs and 6) Innovation type SMEs: firm strategy depends on innovation.

In this report, the distinction between innovative SMEs and technology based SMEs is not clear enough for a practical use because it is a matter of time that technology-based SMEs is converted to innovative SMEs. Innovation type SMEs is of no interest except strategic aspect because majority of firms may respond to interview that the firm depends on innovation. For the age distinction, start-ups (or new) versus established ones can be a proper categorisation. About categorising, technology types emerging/mature and low/high technology are viable, though high-technology and new-technology coincide with each other in most cases. Therefore, in this section innovative SMEs can be divided into following categories.

<Table 2.1> Types of Innovative SMEs

Firm Type	Technology Type	
	Emerging	Mature
Start-ups	Type I (venture)	Type II (differentiated or brave entrant)
Established	Type III (revitalising, or diversifying)	Type IV (incumbent innovator)

The role of Type I firms is significant because new firm may perform well without worrying inertia under less cumulative technological regimes (Malerba and Orsenigo, 1997). Established firms with Type III are transformed into high value-added type ones after incorporating new technologies (*e.g.* Nokia). Type II firms are marketing innovators that successfully search for diverse tastes of customers.

From the previous categorization of SMEs, the role of SMEs mainly attributes to new SMEs that deal with emerging technology. As large firms mainly concerns how to improve the current products with new technology, the reckless rangers of SMEs to pick up initially small but unexpectedly growing market stimulate the knowledge-based economy.

Niche and Specialization

Although, the above paragraph emphasises the growth of SMEs in emerging sector, many SMEs survive and continue to be SMEs by specialization in niche areas. In the market research, SMEs usually occupy a market segment that is either batch production or specialized. In many cases, the value added ratio in these markets is low and large corporations do not want to enter the

market because they are in search of lucrative mass markets. In this sense, SMEs can survive only as second class. However, as Sutton (1998) elegantly presented, the fragmented market by diverse technical solutions enables SMEs to thrive high-value added markets.

Porter (1980) identifies the positioning strategy (in his term focusing) may be crucial. Positioning may apply to SMEs' strategies. SMEs not only need to focus on less congested market but also specialize and differentiate their products. The literature about resource partitioning emphasizes the importance of *niche* (Carroll and Hannan, 1995). It is argued that the market is divided into further segments where central firms occupy the major segment and smaller competitors occupy peripheral markets. The level of protection for SMEs market segments differs amongst countries, but SMEs' niche positions can be found in any country. In the mature economy, the niche is naturally protected and large firms live harmoniously with specialized SMEs. Specialization is the key strategy to keep the niche. The level and type of specialisation could affect SMEs' learning and external relationship with other firms.

2.1.3 Division of Knowledge Labor

This part insists that the role of SMEs is neither exclusive against large firms nor self-sufficient. SMEs need to prosper in symbiosis with large firms to achieve new technological innovation. This is a critical trend in the knowledge-based economy. The division of knowledge labor is the term that puzzled academics and the policy to enhance the efficient division of labor is expected.

Before the division of knowledge labor is scrutinized (Arora and Gambardella, 1994), it is noteworthy to review the division of physical labour. The division of labour in supply chain usually deals with physical production, where Japanese legacy in informal management of supply chain instead of arm-strength control of suppliers in US has been discussed in various papers (Ouchi, 1993; Dyer, 1996). The discussion about interactive learning has evolved due to the fact that a knowledge network differs from supply chain linkages (Gelsing, 1992).

The emergence of new collaborative relationship between SMEs (dedicated biotechnology firms) and large pharmaceutical corporations cast a question on the knowledge linkage. This can be similar to supply chain but also different because it is not about components and assemblies but specialized solutions and downstream developments.

The codification of tacit knowledge has frequently enabled the separation of processes, which is linked to the division of labor and the rise of innovative networks (Baldwin and Clark, 1997; Garud *et al.*, 2002; Langlois and Robertson, 1992). In such networks, small firms can play a more vigorous role (Autio, 1997). This implies that the vertical specialization is reinforced by a

modular trend in technological evolution (Ulrich, 1995). In fact, modular designs affect SMEs external linkage. The paradigm in manufacturing shifted toward modular, and the arm's length contract is growing without affecting the constructive relationship between SMEs and large firms. In both explicit knowledge production and physical component production, the modular trend is assumed to be positive to SMEs because explicit knowledge becomes a licensing entity and various components become standardized and vertically disintegrated from large assembly firms.

SME's role as component supplier to supply chain can be extended to knowledge product supplier as it happened in the pharmaceutical industry. The uncertainty and diverse solutions in drug design for a specific disease caused enormous burdens to large pharmaceutical companies in search of magic solutions. Innovative SMEs work as rangers. They are far more efficient as a set of firms not as an individual firm. High entry and exit indicate the uncertainty of searching, and many fail. However, they are not dragged into pouring non-necessary amount of R&D budget because of limited resources. Although large firms do not put all the eggs into a basket, they are likely to overspend due to available resources. In addition, a set of small firms may cover more diverse fields than a single large firm. The uncertain technical solutions might result in the constructive collaboration between SMEs and large firms.

This caused further examination into a product cycle theory (Vernon, 1966; Abernathy and Utterback, 1978): the relationship between SMEs and large firms can be constructive at the early stage but can be worse in the later stage when the product become mass-produced after dominant design appears (Laamanen and Autio, 1996; Gemser *et al.*, 1996). The truth lies in the sectoral system of innovation whether the industry evolves to mass-production of dominant designs. The pharmaceutical sector cannot have a dominant design as the *panacea* does not exist. In the sector, the constructive collaboration continues but evolves into different modes (Orsenigo *et al.*, 2001).

In sum, the positive collaboration of SMEs depends on technological conditions of industrial sectors such as how tacit knowledge can be easily transformed into explicit. Considering the learning inside SMEs and modular approach in design, the policy to encourage the decoding of implicit knowledge and circulation of information will contribute to SMEs. SME policy for innovation must be sector specific with paying much attention to the characteristics of knowledge.

2.2 Innovation Systems and Clusters

The main objective of this section is to provide the insight into SME innovation policies by exploring the implication of innovation systems and clusters for SMEs. More specifically, it is to suggest the message that the geographical dimension is critical to the SME innovation process, calling for specific and tailored local policies to improve the quality of the regional innovation systems within which SMEs innovate. In doing so, SME innovation policies should consider the way in which collective learning processes are built by implementing local assets level up programs, and encouraging programs for networking and capability development in innovative clusters.

2.2.1 Propensity of Innovative Cluster

In the classic theory of agglomeration, the main reason for the concentration of firms in a certain location is that firms tend to depend on the same skilled labor pool and scarce information (Marshall, 1890[1961]). In the Marshall's analysis of the effect of agglomeration economy, firms that clustered together could take advantage of access to specialized suppliers, skilled labor, and an environment enabling the spill-over of technological knowledge from one firm to another. Therefore, they tended to remain tied in close proximity to each other.

Hall (1985:13) pointed out that although this description was true of the traditional Victorian industrial district and is equally true of high-technology quarter like Silicon Valley, there is a fundamental difference between them. The propulsive influence of the Victorian quarter was the merchant houses associated with the fringe of the central business district, whereas the propulsive element of Silicon Valley is venture capital and the knowledge of R&D that stems from university and research institutes which may be found on a regional or even a national scale. Therefore, the new industrial district is no longer locked into the inner city, and is not located near coal, iron or port facilities. It tends to be located in favour of atmosphere of scientific advances which could result in the external economy of agglomeration[1]. In other words, innovation processes, which require an active search involving several firms, universities, research institutes to tap new sources of knowledge and technology, and apply these in products

[1] Krugman (1991) also argued that firms would be given additional benefits of agglomeration economy, when three conditions, originated from Marshall's theory, are met in a certain location: the geographical concentration of skilled labor, specialized suppliers and a common knowledge base. Once these conditions are established in a certain cluster, such an advantage would be self-reinforced through a dynamic process of increasing returns.

and production processes, have a propensity to be stimulated in the cluster (Asheim and Isaken, 2000; Breschi and Lissoni, 2001; Cooke, Heidenreich and Braczyk, 2004).

For example, Jaffe (1989) argued that there is a strong relationship between innovation performance and geography by identifying that the more universities R&D activities in a certain region resulted in the more outputs of patent. Also, the impact of geography on the innovation process could be found in patent citation in a certain region (Narin and Olivastro, 1992). Verspagen (1992) identified that more than half of literature cited in patent applied by Philip electronic company is cited from the literature published by research institutes located in the same region. It shows that innovation process has propensity to concentrate geographically.

In addition, as innovative clusters such as Silicon Valley and Route 128 in the United State, Oxford and Cambridge in the UK, Lombardy in North Italy, *etc.* have been emerged as the engine of national economic growth in the last two decades, the emphasis is on the way in which clusters of firms in common industries benefit from geographic co-location, enabling companies to achieve a higher level of competitiveness than they would otherwise if located outside of the cluster (Saxenian, 1994; Porter, 1998 2000).

Here the issue on the development of *policies to provide innovative milieu for SMEs* in a cluster could be emerged as one of the main cluster research themes, because of the increasing presence and importance of SMEs to economic activities in certain industries. As considerable literature has identified the critical role of SMEs for knowledge production in a certain region (Asheim, Isaksen, Nauwelaers and Tödtling *et al.,* 2003; Burgel, Fier, Licht and Murray, 2003; Audretsch and Feldman, 1996a, b), the research has been intensified. The reason for this is that knowledge flows generated by *learning by doing* and other economic agents such as other firms and new employees are influenced by *knowledge infrastructure* comprised of formal and tacit knowledge embedded in institutions and individuals located within a region (Black, 2004). Therefore, the understanding of the relationships between geographical proximity or co-location and the innovation process of SMEs is required in order to effectively formulate such policies.

2.2.2 SMEs and Innovation Process in Clusters

There have been a number of discussions on the role of SMEs in innovation systems. More specifically, despite the fact that SMEs account for a small fraction of total business R&D, growing evidence continues to demonstrate that SMEs can substantially contribute to the innovation system by introducing new products and adapting existing products to the needs of customers and overall economic growth since the 1970s (Audretsch, 2005; Smallbone, North

and Vickers, 2003; OECD 2000b; Acs and Audretsch, 1990; Pavitt *et al.*, 1987). This is in part due to SMEs' access to knowledge generated by sources outside the firm, such as universities and large, established firms (Black, 2004:4).

In relation to the contribution of SMEs to innovation, there has been much debate in the literature about the relative contribution of firms with different sizes to innovation. One argument has been placed in the superior contribution of large firms to innovation. A number of empirical studies relating R&D to firm size show that large firms undertake considerably more R&D (Craggs and Jones, 1998; Tether *et al*., 1997). Evidence from second Community Innovation Survey implemented by Craggs and Jones(1998) shows that across all sectors larger firms made much more innovations in terms of introducing technologically new or improved products or process. In particular, the gap is wider in the case of novel or radical innovations. For example, novel innovations generated by larger firms were three times more than by SMEs (Craggs and Jones, 1998).

The other has been placed in the superior role of SMEs for innovation. According to the analysis of Pavitt *et al*. (1987), SMEs are more likely to introduce new innovations than larger enterprises because they have less commitment to existing practices and products than larger firms[2]. Since large firms typically innovate incrementally within existing technological trajectories, innovative SMEs can be important in developing radical or new innovation through their contribution to maintaining technology diversity (Smallbone, North and Vickers, 2003). Also, Audretsch(2005) argued that the innovation rate generated by SMEs was much higher, accounting for about 1.5 times of a large firm innovation rate, although large firms in manufacturing involved more innovative activities in the absolute number of innovation[3].

What is more important beyond this debate is that the relative advantages as innovators of

[2] Scherer(1989) has represented the advantages of SMEs for innovation, compared to large-sized firms in the three perspectives. "One important strength is that they are less bureaucratic than more highly structured organization. Second, and something that is often overlooked, may be advances in technology accumulation on a myriad of detailed inventions involving individual components, materials, and fabric techniques. The sales possibilities for making such narrow, detailed advances are often too modest to interest giant corporations. An individual entrepreneur's juices will flow over a new product or process with sales prospects in the millions of dollars per year, whereas few large corporations can work up much excitement over such fish, nor can they accommodates small ventures easily into their organizational structures. Third, it is easier to sustain a fever pitch of excitement in small organization, where the links between challenges, staff, and potential rewards are tight. 'All-nighters' through which tough technical problems are solved expeditiously are common."

[3] Audretsch (2005) suggested the innovation rates, or the number of innovations per thousand employees in making comparison between SME and large enterprise innovative activities, because the absolute number of innovation contributed by SMEs and large firms is somewhat misleading.

SMEs *versus* large enterprises vary systematically across the manufacturing sectors. In other words, there is no optimal firm size for innovation activity, because the degree of the contribution of firms to innovation rates could be differentiated in accordance with (1) the degree of capital intensity; (2) the technology capability of firms; and (3) the characteristics of industries. For example, as demonstrated by Audretsch (1995), the contribution of SMEs to innovative activity is higher in electronic computing equipment and process control instrument, but the contribution of large firms is higher in pharmaceuticals and aircraft.

In addition, it is critical to understand the heterogeneity that exists within the SME sectors. SMEs include everything from labor intensive to high technology firms, and thus the contribution of different types of SME with respect to innovation could be conditional upon this heterogeneity and cannot be uniformly characterized. The type of SMEs has been classified by a number of researchers in relation to innovative activities. For example, as shown in a typology developed by Hassink (1996), the type is distinguished into three groups; (1) technology-driven SMEs which need to keep abreast of leading technologies, (2) technology-following SMEs where technology does not have to be advanced, and (3) technology-indifferent SMEs, which are essentially craft firms and which rarely invest in new technological equipment. Similarly, Rizzsoni (1991) classified SMEs into three groups; (1) static SMEs largely uninvolved in innovation, (2) traditional SMEs which play a more active role in the diffusion of innovation, and (3) new technology based SMEs where they play an important role in the introduction of significant new technologies. The point to stress here is, therefore, that any discussion on the way of increase in the innovative capability of SMEs starts from the understanding that technology policies for SMEs must be targeted to different user groups, have different objectives, and use several approaches and tools (OECD, 2000b).

What is more, the geographical dimension involved in SME innovation activities is different because all SMEs could not always be embedded in local innovative milieu characterized by close interaction between local players, a high level of collective knowledge, *etc.* Some SMEs may be integrated into higher geographical levels or both international and local levels according to the different types of SMEs. These differentiated spatial dimensions for SME innovative activities could be determined by three types of SMEs categorized by Hassink (1996) (see Table 2.2). Type 1, technology-indifferent SMEs, has very little technical competence, produces components only to order, is subject to strong pressure on pricing and is of an inconstant danger of being rejected in favor of other subcontractors. Also, it lacks even the information of technology development appeared elsewhere. This kind of subcontractors competes through lowering prices and exploiting numerical flexible working arrangements such as short-term contracts, overtime, putting-out and subcontracting to other lower-tier firms. Thus,

this type of SMEs is often non-innovative SME, and the geographical scope of them is not implicated in the local production system.

Type 2, technology-following SMEs, often lacks necessary competence to cooperate directly with R&D organizations and R&D-intensive firms. Also, SMEs in this type may lack both the competence and capital necessary to carry out R&D projects on their own. However, one of the main sources for the innovation process could be R&D knowledge drawn from national and international suppliers of equipment and their related consulting activities including installation, test running, service and maintenance, training and skill development. That is, contact and cooperation with suppliers and traders of production equipment and inputs could be an important source for innovation support in these firms. Their innovation activities are not always involved in the regional-specific knowledge, but often in the firm-specific knowledge built up within firms. Therefore, this type of SMEs is less resource-rich SMEs and the geographical dimension is national and regional levels rather than a local level.

Type 3, technology-driven SME, may be integrated into the innovation system at extensive geographical levels. This type of SMEs often enters into strategic alliance with advance firms outside their home region to promote economic growth. However, technology-driven SMEs are embedded deeply in the innovative cluster, when they are located in a regional innovative milieu (Asheim and Isaksen 2003). The entrepreneurs, firm managers and/or engineers may be members of a community via education and job experience, which stimulate inter-personal relationship and the interchange of information and knowledge between persons independent of locations. As a number of technology-driven SMEs are spun off from universities, R&D institutes or other high-tech firms, they also tend to have dense interactions with neighboring knowledge organizations and firms by locating themselves near their mother organization. Based on close networks among local players and strategic management, the Type 3 SMEs may lead themselves to stimulate R&D activities and to produce knowledge more effectively, which is not easily transferred and un-traded.

<Table 2.2> Characteristics of Innovative Activity for Different Types of SMEs

	Type 1	Type 2	Type 3
Technology level	Technology-indifferent	Technology-following	Technology-driven
Innovation source	- Customers - Local competence and actors	Suppliers of machinery and equipment for less technologically advanced SMEs	R&D sectors for research-intensive SMEs
Characteristics	Dependent subcontracting	Catch-up	R&D-intensive
Geographical dimension	Geography-indifferent	National / regional	International/ national/ regional

Considering the relationships between the heterogeneity of SMEs and the geographical dimensions of innovation systems, it is likely to be very important to link type 2 and type 3 into the local production system in order to upgrade the one to technology-driven SMEs and to sustain and stimulate the other more effectively. In general, SMEs within local production systems could take strong advantages in creating unique and sticky knowledge originated in learning from interactive relationships among local firms, institutions and non-local actors (Asheim and Isaksen, 2003). Parts of this knowledge belong not to any particular firm but to the local production system as a whole as one of its intangible resources. Thus, innovations in local production systems are often led by firm-specific and regional-specific knowledge. In other words, the innovation process of SMEs lies behind the greater emphasis on the regional level, because it is stimulated by cooperation between local economic players and by regional-specific resource which can be found in certain places and which cannot be rapidly and easily traded and imitated elsewhere (Storper, 1997). Therefore, there is a need to establish SMEs innovation policies that enable different types of SMEs resulted from heterogeneity that exist within the SME sectors to be embedded properly in a cluster.

2.2.3 Cluster as a Key Driver of SME Innovation

As reviewed in the previous sections, one of the most important implications of the cluster for SME innovation is likely to be the innovative milieu provided by a way which links SMEs into knowledge production networks with superior innovative performance by clustering economic activities in the regional level. In other words, SMEs take advantage of linkages with other enterprises afforded by the geographical proximity in order to access new ideas and knowledge. As indicated by Feldman and Audretsch (1999), a region characterized by a diversity of firms engaged in complementary economic activities but who shared a common science base, is more conductive to innovation than a more specialized region. Therefore, the competitiveness of SMEs is established through collective and tacit features which cannot be transmitted and imitated simply (Lawson and Lorenz, 1999).

They argue, for example, that the competitive advantages in Silicon Valley and Cambridge Science Park resulted from the establishment of collective and tacit competitive advantages based on the characteristics of the learning region, rather than competitive advantages of production function and technology related to specific products. This competitiveness could be established by knowledge creation through the dynamic interactions among individuals and/or between individual and their environments, rather than an individual who operates alone in a vacuum (Nonaka, Toyama and Nagata, 2000; Nonaka and Takeuchi, 1995; Nonaka 1994; Kogut and Zander, 1996). Therefore, the policy for the cluster as a key driver of SME innovation

should focus on the networks, which enable SMEs to be embedded in a local innovative milieu and to learn in the localized process.

Traditionally, policies for upgrading the innovation capability of SMEs have been based on introducing formal R&D-based product and process innovation, which is a linear innovation model (see Table 2.3). However, this strategy had gone through some limits to upgrading their innovation capability because SMEs have a more limited resource base (particularly finance and management) compared to large firms. It has resulted in another view of innovation as a process of interactive learning between firms and their environment (Lundvall, 1992). This alternative model could be referred to as a bottom-up interactive innovation model, much more adapted to traditional SMEs and the learning economy, where knowledge is the most fundamental resource and learning is the most important process (Asheim and Isaksen, 2003: 28).

Interactive learning as a fundamental aspect of the innovation process takes place (a) between different steps of the innovation process involving the mobilization of different forms of knowledge and information; (b) with different firms and organizations involving inter-firm collaborations between suppliers and subcontractors as well as with customers; (c) with different knowledge production centers and organizations, representing a wide variety from R&D institutions via other parts of the knowledge infrastructure broadly defined to other firms or departments within a corporation; and (d) interaction between different departments of the same enterprises involving the corporation between different groups of employees with different form of knowledge (Asheim and Isaksen, 2003: 29-30). In particular, innovation activities in the interactive model occur more at the level of regional clusters. Therefore, networks based on interactive innovation model are likely to foster the innovation activities of SMEs in a cluster by producing regional-specific knowledge and an innovative milieu.

In addition to this, there is a need to consider a regional central network agent, which is designing an organic operating system for the effective management from R&D to commercialization, to sustain and develop an innovative cluster. Attempting to promote innovation networks between industries, universities and administrative bodies, the central network agent has become critical in both governing regional innovation systems and enhancing regional innovation capabilities by providing varieties of real services for SMEs. While the characteristics and functions of the central network agent should be differentiated with respect to political, social and economic conditions, its common aim is to develop the regional endogenous capabilities by facilitating innovation networks between industries, universities and administrative bodies.

<Table 2.3> Characteristics of Two Innovation Models

	Linear innovation model	Interactive innovation model
Important players	Large firms and the R&D sector	Both small and large firms, the R&D sector, clients, suppliers, technical colleges, public authorities
Important inputs in the innovation process	R&D	R&D, market information, technical competence, informal practical knowledge
Geographical consequences	Most innovative activity (R&D) in central areas	Innovation activity more geographically widespread, but especially occurring in (different types of) regional clusters
Typical industrial sectors	Fordist manufacturing sector	Flexible industrial sectors
Implication for regional policy	Promote R&D in less central areas Promotion of technological diffusion	Develop regional innovation systems, and link firms to wider innovation systems

Source: Asheim and Isaksen, 2003, p.30

2.3 International Organizations' Initiatives for SME Innovation

2.3.1 OECD Bologna Charter on SME Policies 2000

OECD has initiated the first international policy cooperation and research in the area of SME innovation. Recognizing the importance and the crucial roles of SMEs in the knowledge-based economy, OECD held the first OECD Ministerial conference on SMEs in Bologna, Italy in 2000. Through this meeting, the "Bologna Charter on SME Policies," was adopted by almost fifty OECD member and non-member economies[4], stressing for the international policy cooperation on the area of SME innovation and the needs for the OECD's joint efforts to research and exchanges of best practices among OECD and non-OECD countries. The charter assigned OECD the roles of conducting analytical studies and projects, the roles of supporting governments in SME innovation policies initiatives implementation, and the roles of nourishing international policy dialogue.

The Bologna Charter on SME Policies 2000 recognized 1) the importance of SMEs' roles in economic growth, job creation, regional and local development, 2) the importance of

[4] OECD, 2005, "OECD SME and Entrepreneurship Outlook, 2005"

entrepreneurship and a dynamic SME sector in restructuring economies, 3) that globalization and the acceleration of technological change create new opportunities for SMEs, and 4) that SME policies should be tailor-made and customized to the circumstances and priorities of individual countries and sectors.

Based on this recognition, OECD acknowledged the benefits of SMEs' business environment such as 1) regulatory environment conducive to entrepreneurship and innovation (*e.g.* a fair and transparent competition policy, effective anti-corruption measures, stable and non-discriminatory tax regimes), 2) education and human resource management policies, 3) effective access to private financial market services, 4) environment that supports technology innovation and diffusion, 5) public-private partnerships and 6) the efficiency of SME policies and the consistency with other national and international programs.

Concerning the specific policy areas that OECD recommended to OECD and non-OECD economies, there exist four areas of policy concerns: 1) enhancing SME innovation competitiveness, 2) clusters and networks, 3) e-commerce,, and 4)enhancing the competitiveness of SMEs in transition economies and developing economies.

In order to enhance SMEs' innovation abilities, OECD emphasizes 1) facilitating the hiring and training of qualified personnel and disseminating technological and market information; 2) reducing financial barriers by developing equity financial market, by promoting risk-sharing program(*e.g.* financial support and tax incentive to R&D), and by promoting partnerships between entrepreneurs, public agencies and financiers; and 3) facilitating SME access to national and global innovation networks through participation in public R&D programs and procurement contracts.

In order to promote clusters and networks, OECD recommended the policies, 1) partnerships involving private actors, NGOs and various levels of local and central public administrations; 2) the leading role of private sectors in initiating clusters and the market-facilitating roles of government (*e.g.* facilitating private investment and seed funding); and 3) improving efficient communication and transportation infrastructure, local linkages among university and industry, disseminating information, and promoting suppliers' networks and other collaborative undertakings.

In order to promote electronic commerce which creates new opportunities and challenges for SMEs, OECD recommended 1) when drafting guidelines and regulations concerning information and communication technologies (ICT) and e-commerce, SMEs should be fully

accounted; 2) the dissemination of information on opportunities and obstacles concerning e-commerce to SMEs, and the removing legal barriers to commercial electronic transactions, fostering high-quality network infrastructure, and promoting electronic public procurement initiatives; and 3) enhancing the SMEs' electronic commerce participation through promoting the use of ICT, providing user-friendly regulatory framework of e-commerce and establishing a clear legal environment for e-commerce.

In order to enhance the competitiveness of SMEs in transition economies and developing economies, OECD recommended 1) improving the coordination between governments and regional and international organizations for development of SMEs in transition economies and developing economies; 2) fostering the international cooperation and partnerships among SMEs through public support, financial services and intermediaries; and 3) promoting the long-term development of the sector and networking.

After implementing the Bologna Charter on SME Policies 2000, OECD published biannual documents that provide the overview of the trends in SME performance and policies in OECD member economies, which are "OECD Small and Medium Enterprise Outlook 2000, 2002, 2005." These biannual reports provide the synthetic overview of latest changes of SME innovation policies among OECD economies and the critical reviews on various SME innovation policies altogether with each member economy's profile on SME innovation policies. Thus these are the first and most comprehensive works on the international comparisons of SME innovation policies.

The specific policy areas of international comparisons and member economy's profiles include 1) easing regulatory and administrative burdens, 2) fostering an entrepreneurial culture and firm creation (mostly education and training), 3) promoting access to financing, 4) policies for innovation and technology, which are R&D expenditures, innovation networks and research partnerships, IPR system, 5) facilitating SME access to international markets, 6) promoting e-business adoption by SMEs, 7) promotion of skills development and management training, 8) evaluation of SME policies and programs, and 9) more systematic statistical measurement of SME behavior.

These policy areas can be seen as a comprehensive list of SME innovation policies, which includes 1) business environmental policies for SME (*e.g.* regulatory environment, financial market environment, education system, IPR system), 2) networking policies (*e.g.* innovation network and research partnerships), 3) government's direct supports for SME management functions (*e.g.* skills development and management training, access to international markets, e-

business adoption, and R&D expenditure), and 4) administrative policy management improvement (*e.g.* evaluation of SME policies and systematic statistical measurement of SME behavior).

The economies that are covered by the OECD SME Outlook economy's profiles include 30: Australia, Austria, Belgium, Canada, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Japan, Korea, Mexico, Netherlands, New Zealand, Norway, Poland, Portugal, Slovak Republic, Spain, Sweden, Switzerland, Turkey, the United Kingdom, the United States, European Commission, Israel. Among these, Australia, Canada, Japan, Korea, Mexico, New Zealand, and the United States (7 member economies) belong to APEC.

Each economy's profile includes 1) the economic roles and recent trends of SMEs in the member economy, 2) reviews of framework policies, and 3) each economy's SME policies within the broad boundaries of policy areas specified above, which are regulatory reform, entrepreneurship promotion, financing(taxation, attracting investment, venture capital), technology and innovation promotion, management, export promotion, public and private partnerships.

Besides biannual publications of OECD SME outlook, OECD held the second conference of OECD SME Ministerial Conference in Istanbul Turkey in 2004 with the theme of "Promoting Innovative SMEs in a Global Economy," which ended up with the Istanbul Ministerial Declaration on Fostering the Growth of Innovative and Internationally Competitive SMEs. The conference focused on the importance of entrepreneurship and SME innovation in a globalized and knowledge-based economy.

The second Ministerial conference required the analytical studies of OECD to be advanced in the five areas: 1) improving SME access to financing, for the topic of which OECD held an international conference with the host of Brazil in 2006, 2) identifying ways to remove barriers to SME access to global markets, for this topic of which OECD will undertake a joint study with APEC and present the results in an international conference with the host of Greece in 2006, 3) promoting SMEs' participation in global value chains, for this topic of which OECD is undertaking a joint study with UNCTAD, 4) disseminating studies on best practices for evaluation of SME policies, for the end of which OECD will prepare a handbook of best practices for the evaluation of SME policies and programs, and 5) disseminating studies on best practices concerning the development of Women's Entrepreneurship.

2.3.2 European Charter for Small Enterprises 2000

Recognizing the central role of small business in the European economy's dynamism and innovation, European member governments in EU endorsed the European Charter for Small Enterprises in 2000, which in essence incorporates the principal of "think small first" in policy areas. The charter was based on the general acceptance that small business should play the key role in meeting the Lisbon objective of making competitive Europe initiated at European Council of March 2000.[5] Small enterprises are considered as "a main driver for innovation, employment as well as social and local integration in Europe."[6] The European Charter for Small Enterprises is the key instrument to implement multi-year programs for promoting SMEs and entrepreneurship in EU.

The charter set the several policy targets, which are 1) strengthening the spirit of innovation and entrepreneurship, 2) achieving a regulatory, fiscal and administrative framework conducive to entrepreneurship, 3)ensuring market-oriented policies with least burdensome regulatory requirements, 4) facilitating access to research and technology, 5) improving financial access, 6) providing best environment for small business, 7) listening to the voice of small business, and 8) promoting top-class business support.

These policy targets can be implemented by 10 areas of policy actions: 1) educations and training for entrepreneurship from the early years of schooling to specific business-related modules, 2) cheaper and faster start-up registration procedures, 3) better legislation and regulation (national bankruptcy laws, screening of new regulation based on the assessment of impact on SMEs, and exemptions of certain regulatory obligations), 4) availability of skills (delivering adequate supply of skills with training institutions, in-house training schemes and lifetime training), 5) improving online access (increasing online communication between public authorities and small business sector), 6) benefiting more out of the Single Market (developing electronic commerce, telecommunications, utilities, public procurement and cross-border payment systems for better access of SMEs to the Single Market), 7) taxation and financial supports (applying best practices to taxation schemes, creating a pan-European capital market, improving the relationship between the banking system and small enterprises, promoting funds for start-ups and high technology enterprises), 8) Strengthening the technological capacity of small enterprises (technology dissemination, technology cooperation, effective research

[5] European Commission, Enterprise and Industry Directorate-General COM(2005) 30, "Report on the Implementation of the European Charter for Small Enterprises"

[6] European Charter for Small Enterprises, 2000

programs, developing certification systems to small enterprises, inter-firm cooperation at local, national and international level, developing clusters), 9) successful e-business models and top-class small business support, and 10) effectively representing small enterprises' interests at European Union and national policy implementations.

Since the areas of SMEs innovation policies are diverse and related to the other EU's competitiveness implementation plans, the SME Envoy was appointed within the Directorate-General for Enterprises and Industry in December 2001 with the objective of setting up proper communication channels to SMEs and their representative associations, with the objective of better coordination of SMEs policies, and with the objective of ensuring the representations of SMEs interests to European Union's policies and each member states' national policies.[7] These activities are considered as contributing better coordination of policies and better representation of SME-friendly policies.

Moreover, in order to complement the roles of the Charter, the Entrepreneurship Action Plan was implemented in February 2004 to address more broad arenas of SMEs innovation policies. Bilateral meetings with the member states are provided to regularly review the Charter implementation progress, during which national business organizations actively participate in the review process. Annually the European Charter Conference is held to disseminate best practices and learning about SMEs innovation policies with interactive exchanges of experiences.

Following the implementation of the Charter, the Charter Implementation Reports were annually published since 2001. These are the synthesis report for ten areas of policy actions that are specified in the Charter 2000. Every year, three areas of policy actions are selected for special attention and in-depth policy reviews. The contents of every area are composed of 1) indicators and targets, 2) recent developments of policies, and 3) conclusions and recommendations. The other seven areas of policy actions are only provided critical summary of national reports. Every area of policy actions are narrowed down with more specified focused policy areas. For instance, education and training for entrepreneurship can be narrowed down: entrepreneurship in primary education, global strategies for entrepreneurship education, entrepreneurship as part of the national curriculum, training of teachers, entrepreneurship in vocational secondary education, incentives and support to schools, cooperation between schools and the world of business, programs based on students running a mini-company, dissemination

[7] European Union, Commission of the European Communities, COM(2005) 30, "The activities of the European Union for small and medium-sized enterprises: SME Envoy Report"

of good practice, entrepreneurship in higher education and training for entrepreneurs and managers.

The reports focus on identifying strengths and weaknesses of each member economies' SME policies on producing best practices and on recommendations for policy actions. In the EU report, "best practices" means the "initiatives which seem to have been particularly beneficial in a national context and which could be of interest to other countries."[8] The reports do not intend to include all the existing measures to be reviewed but mainly covers the new measures that were implemented during the previous year. However, the reports do accompany each member states' annual reports concerning recent developments of the ten charter areas of policies, which include specific policy measures and trends even with correspondents e-mail address for each policy measure.

2.3.3 APEC SMEMM 2001 and the Daegu Initiative 2005

APEC (Asia-Pacific Economic Cooperation http://www.apecsec.org.sg) has been striving to achieve the Borgor goals since its inception in 1989. The Bogor goals are "free and open trade and investment in the Asia-Pacific by 2010 for developed economies and 2020 for developing economies." APEC Ministers recognized that innovation is the driving force of economic growth to meet the goals, and urged continuous cooperation in promoting innovation.

In the 2001 APEC SMEMM held in Shanghai, Ministers agreed upon that economic globalization was in the marketplace, technological innovation was a driving force behind economic development and knowledge was recognized as a core competence. This in turn relies more and more upon new technologies and new industries, as well as increasing linkages among industries, universities and research institutes. This is the new context and economic environment for SMEs.

Since then, APEC member economies discussed the innovation related issues in the SME Working Group and Ministerial Meetings every year. In the 2002 APEC SMEMM, Ministers recommended the consideration of innovation policies that provide channels for start-ups to access a variety of financing resources, research and development, commercialization, and marketing tools. In the 2003 APEC SMEMM, Ministers stressed, "Innovation plays a key role in facilitating the creation of high-growth firms and is directly associated with the levels of

[8] European Union, Commission of the European Communities, COM(2005) 30, "Report on the implementation of the European Charter for Small Enterprises in the Member States of the European Union."

competitiveness of SMEs and micro-enterprises." In the 2004 APEC SMEMM, Ministers reached a common understanding that the promotion of entrepreneurship was the most important factor in carrying out innovation and agreed that innovation was essential for the growth of SMEs in the 21st century.

In the 2005 APEC SMEMM, Ministers recognized that innovation was the main driving force that created dynamic SMEs and sustained growth in the current globalized marketplace. Further, Ministers recognized that SMEs in developing as well as developed economies had the potential to play a vital role in advancing innovation given their flexibility and ability to respond more quickly to current conditions. Ministers emphasized the importance of APEC cooperation in developing appropriate economic and policy environments for the APEC SMEs to reach their full innovative potential.

The "Daegu Initiative on SME Innovation Action Plan" adopted in the 2005 APEC SMEMM provides a framework, including Innovation Action Plans for member economies to review and improve their economic and policy environments for SME innovation, both individually and collectively. In 2005 APEC SMEMM, Ministers welcomed the Korea's proposal for the APEC SME Innovation Center that would link SMEs with supporting organizations of member economies. The APEC SME Innovation Center will also serve as the foundation for sharing policy experiences to effectively enhance the innovation capacity of APEC SMEs.

Recognizing the pivotal roles of SMEs in innovation and economic development based on flexibility and responsiveness, the Daegue Initiative has a clear objective to help each APEC member economy improve the economic and policy environments conducive to SME innovation. Through the Daegue initiative, each member economy's Innovation Action Plan for SME innovation policies are currently solicited for submission based on the common template. The Innovation Action Plan will then be aggregated to produce a synthetic report which lists how the member economies will improve their economic and regulatory environments conducive for SME innovation by 2020. The Action Plan has five year cycles. In 2010, the member economies will perform self-evaluation of their own progress on SME innovation policies. In 2010 the member economies may decide whether to proceed the second five-year cycle and again in 2015 for the third five-year cycle. The final self assessments on SME innovation policy progress will be held in 2020.

In the first cycle of the Daegue Initiative, seven areas of SME innovation policies, which being considered as important for SME innovation, were identified for the international comparisons and best practices studies: 1) developing human resources and technology through linkage

between industry and educational and research institutions, 2) accessing to specialist assistance and advice, 3) enhancing availability of capital to innovative SMEs, 4) networking and clustering for innovative SMEs, 5) establishing appropriate legal and regulatory structures, 6) establishing a market consistent economic environment and 7) developing methodologies for effectively measuring progress in the implementation of innovation programs for SMEs.

Chapter 3: Formulation of SME Innovation Policy Framework

3.1 Formulation of Matrix Framework

3.1.1 SME Innovation Policy: Definitions and Government Intervention Rationales

Definitions

A SME innovation policy is not clearly defined in the literature of SME policy. Since SME innovation policies can be differentiated from general innovation policies and also from traditional SME policies, it is better to start with the definitions of innovation policies and traditional SME policies.

In the traditions of Innovation System (IS) literature, innovation policies originate from science and technology policies, which are defined by frequently-cited Stoneman(1987) as "policies involving government intervention in the economy with the intent of affecting the process of technological innovation" and also by Mowery(1992) as "the policies that are intended to influence the decisions of firms to develop, commercialize, or adopt new technologies." While these two definitions of technology policies identify the policy intention to influence the process of technological innovation from the perspective of IS literature, the institutions and regulatory framework policies which clearly influence the process of technological innovation are not properly addressed. Thus, recognizing this deficiency in the definition of technology policy, Haukness(1999) defined the technology policies as 'explicit innovation policies,' while rather indirect institutional framework policies are defined as 'implicit innovation policies. Moreover, based on the IS framework, Lee, W.(2005) defined innovation policies as "the policies that promote innovative activities, performance and economic growth through enhancing the capabilities of innovative actors, facilitating the networks of innovative actors and establishing innovation-conducive institutional environments." Innovation policies consider the innovation process as a systematic one with complex interaction among innovative actors and various institutions and thus do not simply focus on any individual firms or innovative actors but rather intervene in the innovation process from the systematic perspective.

The traditional SME policies can also be differentiated from SME innovation policies. The traditional SME policies are mostly oriented towards sustaining rather inefficient SMEs with public support. US Small Business Administration was created with the explicit intention of "aid, counsel, assist and protect… the interests of small business concerns(Small Business Act

of 1953, Audretsch, 2004).” The traditional SME policies also focus on the gaps between large firms and SMEs in productivity, wages, human resources, managerial resources and *etc.*

SME innovation policies can be differentiated with innovation policies and also with traditional SME policies. While SME innovation policies can be parts of overall innovation policies, SME innovation policies include traditional SME policies with subtle different focus.

Since SME innovation policies are incorporated within overall innovation policies, SME innovation policies should take the point of view of IS literature to see SME innovation process within innovation system and institutions. Thus, SME innovation policies should intervene in the area of SME innovative capability building, network facilitation and innovation-conducing institutional framework (which are mostly cluster and incubating facilities in the case of SMEs). SME innovation policies should have clear innovation system perspective while innovation is not confined to technological innovation but extended to process, organizational, managerial innovations.

SME innovation policies should also be distinguished from traditional SME policies, which lift up SMEs focusing on the gaps between SMEs and large firms (Motohashi 2001). SME innovation policies focus on the wide-range innovation activities of SMEs rather than overall support for the sustainability and gap-reducing activities of SMEs. This change of focus in SME policies can be attributed to the fact that SMEs have become the sources of technological, industrial and economic dynamism through new business openings, technological spin-offs and active product/process innovation in high-tech emerging industries. Moreover, SME innovation policies take the perspective of innovation systems while traditional SME policies mostly concerns one unit of organization separately from whole innovation systems.

SME innovation policies include entrepreneurship policies, which are defined as “those intended to directly influence the level of entrepreneurial vitality in a country or a region” by Lundsome and Stevenson(2001). Entrepreneurship policies focus on the potential entrepreneurs or early start-ups SMEs, while SME innovation policies cover all the stocks of SMEs including potential entrepreneurs. However, entrepreneurship policies share the commonality with SME innovation policies that these policies encompass broad context of innovation process system, i.e. various levels of firms, clusters, networks, interactions, linkages and institutional environments altogether beyond the SMEs themselves.

Rationales for Government Intervention

1) Market Failure Approach

In economics there were traditionally wide recognitions of market failures with regards to innovation. Market failure means "the inability of a system of private markets to provide certain goods, either at all or at the most desirable or 'optimal' levels (Pearce, 1986)." In this line of researches, innovation-related market failure has been mostly related with technology policy, which has focused on new and pursued technology.

Because of the violation of the divisibility, one of the basic assumptions of perfectly competitive market, the benefits of technology development is non-excludable and diffused to free-riders in markets. In this situation, firms have little or weak incentives to spend R&D expenditure since the return from R&D investment is limited and simply imitating new inventions results in reaping the external benefits of other's inventions(Cohen, 2001).

New technology and new engines of national economic growths have also the characteristics of uncertainty, externalities, collectiveness, which are all related with the four basic assumptions of Arrow's perfectly competitive markets. New technology in the future and its success certainly possess the uncertainty and the lack of information. Because of non-excludability, findings of new technology in most case bring forth positive externality to broad economic growth through the diffusion of the technology. Because of non-rivalry, new technology findings can benefit the members of the whole society. Because of the violations of these basic assumptions, rationales for the government intervention in innovations can be further provided.

With regard to indivisibility, competition policy is another important area to promote innovation in market. With regard to uncertainty, there are problems of incomplete information and asymmetric information. In order to solve incomplete information problems government can intervene in providing information, using economy of scale for information production, and can intervene in centralizing information as public goods and in prohibiting deceptive information. In order to solve asymmetric information problem and agency-principal problem, government can intervene in commodity market, capital market and corporate governance to facilitate information flows through rules and regulations. With regard to externality industrial policy and environmental policy can be implemented. Industrial policies include technology investment, commercialization of new technology, various infrastructure and institutions which promote innovation in firms. With regard to collectivities, government should provide public goods such as education (Cohen 2001).

Thus, from the every aspect of market failures, the rationales for innovation-related policies can be found. And traditionally innovation-related policies or S&T policies are all based on these market failure analyses.

<Table 3.1> Market Failure Approach and Government Intervention Rationales

Violated technical and behavioral assumptions	Resulting problems	Public policy
Indivisibilities	Natural monopoly - restricted output and higher price, or - monopoly making, loss and closing down	*Competition policy* in reaction to monopoly: nationalization, privatization, regulation and deregulation
Perfect competitive behavior in dynamics	Retarded growth	*Technology policy* with focus on innovating firm. Technology policy with focus on perspective technology
Uncertainties Perfect informational behavior	- deadweight loss - adverse selection - moral hazard - obstruction of market formation	*Governance policy*: Information provision. Governance policy: Transaction restructuring
Externalities Independence of utilities of individuals	Underinvestment below optimal level	Positive externality: *industrial policy* Negative externality: *environmental policy*
Collectivities Genuinely revealed preferences	- Unattended public goods and merit goods - Collective provision not optimal	Public goods and merit goods: - *social provisions* - *insurance schemes*

Source: Lee, Y., *et al.*, 2005

Specifically concerning SME innovation policies, market failure approaches provide the same basic rationales with general innovation policies, i.e. indivisibilities, uncertainties and externalities, but with rather different perspectives. Since the process of innovation activities are more and more closely interwoven with various interactive innovation actors, networks and even in regional clusters, the indivisibilities of innovation benefits are more common in recent technological innovations. Perspective technology approach emphasizes the importance of interfirm relations, network policies, new technologies and knowledge diffusion policies and innovation policy coordination in promoting innovation activities. The uncertainty of future technology development increases rapidly as with the revolutionizing new emerging high technology. Positive externality exists among clusters and networks of innovation activities. The government needs to intervene in the formation of innovative clusters because of the existence of positive externalities in cluster formation. Even though the networks and cooperation among innovative actors produce positive externalities to all the participants, the benefits of innovation cannot be divisible. Thus, underinvestment in private sectors can be solved by public intervention in the formation of innovative clusters (Cohen, 2002).

SME innovation policies should be confined to the purpose of enhancing overall cluster innovative capability. If SME innovative capabilities are weak and hampering to cluster innovation activities because of the interdependence and networks among innovative actors in cluster, SME innovation capabilities should be promoted by SME innovation policies, but in order to produce positive externalities and ultimately to enhance overall innovation capabilities of cluster, not to sustain near-extinct SMEs. Thus, SME innovation policies should focus on SMEs, which have high interdependency and networks with innovative clusters and other innovative actors, but show rather weak innovative capabilities (Cohen, 2002).

2) System Failure Approach

Smith(1996) identified four areas of innovation system failures, which are 1) failures in infrastructural provision and investment, 2) transition failures, 3) lock-in failures, and 4) institutional failure.

Failures in infrastructures focused firstly on the physical infrastructures related to energy and communications, and secondly on the science-technology infrastructures such as universities, public-funded technical institutes, libraries and databanks. Transition failure means the inability of firms or innovation system to adapt to shifts in technology. Firms have strong competency in current technology and have only limited capabilities of newly shifted and discontinuous technology, sometimes technological paradigms shifts. In this situation a transition failure might be aroused.

Lock-in failure is somewhat related to transition failure. Since not only individual firms may face transition failure, but also the innovation system as a whole shows path-dependency to current technology, the innovation system may lock-in" to current technologies. This lock-in is due to the fact that innovation systems are interlinked each other and the current technology are embedded in these interlocked innovation system producing positive externality. Institutional failures mean that institutions such as regulations and rules in innovation system can fail in promoting innovation activities in a society. Institutions can be divided into formal rules, such as the general legal system of contracts, intellectual property rights, and the wider context of political culture and social values (Smith, 1996).

Carlsson and Jacobsson(1997) categorized system failures into two areas, which are 1) network failures, 2) institutional failures.

Network failures is a similar concept to Malerba(1996)'s complementarities failures. Network is one of the most important concepts in innovation system literature and is highly regarded as an

innovation-promoting mechanism. Since a firm's research areas and capabilities are limited, networks and connectivity among firms and other innovative organizations such as universities and public R&D institutes can produce strong synergetic and positive externality resulting in new technology advances. Network failures mean that network and connectivity among these innovative players are broken or poorly performing not to produce synergetic effects (*e.g.* coordination of R&D investments and information sharing).

Institutional failures have two-fold implications, which are organizations' failures, called as hard institutional failures, and soft-institutional failures related to laws and regulations. Soft institutional failures are almost identical concepts to Smith (1996)'s institutional failures, but much more emphasized on promotion of interaction and entrepreneurial spirit. Hard institutional failures, i.e. organizations' failures, mean that innovative agents such as firms, universities, public R&D research institutes, public organizations(among those are bridging organizations promoting networks and regulatory agencies, standard-setting agencies and patent offices) can be non-conducive or even hamper to innovation activities and new technology development. (Carlsson and Jacobsson, 1997)

Overall Disadvantage of SMEs and Needs of Innovative Capabilities Building

<Table 3.2> Disadvantages of SMEs in Innovation

	SMEs Disadvantages
Marketing	Market start-up abroad can be prohibitively costly
Management	Often lack of management specialists, *e.g.* business strategists, marketing managers, financial managers
Qualified technical manpower	Often lack suitable qualified technical specialists. Often unable to support a formal R&D effort on an appreciable scale
External Communications	Often lack the time or resources to identify and use important external sources of scientific and technological expertise
Finance	Can experience great difficulty in attracting capital, especially risk capital. Innovation can represent a disproportionately large financial risk. Inability to spread risk over a portfolio of projects.
Economies of scale and the system approach(scope)	In some areas economies of scale form substantial entry barriers to small firms. Inability to offer integrated product lines or systems
Growth	Can experience difficulty in acquiring external capital necessary for rapid growth. Entrepreneurial managers sometimes unable to cope with increasingly complex organizations
Legal	Lack of ability in coping with the patent system. Can not afford time or costs involved in patent litigation
Government Regulation	Often cannot cope with complex regulations. Unit cost of compliance for small firms often high

Sources: Dodgson and Rothwell, 1992

While SMEs play significant roles in innovation and employment creation, SMEs inherently possess several disadvantages in the perspective of innovative capabilities, which should be sources of government policy interventions. Dodgson and Rothwell(1992) summarized the relative disadvantages and weakness in SMEs innovation.

3.1.2 SME Innovation Policy Matrix Framework

A two-dimensional policy matrix framework is suggested for the comparisons of SME innovation policies in APEC 10 member economies. Within this research on comparisons of SME innovation policies, the elements of SME innovation policies to be analyzed are two-fold: 1) Dimension of SMEs growth stage, 2) Dimension of SME functions. In order to incorporate innovation-systematic perspective into this policy comparison research, the innovation institutions surrounding SMEs innovation activities are confined to cluster environment in this research framework.

Moreover, this research focuses on only the direct governmental support for SME innovation activities instead of including broad innovation policy areas, i.e. implicit innovation policies, institutions and laws such as education policy, financial market regulations, because of limit in resources and times.

Dimension of SMEs Growth Stage

Even though the types of SMEs from the perspective of innovation are diversely suggested by many authors (Kim, 2005; Bollinger *et al.*, 1983; Fontes and Coombs, 2001; Tether, 1997; Hicks and hedge, 2005), this research framework only confines the SMEs types to three respective categories: 1) technology-based venture firms, 2) technological-innovation-based SMEs, and 3) non-technological-innovation-based SMEs.

The growth stages of SMEs can be broadly divided into 1) start-up stages, 2) development and mature stages, and 3) restructuring stages. Since this research of international comparisons of SME innovation policies are mostly concerned with SME innovation activities, the growth stages of SMEs for this research are restricted to 1) start-up stages and 2) development and mature stages.

Concerning the types of SMEs, Kim, Y.(2005) identifies various definitions related with SME innovations which are 1) Innovative SMEs, 2) Technology-based SMEs, 3) New Technology-based SMEs, 4) Hi-tech SMEs, 5) Mature Technology-based SMEs and 6) Innovation Type SMEs. Lee B. (2005) also identifies five types of SMEs, which are 1) technology innovation

SMEs, 2) production-focused SMEs, 3) multi-products SMEs, 4) sub-contracting SMEs and 5) niche-and-specialized SMEs.

In this research of international comparisons of SME innovation policies, the research interests and policy interests mostly lies on 1) technology-based venture firms, 2) technological-innovation-based innovative SMEs, 3) non-technological-innovation-based SMEs. Thus, in this framework of SME innovation policies, these three types of SMEs are only considered. Thus, in this research framework, 1) technology-based venture firms mean the mostly spin-off venture firms from universities and research institutes based on possessing innovative technologies. 2) technological-innovation-based innovative SMEs mean the SMEs that show economic competency through technological innovation capabilities mostly with product innovation. Lastly, 3) non-technological-innovation-based SMEs mean the SMEs that build up economic competency not through technological innovation but through organizational, managerial, marketing innovation capabilities mostly with process innovation.

Dimension of SMEs Functions (or Policy Instruments)

OECD (1999) identifies seven categories in innovation capabilities of innovative enterprises: 1) vision, strategy and structure, 2) managing the competency base, 3) creativity and ideas management, 4) culture and climate, 5) systematic intelligence, 6) organization and process, and 7) technology management. These sub-divisions of innovative capabilities can be utilized to research in-depth comparisons of SME innovation capabilities. However, for the purpose of comparing SME innovation policies at the level of APEC member economies, it is too-much detailed and segmented to be unable to distinguish different characteristics of SME innovation policies.

Thus, the general framework that is used in Korean SME policies categorization should be applicable to this research of international policy comparisons. SME innovation policies can be categorized according to enhancing each elements and functions of SME innovation. Since SME innovation policies are mostly targeting building-up of SME innovative capabilities, SME innovation policies should be differentiated and customized to each segments of SME innovation functions, which can be broadly defined as five categories: 1) Marketing capability, 2) Human Resources Development capability, 3) Technology capability, 4) Financing capability, 5) Management capability.

Cluster as an Infrastructural Institutions

Since SME innovation policies take systematic perspective of innovation process, the cluster

surrounding SME innovation process and networking activities are important areas where government interventions are needed. Even though IS literature identifies various systematic failures regarding innovation-affecting institutional environments such as education policies, financial market regulations and overall regulatory frameworks and laws, the explicit and direct support for regional SME innovation could be regional clusters. As the importance of regional clusters for SME innovation increasingly emphasized in academic realms and real world innovation activities, it is indispensable to regards the distinguished characteristics of each economy' regional clusters for the comparisons of SME innovation policies.

SME Innovation Policy Matrix Framework

The SME innovation policy matrix framework for the comparisons of APEC 10 member economies is described in Chapter I. This framework consists of 1) dimension of SMEs growth-stages and innovation types, 2) dimension of SME innovation functions, 3) regional cluster as the most critical infrastructural institution affecting SME innovation activities.

3.2 Marketing Policy

SME marketing can be stimulated through the procurement of government and any of a range of crossing border activities including export promotion and participation in the global supply chain of foreign investors and large firms.

3.2.1 Procurement of Government

The government procurement policy is one of the important factors to stimulate SME marketing. The most representative case for this could be found clearly in the Small Business Innovation Research (SBIR) Program enacted by the U.S. Congress in 1982. The main purpose of SBIR Program stated in the legislation is 'to stimulate technology innovation; to use small business to meet R&D needs; to foster and encourage participation by minority and disadvantaged persons in technology innovation; and to increase private-sector commercialization of innovations derived from federal R&D' (Black, 2004: 9)[9]. The program provides federal funding only to SMEs in high technology sectors as an incentive mechanism to enhance innovation and commercialization. Federal policies targeting small business also included implementing special considerations SMEs in federal procurement policies by offering small firms economic

[9] The Congress reauthorized the program's continuance in 1986, 1992 and 2000.

incentives to pursue SBIR research. Firms that successfully complete SBIR research could have a potential market through the funding agency for their research outcomes. For example, as indicated in surveys in the 1990s by the U.S. General Accounting Office and the Department of Defense, from 35% to 53% of total sales of SMEs awarded SBIR funds was attributed to SBIR project that came from the federal government (Black, 2004). Therefore, there is a need to consider the government procurement policy as one of policies to stimulate marketing of SMEs.

Facilitating Procurement of New Technology Products

Provision for the government procurement of new technology-based products could be concerned as a policy for SME marketing, to enhance the use of new technology produced by SMEs. It is to provide some solutions for SMEs which possess capabilities to enhance technology innovation and difficulties in access to the domestic market by increasing government procurement. This could be facilitated by the participation of government agencies and SMEs in e-marketplaces operated by the government.

Technology Development Support Program on Condition of Government Procurement

There is a need to increase SME technology development supports by guarantying government procurement in certain periods. SMEs that successfully complete research funded by the technology development support program have a potential market through the government procurement guarantee for their research and technology development outcomes.

3.2.2 Building up Capacity of Overseas Marketing

The contribution of SMEs to international business activities, according to OECD (2004), is in general under-represented in world trade, although there is an increasing evidence of SME globalization for OECD and non-OECD economies. For example, while SMEs typically contribute to around 50% of GDP, and 60% of employment in national or local economies, most evidence suggests they are estimated to contribute to only about 30% of world manufactured exports, and even less of international investment. It is likely to lead to some specific policy actions related to international marketing by promoting SME exports and enhancing the integration of SMEs into the global supply chain of FDI firms.

The main strategy open to SMEs who would like to promote their markets in the global economy is to actively integrate into the global value chains of MNCs located in home economies or outside. The inclusion of SMEs in the supply chains of MNCs and their indirect involvement in exporting activity can lead to significant diffusion of technology and more

efficient business models, thereby raising the international competitiveness of SMEs in the global market.

The effectiveness of a FDI strategy for enhancing SME competitiveness is shaped by three fundamental sets of factors. The first is that foreign entrants have to possess some compensating advantages in order to compete with indigenous firms with innate strengths due to new knowledge of the local environment, market and business conditions (Hymer, 1976). The aim of FDI is to search for the compensating advantages that provide firms with 'firm specific advantages' or 'ownership specific advantages' (Dunning, 1991) with respect to their actual or potential rivals. Such firm specific assets are intangible assets like proprietary knowledge or a position of market leadership or human capital.

Secondly, firm-specific advantages of MNCs should be achieved through the way in which they extend their own business activities rather than the way in which they externalize them through contracts at arm's-length transactions with independent firms. In other words, the net benefits from the direct utilization of firm-specific advantages should be greater than the net benefits from arm's-length transactions. The final condition is that, along with the two advantages stated above, production in the host country has to have more benefits than that in the home country, which is location-specific advantage. Therefore, the satisfaction of three specific advantages – ownership, location and internalization (OLI) advantages - enables enterprises to undertake the international relocation of production. Assuming there are no location-specific advantages, foreign markets would be served by export. Also, the existence of only firm-specific advantages leads firms to operate portfolio resource transfers (Dunning, 1981).

In this view, SMEs are clearly disadvantaged by scale economies and other size related firm specific advantages. All of advantages bestowed upon subsidiary and branch establishments of incumbent corporations, such as access to administrative, managerial, R&D, and marketing capacity, are less evident for SMEs than for their larger counterparts. However, the benefits from integrating SMEs into the global supply chain by exposing to different consumer demands, networking with foreign collaborators and accessing novel sources of knowledge, make FDI an important element of the panoply of strategies open to SMEs who want to expand their market and remain innovative in the global economy.

According to Dunning (1992), the potential benefits of MNC FDI to local SMEs could be divided into four main types of linkage and spillover effects related to local SME marketing. The first type is a backward linkage with suppliers, which procure components, materials and services within the host economy. This can create new market opportunities for local SMEs. The

second is a forward linkage with customers, which may include marketing outlet of local SMEs. Examples include petrol stations and restaurant chains; and linkage with industrial buyer. The third is a linkage with competitors. Although MNCs may hold a strong market position in relation to local SMEs, it should consider that the linkage with competitors may refer to second and third tier suppliers to leading inward investors. Finally, some MNCs plays an important role in creating local SME markets by initiating common project with local SME partners in the form of joint ventures, licensing agreements and strategic alliances, i.e. linkages with technology partners. It provides some implications for the integration of local SMEs into the global supply chain of inward investors.

Linkage to SMEs

A program for enhancing FDI and SME linkage would need to consist of two distinct components; a host of linkage promotion services, and technical and management upgrading services.

The linkage promotion service program may involve; (1) improving the flow of information about potential local suppliers to potential MNC purchasers and about supply opportunities to potential suppliers through the development of website and business directories (by compiling detailed technical information from SMEs such as types of machinery and equipment, their make, model, power, capacity, state of maintenance, etc); and (2) organization which inform clients and suppliers of matching needs and requirement by establishing information database complemented by seminar and "meet-the-buyer" events (OECD, 2004: 46).

The capacity building service program for technical and management upgrading may include organization, which is linkage center for same sector local suppliers and operates project involved in MNC-initiated business development. This organization (linkage center) compiles a database of "fit-to-supply" and disseminates information for both FDI MNCs and local supply SMEs. Additionally, the organization would regularly run executive level training courses for local supply SME managers: quality assurance systems, awareness raising, social corporate responsibility, negotiation skills, *etc.* Also, it provides consultancy on the requirement of foreign partners. The good example of this organization could be The Enterprise Center, Baku. The representative project operated by the Center is linkage between McDermott Caspian Contractor Inc. (MCCI: an international manufacturing company for oil supplies), and local Azerbaizani suppliers and contractors (BP). Local supply SMEs made up nearly 70% of all purchases MCCI undertook in connection with its own contract with BP between June 2002 and May 2003 (OECD, 2004: 48).

<Table 3.3> Elements of Marketing Policy

Elements	Sub-elements	Contents
Procurement of government	Procurement programs	- Facilitating procurement of new technology products by suggesting guideline and establishing e-marketplace - Technology development support program on condition of government procurement in certain periods
Building up capacity of overseas marketing	Export promotion policies	- SME export-supportive institutional infrastructure - Export development & promotion agencies
	Programs for enhancing integration of SMEs into global supply chain	- Incentives to inward FDI MNCs involved in production networks with local SMEs - Linkage promotion program - Capacity building program for technical and management upgrading

3.3 Human Resource Development (HRD) Policy

Human resources development is central to knowledge creation, and talented individual is an essential component to achieve organizational learning. Recruiting and training have been traditionally important functions in a firm, but it is not well reviewed how public policy can affect this routine practice of human resource management.

Education policy is directed toward human resources, mainly on input to SMEs in general. The supply of fresh graduates with knowledge in emerging technologies has been central in the education policy. Other human resources such as technicians who are capable of implement invisible innovation are also managed by various certificate policies such as certificate on skill level. Although the basic education before the recruitment is important, managers complain that they have to educate employees again. In a certain economies, SMEs have characteristics of family business, and the employee training in those SMEs is not well designed in many cases. Therefore well-developed public skill training centers play a critical role for SMEs.

In this section, the policy is reviewed as a corresponding measure to activities inside the firm. Therefore the human resource management in the firm can be reflected in government HRD policy to increase the impact of policy.

3.3.1 Responding to SMEs' Human Resource Management

Incentive Structure and Evaluation in SMEs

Incentive structure is a rule that members of an organization follow to develop own careers. Some companies adopt a dual ladder system, in which the incentive structure of research jobs can be different from that of administrative jobs. The possible consequence of ill-structured incentive scheme may result in loss of manpower. Many researchers actually leave SMEs to get paid more or to gain stability. However, the wage alone is not a decisive factor. The proper incentive structure to attract talented young researcher is missing in many SMEs. For example, SMEs cannot afford job-training overseas, while some talented workers want to do cutting-edge research in foreign countries. Government policy can provide additional incentive to keep talented people within promising SMEs.

Practice: recruiting and training

Some innovative SMEs devise special incentive to recruit high profile researchers. Some provides incentives for long-served employees to build his/her own firm. Employees feel the small sized firm providing opportunities to overview whole activities of how to manage a firm. The experience endows the potential entrepreneur a certain confidence to start up a similar firm. However, many SMEs have no specific program to help career development of employees. Possible barrier to the supply of high-profile R&D personnel to SMEs can be many-folds. The unstable job position in SMEs may require proper social securities for a flexible move between job places. In addition, the low payment of SMEs than those of MNCs may discourage young talents. If the government aims to improve research in SMEs, a special policy can provide incentives to SME researchers, such as special income tax credit.

Training in SMEs is not an easy task due to the lack of staff specialized in training. Therefore training outside the firm becomes a regular practice. Some SMEs could send employees to affiliated *keiretsu* firm to learn new management and technical skills. SMEs do not have resources to allow employees' intermission to study formal degree courses. However, short training courses prepared by universities and colleges are attractive options for SMEs. As the insufficient size to organize training program have been a typical problem, it calls for SMEs to collaborate each other and to build shared training programs or to outsource training programs.

3.3.2 Manpower Supply Policy for SMEs

The priority of HRD in innovation policy is not equivocal in government, venture capital, and new firms (Hsu, *et al.*, 2005). The difference indicates that HRD policy may target unbalanced point between recruiting and training. The implementation of HRD policy may need involvement of private sector as well as accompanying a financial policy for efficient implementation.

Appropriate Manpower Supply

High technology SMEs that execute formal R&D demands doctoral graduates, but established SMEs with moderate incremental innovation search for graduates or master degree holders. In addition, the deep and narrow knowledge of expert is not so useful as an employee of SMEs because a researcher needs to understand various fields to undertake multiple-roles in product development. A talented SME employee makes software programs and designs mechanical components simultaneously. Education policy needs to provide both highly scientific engineers and multi-functional engineers. Universities and colleges are encouraged to provide short courses in response to the demand for continuous education in SMEs. In the case of developing economies, exploiting multi-national companies(MNCs) is recommended to upgrade human resources (Khalil and Ezzat, 2005).

Providing Incentives to Work in SMEs

Many SMEs suffer from leaving researchers. In the case of developing economies, the brain leakage to advanced countries can be a confounding difficulty for SMEs. The policy has two options: to attract high-profile engineers and researchers to SMEs and to keep these people from leaving for large firms and academic institutes. A third way is to encourage entrepreneurship education so that they leave for their self-established SME.

Entrepreneurial culture is also significant in the graduates' decision on career development. In Japan, the collapse of a venture boom in 1980s created a pessimistic mood amongst students and had risk-taking spirit decreased. On the other hand, the US has successfully built entrepreneurship culture, and promising graduates do not hesitate to work in venture firms. In this sense, HRD is linked with macro policy on job safety and job mobility. Heavy tax exemption for R&D manpower in SMEs can be suggested in certain economies.

A scheme to absorb capable researchers from failed venture firms is necessary. Public research sectors like government institutes need to function not only for providing spin-off SMEs but

also work as buffer for researchers to move to another venture firms.

Linkages between Educational Sectors and SMEs

The standard framework for university-public research institute-industry collaboration can be figured as follows: Financing from government and from firms (matching fund), graduate students from universities, and they carry out research in public institute. As universities increase collective research capabilities with various centers, the research institutes may also provide education programs. The short programs presented by public research institutes contain more practical contents, and the response from SMEs can be positive particularly.

Universities may change curriculum of engineering college based on demand from industries. The inclusion of information technology in a Mechanical Engineering department is an example in such changes. In addition, to provide multi-functional engineers, more inter-department and inter-disciplinary education programs are in demand.

3.3.3 Policy Measures for HRD

As the basic activities of HRD incur recruiting and training, the corresponding policy measures can be categorised into following elements.

<Table 3.4> Elements of HRD Policy

Element	Sub-element	Contents	Notes
Recruiting	R&D manpower Accessibility of local skilled labour	- Promoting SMEs' recruitment of graduates from tertiary education courses. - Subsidy to recruit R&D manpower - Basic education level	
Training	SME specific training programs Diversity of training programs	- ICT skill program for SMEs - Subsidy to training SME personnel - Training at different levels – researchers/ technicians/ skilled labour	

3.4 Technology Policy

The basic principle of technology policy in 1970s was to develop commercial technology from the scientific discoveries. In late 1980s, after long debate on science-push and demand-pull policy, the diffusion oriented policy started and evolved to a network policy. The network policy encourages interaction of innovators. From the 1980s, industrial characteristics became a critical factor to take into consideration. Different innovation patterns in industrial sectors call for different remedies(Pavitt, 1984; Malerba and Orsenigo, 1997). Technology policy for SMEs must incorporate the science-push and demand-pull measures, and it also needs to encourage collaboration.

For example, the major tool to promote research and development is a tax policy. In this section, the early part 3.4.1 will develop the concept of SME learning in Chapter 2. The later part delineates practical measures to promote R&D and technological learning. The technology policy is being implemented through financing and education policies in many cases, and thus technology policy is not exclusive to other policies but intertwined with financial and human resource development policies.

3.4.1 Generation and Diffusion of Innovation

Generation: science based / demand oriented innovation

The classic argument on the science-push and demand-pull policy is still useful to analyse actual policies for innovation. Policies that promote spin-off from universities contain a component of the science-push argument. Whereas, the demand oriented innovation can be traced as well. The SME specific market is protected to provide demand base for SME innovation. It is acknowledged that proper mix of these two policy strategies will work better (Kline and Rosenberg, 1986). The market protection without stimulation could cause a moral hazard of SMEs who ask for continuous protection instead of innovation.

Diffusion: knowledge sharing

Although the concept of knowledge sharing is not exactly the same as interactive learning, they are interlinked concepts. Knowledge sharing is the result of interactive learning and prerequisite for interactive learning. Stationary producers may learn from plastic component producers on how to make durable coating on plastic stationary goods. When knowledge is generated in universities or research institutes, technology transfer is critical. If the knowledge is created in venture firms, accelerating the business and realizing the technology potential are critical. The

former needs explicit knowledge sharing between public research institutes and private firms. The latter needs informal knowledge sharing between firms about industry specific knowledge.

This inter-industry knowledge sharing, sometimes articulated or mediated by government-funded agencies, can contribute to innovation. To stimulate interactive learning, a common knowledge base is created by educating technicians in different firms. For instance, the government can create a CAD center for manufacturing SMEs. The designers from various SMEs can meet in the center and learn basic knowledge. Later they can develop into interactive learning on how to add customised programs on the CAD software package. The organization level (trade association) and individual level (engineers club) are instrumental in the knowledge sharing.

Human mobility also contributes to knowledge sharing between different firms. Tacit knowledge embedded in skilled labour is forced to work in a public center and the center dispatches these skilled labours (majority of them are retired) to other laggards to stimulate innovation.

Interactive Learning

Interactive learning (Lundvall, 1992) emphasized innovation from a user side is critical as well as innovation from upstream suppliers. Learning in the user sector can be transferred into upstream improvement in capital goods. Unlike rather unidirectional learning in Arrow (1962) model, Lundvall envisages that learning in upstream also facilitates learning in downstream. The diffusion of innovation from upstream to downstream can be identified in the use of high-technology component (*e.g.* laser). The development of semi-conductor laser was largely carried out by large user firms (*e.g.* General Electric) in the early stage but the specialized laser producers soon improved further. As a consequence, the components spread to other downstream manufacturers such as laser pointer and barcode scanner producers.

There are three types of the policy that promotes interactive learning in SMEs. The first type of interactive learning (vertical) can be facilitated by large firms to help their suppliers. As for the second type of learning between private and public sectors, the superior financial resources in large firms overshadow SMEs in cooperative R&D program, and the government allocates a special matching fund exclusively to collaborative R&D program between SMEs and public sectors. The third type is between similar SMEs.

3.4.2 Policy for Improving Technological Innovation

This subsection describes policies about incentives to implement internal learning and external learning from outside innovators. The external learning is divides into vertical (trade) partners, public sector organizations, and horizontal firms as indicated above.

Policy for Internal Learning

Government help high-technology start-ups in various ways. For the high-technology market, Government may impose a high tariff temporarily to support development of the domestic component producers to compete with foreign producers. However, this may be problematic in many cases as users may complain about the high tax on the necessary component. Therefore, more direct support such as incubating ventures and the R&D subsidy for new technology-based firms can be found.

The detailed technology policy can be also different based on the stage of product development. The R&D subsidy for early idea generation and after commercialisation stage can be different. The early stage can be more directly supported but the later stage can be supported by tax exemption or a matching fund for pilot development.

The incentive to provide internal learning can be connected with other means of financial supports. Tax reduction and exemption are common in the support of R&D activities in SMEs. Certificates on innovating firms also help as it increases credibility of firms. The most direct intervention to promote internal learning is facilitating training programs inside a firm. Firms that send employees to training institutes may receive a matching fund or receive consulting expertise in relevant fields at a very low cost.

Strong protection of intellectual property in the US may have a little positive effect on SMEs. Some SMEs can compete with large firms not as suppliers. Even as upstream suppliers of solutions, biotech firms also keep own status as independent thanks to the well established intellectual property market (and protection). However, the patent protection in biotechnology (Mansfield, 1986) cannot be applied to other industrial sectors as some industries prefer other forms of protection (Griliches, 1990).

Policy for External Learning: SMEs' Technological Collaboration

The mode of interactive learning is quite different in the case of vertical trading partners and with horizontal partners. The position of a firm in a network decides the behavioural pattern of

collaboration (Stuart, 1998). Large user firms start to realize the importance of the management of supply chain. In a recent research, it is argued that the level of technological capability in large user firms matters for implementing innovation policy for supplier SMEs (Min, *et al.*, 2005). A caveat is that it is usually large firms that benefit from alliances between small and large firms (Alvaiez, 2001).

As knowledge network is different from trading network (Gelsing, 1992), the horizontal collaboration and exchange of information between non-trading partners exhibit the characteristics of a knowledge network. The problem of a knowledge network is a lack of explicit incentives. It starts as an exchange of information in expert communities such as associations of engineers. The process is rather slow and SMEs may discourage the engineers from taking part in those external activities of knowledge sharing. Therefore the policy measures to promote the knowledge network need to design incentives at individual and firm level.

The interaction between industry and universities are most intensively studied and the implication from those studies illuminates a different pattern of collaboration (Faulkner and Senker, 1994). In addition, the government's role in facilitating the university-industry collaboration is critical (Etzkowitz and Leydesdorff, 1997). The university role is particularly important in science-based industrial sectors.

The content of university-industry research collaboration in SMEs differs from that with large firms (Santoro and Chakrabarti, 2002). Universities may provide consulting collaboration for SMEs rather than a formal large project. Public research institute also functions as a portal for SMEs to access emerging technologies. In the traditional role model, these institutes function as a bridge between university research and industrial demand. It would be interesting to observe whether university or government research institutes play a critical role in knowledge transfer to SMEs.

3.4.3 Policy Measures for Technological Innovation

The technology policy can be overlapping with other policy measures especially financing for SMEs. In certain cases, the R&D grant is partial and R&D project loan is provided. The technology policy can be divided into generating, diffusion and networking, and efficient use of innovation. The infrastructure for these activities can be implemented through enhancing appropriability of technology for SMEs (*e.g.* IPR protection), R&D subsidy, and matching fund for R&D collaboration, *etc.* The following table summarises relevant policy measures.

<Table 3.5> Elements of Technology Policy

Element	Sub-element	Contents	Notes
Generation of knowledge in SMEs	· Efficiency of R&D · R&D grant · R&D tax	- Inclusion of SMEs to national R&D programs - Stimulating generation of knowledge in SMEs	
Diffusion and system	· Globalisation of SME	- License and other office for SMEs	
	· Technological collaboration	- Promoting collaboration between firms: vertical & horizontal collaborations - Promoting technological collaboration between SMEs and universities/public institutions	

3.5 Financing Policy

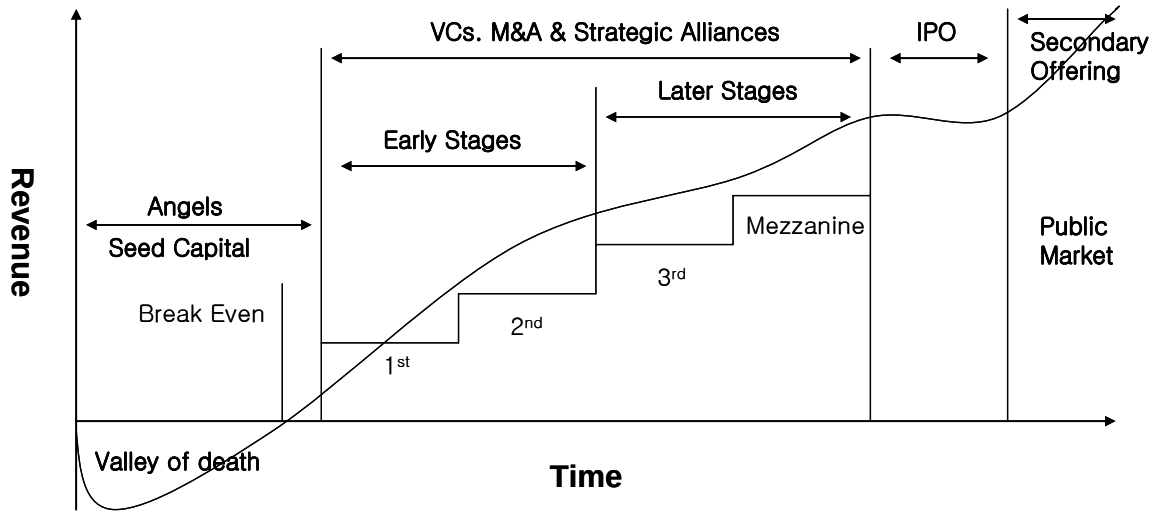
3.5.1 Financing Life Cycles and Government Financing Policy

Innovative SMEs encounter different financial requirements for stepping up each stage of growth. For the start-ups stage, mostly personal savings of entrepreneurs, their relatives and friends are the sources for the setting up the firm. However, this start-up stage predominantly experiences years of negative earnings before going through the breakeven point. Thus, soon after depleting entrepreneurs' own sources of finance, they cannot proceed to further stage without outside funding. For the innovative start-ups, R&D funds are needed for further deepening of technology development. However, the high risks are associated with investments in this stage of firms' growth, and only seed capital by the government or business angels, who are wealthy individuals providing not only sufficient funding but also consultation and their expertise, can intervene in this first and second valley of death for R&D investments and technology commercialization funds.

After successfully developing engineering model and production model, start-up companies need to in-source further injection of capital for building up manufacturing production lines and further R&D investments, which are the third valley of death. However, in this early stages of growth with low profitability and short record of business, if without sound collaterals, debt financing are difficult to obtain in commercial banking system because of information asymmetry and uncertainty problems. Venture capitalists can provide indispensable capital for this young stage of firms before IPOs. Unlike commercial banks venture capitalists intensively examine growth potential and possible failures of these young firms and their technologies

before providing capital. They closely monitor firms' management even after capital injection, alleviating the problem of information asymmetry and uncertainty. When the start-ups are successful in IPO or M&A deals, venture capitalists can exit the investments, reaping huge profits. The facilitation of exit mechanism in the market is a necessary condition for viable venture capital markets.

Small start-ups and young venture firms have to face a *funding gap*, which means the rationing of financing due to substantial asymmetric information problems and a small size of early stage investments. Along this line of financing life cycle of a firm, governmental interventions are needed to solve the problems of information asymmetries and uncertainties, *i.e.* market failure problems, through providing direct finance to start-ups and venture firms in early stages of growth or through providing better flows of information communications such as technology information, venture certification, technology guarantee programs, or technology transfer intermediaries.



<Figure 3.1> Financing Lifecycles

Sources: OECD, 2004, "Financing Innovative SMEs in a Global Economy"

Governments' roles are two folds: 1) facilitation of efficient financial market through establishing better regulations and rules, and 2) provisions of direct supports to SMEs either by direct financing or by infrastructures and public services. Since this research only focuses on the direct intervention roles of government SMEs innovation policies, the second role of SMEs financing policy is only considered. There exist two venues for direct financing to SMEs and start-ups: 1) equity financing and 2) debt financing.

3.5.2 Equity Financing

Government Equity Programs

For the first stage of a valley of death, governmental R&D investment financing can be provided for emerging new technology developments. Furthering technology development, commercialization R&D and establishing manufacturing capacity can be supported by government direct equity program. Government can participate in direct equity investment through establishing direct funds for innovative SMEs with technological capabilities. These special-purpose funds obtain equity shares of innovative start-ups mostly below the entrepreneurs' shares proportion. Some member economies has established governmental venture capital investment organizations with the purpose of direct investment in venture firms or participating as a limited partner.

However, the experiences of governments' direct equity programs were relatively negative in their effectiveness promoting innovative venture firms and start-ups. Since the government equity programs have unexceptionally ill-equipped with the suitable incentive structures for fund managers, they tend to lack in proper monitoring and due diligence of selection of potential leapfrogging venture firms. Government officials, who operate governments' equity programs, often lack the essential expertise in financial markets and fund management. Inefficiencies in dealing with venture firms naturally lead to increases of venture firms' failures and investments loss.

Often *hybrid-funds*, which are venture capital firms with injections of public equity investments, are established in order to allocate public financial supports for venture firms, using professional fund managers to act upon equity investment. However, even in this case, establishing proper incentive structures for fund managers are essential in successful equity investments on venture firms.

Networks of Venture Capitalists: Business Angel Networks (BANs)

Angel financing plays the pivotal roles for the first-stage of a financing death valley for innovative SMEs. However, business angels mostly face the lack of investment opportunities while entrepreneurs complain about the lack of opportunities to technology assessment and financing. These can be identified as one of the market failures with the lack of information flows in the financial market. The fragmented marketplace for business angels and the early stage entrepreneurs call for the government intervention in this area of insufficient financial market.

Business Angel Networks (BANs) are highlighted among policy makers as an alternative to direct equity financing for innovative SMEs. BANs bring together business angels, venture capitalists, investors and entrepreneurs looking for financial sources with high potential innovative technology. BANs provide communication channels among potential demanders and suppliers of capital for technology and commercialization development. These policy initiatives are cost effective without substantial deadweight sunk cost, and were successful in promoting the venture capital market compared to any other government financial schemes.[10] However, this policy can not reap the fruits of venture firms' success. Government only participates in BANs as sponsorship for maintaining overall business angels networking. Moreover international BANs can be further beneficial to in-sourcing international venture capitals and to sharing their knowledge and expertise.

3.5.3 Debt Financing

Direct Loan Programs

Government can establish direct loan programs for innovative SMEs, technology-based venture firms. Most governments provide these loan programs for SMEs with relatively favorable interest rates and low commission rates in order to support innovation activities of SMEs. These programs are mostly operated by government owned special-purpose commercial banks and also in cooperation with private banks. When cooperating with private banks, loan guarantee programs should be provided for the preservation of possible defaults loss of loans to SMEs.

However, most direct loan programs are not viable solutions for financing innovative SMEs and technology-based venture firms in the long-term perspective. Since interest rates are fixed under the low ceilings while the defaults risks are high with young venture firms and SMEs without collaterals, the financial losses of direct loan programs are clearly inevitable. Since the direct loan programs are established to share the downside risk of SMEs and venture firms while abstaining from high returns for successful investments, the financial losses are expected. In the long term perspective, continued rather purposeful loss in the direct loan programs is not viable, does not cost effectively promote SMEs innovation, but rather create the problems of moral hazards among the loan recipients.

[10] OECD, 2004, "Financing Innovative SMEs in a Global Economy"

Loan Guarantee Programs

Loan guarantee programs are mostly combined with governmental direct loan programs. Governmental loan guarantee programs provide guarantee to SMEs either through obtaining premiums for guarantee or through technology evaluations. With this governmental guarantee, private commercial banks provide loans for innovative SMEs and venture firms.

Since governments assume the downside risks of venture firms and SMEs through government direct loan programs, proper guarantee premiums and authentic technology evaluations are indispensable for efficient operations of government loan guarantee programs. Especially technology evaluations are important because those evaluations reduce the problems of information asymmetries about the venture firms' technology success possibilities and the problems of credit and default risks. Technology evaluations mean the evaluations of potential values of technology through the analysis of technology development, possibility of commercialization and market demands. These technology evaluations can be utilized for venture capital investments, debt financing, M&A and technology transfers.

3.5.4 Certification of SMEs

Needs for Certification Programs for venture firms or SMEs

SMEs typically face the information asymmetry problems in financial market. Since SMEs are mostly in the early stages of development with little credits and financial market reputation, sometimes even without market sales records or manufacturing facilities, SMEs can not easily earn the outside credibility for their growth potential or business attractiveness. Because outside investors possess insufficient knowledge about SMEs or venture firms, entrepreneurs could have incentives to pursue private benefits and opportunistic behaviors. Thus, because of this market failure in the form of information asymmetry between the insiders of SMEs and financial market participants, there exist needs for the government's intervention to solve the problem. Besides the problem of information asymmetry, venture firms and SMEs possess high uncertainty and risk regarding their future business. Moreover, SMEs typically lack in physical and tangible assets, which can be used as collateral for bank loans, while most of commercial banks strictly require physical collateral for their lending. Even in the US financial market, which is the most developed one, especially in the venture capital market, the investments or loans to the early stages of venture firms are rare and too low to provide adequate financial supports to venture firms' technology development and commercialization (Lee, K. *et al.*, 2003).

These market failures, which are faced by the early stages of SMEs and venture firms, especially in the areas of financial markets, call for the government intervention in the form of SMEs and venture firms certifications.

Government certification programs can provide adequate information and credibility about SMEs and venture firms' technology and business growth potential, which can solve the problems of information asymmetry to outsider investors, mostly venture capitalists.

Certification Hypothesis and Government Failures

Lerner (2002) proposed the certification hypothesis regarding government certification effects. If a start-up venture firm does not finance adequate funds for technology development, it means there exists market failure even though the NPV(Net Present Value) of the technology project shows positive. Then, through the government certification of venture firms or SMEs' technology projects, the government can signal to the financial market the significance and success potential of the technology projects. Outside investors can provide sufficient funds to the venture firms or SMEs, trusting the government certifications. Lerner (1999, 2002), and Gompers and Lerner (1998) provided the empirical evidences about the positive effects of government certification on SMEs or venture firms' performances.

However, there could possibly be the government failures in the certification programs. De Meza (1992) questioned the government's abilities to discern among venture firms or SMEs about technology development and future growth potentials. The certification programs could be more inefficient than private financial markets. Moreover, government certification programs can face severe political pressures and lobbying from various interest groups. The SBIR programs of the US could be successful because of the decentralization of decision making procedures (Lerner 1999).

Venture capitalists or private market players should eventually play the role of screening and monitoring venture firms and SMEs' technology projects. Since venture capitalists mostly invest in the early stages of venture firms or SMEs before IPO, they are the most demanding groups for the certification of venture firms or SMEs' technology projects. The venture capitalists should possess industry expertise, which can discern and screen successful technology projects, and should also follow up close monitoring after investment to venture firms or SMEs.

<Table 3.6> Elements of Financing Policy

Element	Sub-element	Contents	Notes
Equity Financing	Government equity programs	- Establishing governmental sponsored special-purpose funds, which provide direct equity financing to innovative SMEs or venture firms - Participating in private hybrid funds specialized for investment in innovative SMEs or venture firms	
	Networks of venture capitalists: Business Angel Networks (BANs)	- Providing communication channels to business angels, venture capitalists, investors and entrepreneurs looking for financial sources with high potential innovative technology	
Debt Financing	Direct loan programs	- Providing direct loans to innovative SMEs or venture firms with favourable interest rates or often with long-term fixed rates	
	Loan guarantee programs	- Providing official guarantee about SMEs to financial institutions with which loan guarantee institutions compensates the loans loss in the case of the SMEs' default	
	Certification of SMEs	- Providing adequate information and credibility about SMEs and venture firms' technology and business growth potential - Solving the problems of information asymmetry to outside investors or financial institutions	

3.6 Management Innovation Policy

3.6.1 Importance of Management Innovation in SMEs

Small and medium enterprises (SMEs) account for more than 98% of business enterprises and more than 60% of employment in the APEC region. Among them, most of SMEs with less than five employees take up over 90% of total enterprises. Today, in general, SMEs have confronted various problems such as insufficient information, limited financial and technological resources and shortage in skilled labor force. Technological innovation, which was dealt with in the previous chapter, has a huge impact on the whole management process, including capital, labor, distribution, production and management methods, and it presents new opportunities for companies. But on the other side of the coin, those who lag behind can lose in the competition. Given that the speed of technological innovation has further accelerated, 'innovative change in management' or 'management innovation' is strongly needed to meet the challenge.

There has been virtually no shared view on the definition of management innovation. However, management innovation is generally referred to as a trigger for change in core elements or parts of a company through the intentional implementation of new plans or programs that bring new services or products, new process technologies, new organizations or management systems and that transform organizational members. In addition, management innovation can be defined as innovation of business activities which can be categorized into Plan, Do and See and as innovation of management methods which comprise planning, organizing, commanding, motivating, controlling, coordinating, and staffing. Generally, management innovation brings considerable change to existing structures, business methods and business tools in production, marketing and support work of the entire business process

On the other hand, to achieve management innovation, management strategies for a firm are necessary. Since the introduction of the concept of management strategies in the 1960s, scholars have been engaged in a debate falling into two camps – 'the rationalist school' and 'the incrementalist school (Souitairs, 2002)'. Researchers of the rationalist school believe that corporate executives make a decision on a series of corporate behaviors based on the analysis of the external environment (Porter, 1980: Ansoff, 1965). Meanwhile, incrementalist researchers have come up with the concept of dynamic capability focusing on enterprises' dynamic change and enterprise-wide learning (Teece et al, 1997: Mintzberg, 1987). Management strategies are defined as a series of decisions or a type of decision- making to address challenges and opportunities presented by the environment in harmony with resources available in an organization to secure competitive edges in a given market. (Hambrick, 1983) Or management strategies are referred to as a gathering of decisions that are used for positioning a company and designing its structure & process, which are best suited for the business environment (Souitairs, 2002). Such argument suggests that management strategies are a gathering of decisions on resource allocation based on scanning and analysis of the environment and that a firm's internal capacity underlies those decisions.

As can be seen in Table 3.7, existing research findings have shown that elements of management strategies such as environmental scanning, the consciousness or explicitness of strategies, internal R&D efforts and marketing capabilities have an influence on innovation in Table 3.7. First, environmental scanning is defined as the acquisition and use of information about events, trends, and relationships in an organization's external environment, the knowledge of which would assist management in planning the organization's future course of action. Second, the consciousness or explicitness of management strategies is defined as the extent to which a firm's management strategies are explicitly considered and are intentionally conceptualized (Miller and Friesen, 1982). Other researchers conceptualized management

innovation as the existence of management strategies or definition (Hadjimanolis, 2000, Souitaris, 2002). The existence of management strategies enables efficient use of resources called top management and spurs innovation(Miller and Friesen, 1982). Souitaris(2002) claimed that a firm equipped with a more efficient channel of communication (from management to employees)in addition to well-defined business strategies boasts higher innovation rates.

<Table 3.7> Management Strategies and Innovation

Element	Impact logic	Empirical analysis results
Environmental Scanning	Environmental scanning enables recognizing demand or needs of the external environment, which is the starting point for innovation and cannot be easily grasped with internal information.	(+): Khan and Manopichetwattana (1989), Kim et al(1993), Hadjimanolis(2000) (+) Conservative company specimen, (-)Entrepreneurial company specimen: Miller and Friesen(1982) (-) Same industry scanning, (+) general environment scanning : Frishammar and Horte(2005)
Consciousness or explicitness of strategy	Specific tasks based on well-planned strategies create follow- up tasks & synergy effects and efficiently utilize resources called top management.	(+): Miller and Friesen(1982) Hadjimnanolis(2000), Soutiaris(2002a) (n.s): Khan and Manopichetwattana (1989)
Internal R&D efforts	One of the major corporate activities related to innovation and a prime source of innovation	(+): Rocha et al. (1990), Kim et al. (1993), Romijn and Albolandejo(2002), Soutiaris(2002b),Freed(2003), Becker and Dietz(2004)
Marketing capabilities	It is important to identify needs of customers and reflect them onto innovation process. Marketing capabilities are mutually reinforcing assets necessary to acquire innovation outcomes.	(+): Rothwell et al. (1974), Soutiaris (2002), Galenda and de la Fuenta(2003) (n.s): Rocha et al (1990) (Control on R&D efforts level is required)

Source: Kim, Y., 2005, Innovative SMEs: Characteristics of firms, technology education and management outcomes, Science and Technology Policy Institute.

Third, internal R&D efforts have been known to be a major source of innovation for advanced economies as well as for developing economies and one of the most important corporate activities pertaining to innovation (Kamien and Schwartz, 1982; Kim et al., 1989, 1993; Souitaris, 2002b). Internal R&D efforts can be defined as degree of efforts that a firm put into in carrying out internal R&D. (Rocha et al, 1990; Kim et al. 1993). And some researchers use factors - technological efforts, innovation budget and innovation input- to define internal R&D efforts.(Romijn and Albaladejo, 2002; Souitaris,2002a; Becker and Diets, 2004). Fourth, marketing identifies new and evolving customers' needs, which is necessary to develop new products and improve existing products, and plays a role in building closer relations with customers by scanning the market environment.

As such, corporate management strategies have a positive impact on innovation, which, in turn,

has a favorable effect on management performances such as productivity improvement, efficiency enhancement and revenue growth. As seen in Table 3.7, management strategies, such as the provision of information on the external environment, the consciousness or explicitness of management strategies, internal R&D efforts and marketing capabilities have a positive effect on innovation. Objectives of SME innovation promoting policies in countries in the world include 1) provision of overall information on the external environment related to SMEs, 2) support for establishing systematic management strategies in SMEs' business activities and operation, 3) offering management counseling and assisting with e-business (informatization) to boost marketing capabilities and 4) conducting education on management innovation and infusing innovative minds to strengthen internal R&D efforts. With regard to internal R& D efforts and support for marketing activities dealt with in this chapter, focus will be on management innovation (excluding the areas which have been previously dealt with in previous chapters such as support policies for technological innovation and support policies for marketing).

<Table 3.8> Management Strategies and Support Systems

Element	Impact logic	Support systems
Environmental scanning	Environmental scanning enables recognizing demand or needs of the external environment, which is the starting point for innovation and cannot be easily grasped with internal information	**Provide overall information for SMEs** - Offer information on management activities and support policies for SMEs **Support for e-business**
Consciousness or explicitness of strategy	Specific tasks based on well-planned strategies create follow- up tasks & synergy effects and efficiently utilize resources called top management.	**Supp ort for management counseling**
Internal R& D efforts	One of the major corporate activities related to innovation and a prime source of innovation	**Supp ort for management counseling and e-business** (Education on management innovation and spread of innovative mindsets)
Marketing capabilities	It is important to identify needs of customers and reflect them onto innovation process. Marketing capabilities are mutually reinforcing assets necessary to acquire innovation outcomes	**Support for informatization (e-business)** **Supp ort for management counseling**

Management counseling is a necessary activity to solve problems that SMEs confront in their management process & execution, and measures to address the issues can be established. To devise the measures, professional counseling on management techniques, business planning and operation needs to be conducted. Also, e-business(ICT) is examined to be an effective tool to overcome SMEs' limitations in terms of marketing capabilities, human resources and

information and to have a positive effect on business(management) activities. Table 3.8 shows management strategies that have a positive effect on innovation and their support systems.

3.6.2 Support Policies for SME Management Innovation

In this section, we will deal with support policies for SME management innovation centering around 1) provision of the information on comprehensive policies and SME business, 2) support for SME management counseling and 3) support policies for SME e-business.

Provision of Information

Generally, SMEs suffer from the lack of information on business activities and government support policies due to limited financial & technological resources, insufficient skilled labor force and lack of reasonable organizational structure. To redress these problems, a site (or system), which helps SMEs access comprehensive information and government support policies by stage and function (technology, capital, human resources, marketing routes/exports, start-up, taxation and administrative regulations etc.) from entry to exit, needs to be set up.

In Korea, the comprehensive policy information provision system tailored to SMEs opened in 2006 offering necessary tips and overall information on support policies for SMEs by stage and function (capital/ guarantee, technology, human resources, marketing routes/exports, start-up venture /small business owners, taxation and administrative regulations). In particular, the call center has been in operation through toll-free telephone number of 1357. In Canada and the US, tips necessary for SME operation ranging from entry to exit and by stage and function and overall information on SME support policies are provided at Canada Business (http://canadabusiness.gc.ca) and Business.Gov(http://www.business.gov), respectively.

Support for SME Management Consulting

1) Management Consulting System for SMEs

In order to analyze problems in business activities and come up with solutions to the problems, professional counseling (advisory services) on management techniques, business planning and operation is necessary. SMEs need consulting services through the entire process of business ranging from planning, financing, production, marketing, etc. Since SMEs, however, cannot afford consulting to address the issues on their own due to insufficient finance and human resources, government assistance is required. In order to strengthen competitiveness of SMEs, a mid- to long- term vision (strategy) should be devised. In this regard, counseling enables SMEs

to generate synergistic effects of knowledge through the combination of internal and external knowledge and information, and helps them devise a mid- to long- term vision.

To this end, the governments in Korea, Japan and Australia bear part of consulting fees for SMEs or experts are sent to SMEs on the condition that part of consulting costs are covered by the government. On the other hand, as seen in the case of the US, through the project like SCORE, retired or incumbent specialists offer counseling for SMEs as volunteers.

2) Management Consulting Support system for SMEs

- Selection and Education System of Counselors

The system is designed to efficiently provide SMEs with counseling services by setting up the accreditation system or criteria for SME counselors. In Korea and Japan, the government gives certificates to those who pass the qualification examination through the *Certified Business Counselor System* or the *Firm Diagnosis System*.

In some cases, SME consultants are nurtured through programs at universities or educational institutions. Under the system, the government establishes a department related to counseling at a university and anybody who completes required courses will be given a consultant certificate. In Japan, an SME consultant education course is set up within a university. In Australia, an MBA degree is given to management consultants after they complete a graduate course through industry- academia cooperation, hence authorizing them to give consulting for SMEs. On the other hand, as part of efforts to enhance consulting quality for SMEs, in-depth training is conducted additionally on existing consultants who had graduated from courses at relevant associations or educational institutions.

- Establishment of regulations and code of ethics related to counseling

The institutional framework should be established in order to prevent moral hazard on the part of consultants and SMEs (policy beneficiaries) and enhance the transparency of consulting when consulting is provided. Efforts are made to prevent moral hazard and to lay the basis for sound SME counseling by preparing code of ethics and clear guidelines for SME consulting.

3) Spreading Innovative Mindset

In order to disseminate SME innovation, the government runs innovation education programs for CEOs in SMEs to let them learn about innovative techniques and success cases. In some case, universities offer a broad curriculum to train current CEOs, would- be entrepreneurs and executives on best practices (that would lead them to success), thus raising awareness of management innovation. Those who finish courses will obtain credits from the department of management and business. However, at the same time, researches, seminars and conferences are held in order to raise awareness of the need for SME management innovation and innovation methods among SME CEOs and employees.

e-Business

The term e-business is often used interchangeably with e- commerce. However with the spread of e- commerce, e-business is used broadly to include industry informatization which is closely related to company informatization as well as B2B, B2C and B2G. According to OECD Information Technology Outlook 2004, e-business concept goes well beyond e- commerce as it means all innovative activities to enhance overall business efficiency and create values by transforming and integrating internal and external business processes through the adoption of information system.

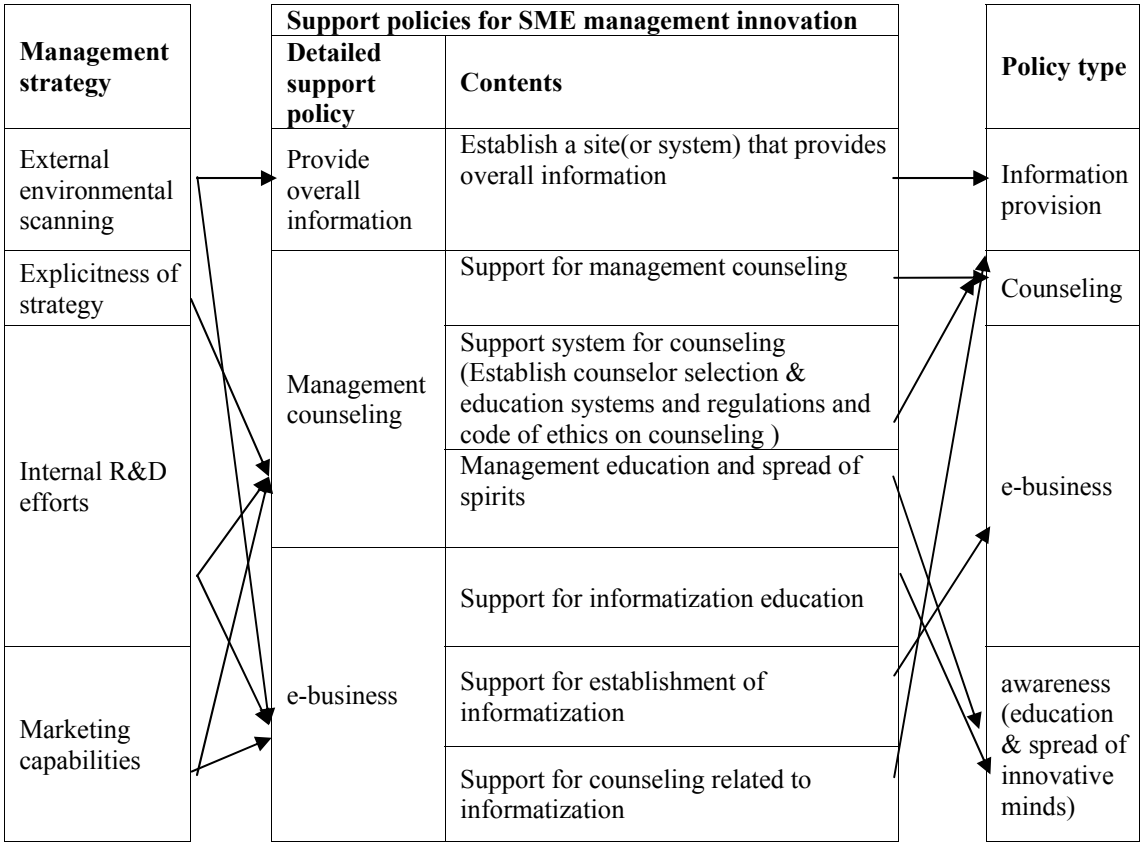
With the arrival of the digital era, e-business has become a new growth engine to dramatically change companies' way of doing business. Through the strategic utilization of e-business within and outside the company's environment, SMEs have sought to enhance productivity and efficiency and at the same time have rapidly innovated the industry structure by creating new business opportunities and changing relations among companies. Thus, in a fierce competition where companies need to ceaselessly streamline business process and cost structure, the adoption of e-business and proactive investment in it has been recognized as strategies to strengthen competitiveness of not only a firm but also a country. E-business is expected to move beyond e- commerce and greatly change ways of doing business in an industry as well as a firm, having a tremendous influence on economic growth in the years to come.

However, despite the fact that e-business has emerged as a new source of competitive edge, a majority of SMEs have failed to reap benefits from e-business without opting for informatization. Hindrances to SME informatization stem from structural problems such as shortage in skilled labor force and capital, and weak innovative minds toward informatization. These problems are much more severe in less developed economies than in advanced economies.

The digital divide between economies will ultimately lead to aggravated polarization between rich and poor economies.

Advanced economies and advanced developing member economies have seen their informatization plans launched in the early 1990s gain momentum these days. Leading economies in informatization have already enjoyed the benefits of e-business with the advancement of the internet and new technologies. However lagging economies (least developed economies) have witnessed their informatization plans or ICT development strategies fail to produce desired results since the 1990s due to internal constraints or the Asian financial crisis. As mentioned earlier, economies around the world are striving to achieve their strategic goals to establish e-business system for their SMEs employing all policy means available. Major policy measures can be classified into education support to promote SME e-business, support for e-business related system establishment and counseling support for e-business.

In conclusion, a research framework for analyzing support policies for SME management innovation in the APEC region can be summarized in Figure 3.2. This aims to study correlations between SME management strategies and SME support policies.



<Figure 3.2> Correlations between SME management strategies and SME support policies

3.7 Clustering and Networking Policy

As reviewed in the section 2.2, the innovation process of SMEs in the cluster could be realized by regional-specific knowledge and capability produced by interactive learning based on networks among innovative actors within a geographically bounded space. Therefore, the key relationships between SMEs and innovative clusters would be highlighted by *system*, *learning and capability*, and *networks*.

It is also important to concern business incubator (BI) as the microcosm of cluster, as it plays similar roles to cluster in stimulating SMEs innovation through clustering and networking. The main roles of BIs do not provide cheap rents and physical infrastructures, but also facilitate the knowledge generation of start-ups by stimulating the linkage of start-ups with research organizations and professional service providers in clusters. Therefore, BIs could be regarded as a system to support start-up SMEs. In this perspective, it should be concerned as a pocket edition of a cluster which facilitates the innovative activities of start-up SMEs.

This section aims to formulate a networking and clustering policy framework that may be able to influence the ability of regional innovation systems to support SME innovation. To this end, there is a need to consider policy levers to promote networking and clustering by facilitating; (1) local assets level-up programs such as public investment in knowledge-based organizations to generate innovation, and business incubating policy to encourage start-up SMEs to build sector strengths; (2) encouraging policies and programs for networking to stimulate the interaction that supports collective learning; and (3) capability development programs to support innovation adoption and technology transfer.

3.7.1 Local Assets Level-up Programs

In order to facilitate the innovative activities of SMEs, it is critical to concern the local assets itself formulated by economic actors such as SMEs and large firms, research organizations, professional service providers and public organizations in the cluster level. Above all, the formulation of an innovative milieu surrounding SMEs is one of the most important factors to stimulate SME innovation. In other words, SME innovation would be more stimulated through policies and programs to build effective and innovative cluster by enhancing the capability of each economic actors implicated in knowledge production and technology innovation processes.

One of the local assets involved in the knowledge production of SMEs in clusters is knowledge-

based organization such as universities and public research institutes (PRIs). They play an important role in providing human resources, new business ideas and technology for SMEs. Therefore, there is a need to have some policy considerations that enable universities and PRIs to enhance their role as the knowledge source and provider for SMEs.

The local assets level-up programs could be summarized as follows.

- Public investment in technology development organizations including universities and public research laboratories, focusing on activities by which locality has strengths.

- Supporting business incubators located in/around universities and public research laboratories, aimed at encouraging start-up SMEs to build sector strengths or fill the gap in the local innovation system

3.7.2 Programs to Promote Networking

External relations are critical for the innovation process of SMEs in clusters, because of the fact that innovation is an interactive process both within a firm and between firms and other organizations (Asheim and Isaksen, 2003; Malecki, 1997; Kline and Rosenberg, 1986). As mentioned earlier, these relations are mainly based on trust-based partnerships (Cooke and Morgan, 1993) and 'untraded interdependencies' (Storper, 1997) drawn upon regional-specific knowledge produced by the complementary interactions of local actors in a certain cluster.

There are various kinds of actors and organizations involved in the innovation process which interact in the innovation system of a cluster: customers, suppliers, competitors, service firms, universities and research organizations, technology centers and transfer organizations, finance and training organizations (Kaufmann and Tödtling, 2003). The analysis of external relations of SMEs with these various kinds of actors and organizations would provide an insight into policy for SME innovation by identifying the characteristics of SMEs' networks for the innovation process in a cluster. Therefore, there is a need to consider the local bridging institutions (i.e. network agencies), which play an important role in developing regional endogenous capabilities by facilitating innovation networks among industries, universities and administrative bodies, to help shaping the direction of R&D and facilitating technology transfer.

3.7.3 Capability Development Programs

It is also important to consider their capability itself, to stimulate the innovative activities of SMEs. The capabilities development programs could be summarized as follows.

- Advice and consultancy to SMEs to increase their motivation and capabilities to absorb innovation

- Education and training of SMEs to increase their abilities through technology transfer training, seminars, *etc.* implemented by universities and public research organizations to engage in collaborative research with SMEs

<Table 3.9> Elements of Clustering and Networking Policy

Elements	Sub-elements	Contents
Local Assets Level-up Program	• Knowledge-based organizations	- Public investment in technology development organizations, including universities and public research laboratories
Programs to promote Networking	• Network agencies	- Encourage local innovation collaboration by strengthening networks among SMEs, large firm and research organizations
	• Collaborations	
Capabilities Development Program	• Consultancy	- Increasing SMEs' capabilities to absorb innovation
	• Education and training	- Enhancing ability of SMEs to engage in collaborative research with research organizations

Chapter 4: Analysis of SME Innovation Policies in APEC

The SME innovation policies of the ten APEC member economies are compared with respect to seven areas of SME innovation policies, which are 1) overall strategy and priorities of SME innovation policies, 2) marketing policies, 3) human resources policies, 4) technology policies, 5) financing policies, 6) management innovation policies, and 7) clustering and networking policies. The characteristics and operational aspects of SME innovation policies in each APEC member economy are identified through APEC member economies' survey questionnaires, literature surveys and direct interviews with governmental officials, intermediaries, professors and business circles. Through these activities, the seven areas of SME innovation policies can be categorized into several groups of differentiated policy characteristics. Furthermore the best practices of each APEC member economy are also selected to conduct an in-depth research for the operational aspects of each SME innovation policy and to induce policy learning. Wrapping up overall SME innovation policies of the ten APEC member economies, the typology of SME innovation policies is proposed in order to identify the distinguished aspects of SME innovation policies in APEC member economies.

Through these analyses, the advanced SME innovation policies can be identified to contribute policy implications to other APEC member economies, which endeavor to develop their own SME innovation policies within the context of their economic, industrial and innovation systems. Section 4.1 compares the overall strategies and priorities of the SME innovation policies in the ten APEC member economies. Section 4.2 compares the six SME innovation policies. Section 4.3 synthesizes the best practices selected from the various SME innovation policies. Finally, section 4.4 proposes a typology of SME innovation policies in the ten APEC member economies with the perspective of general economic/industrial environment and overall focus and priorities of SME innovation policies.

4.1 Comparison of Strategies and Priorities

The ten APEC member economies share common characteristics in SME policies that all of the member economies recently renewed their recognition of the importance of SMEs' role in economic growth, innovation and job creation. The other commonality is that all of the member economies placed the major focus of SME policies on the promotion of SMEs innovation. Witnessing the success of IT revolution and high-tech venture firms in the global markets, all of the APEC member economies choose the strategy to promote high-tech venture firms or SMEs'

innovative activities. The diversities can also be found due to the development stages, technological capabilities, the innovativeness of SMEs and the traditions of SME policy principals in each member economy.

Australia and Canada

With the long history of market-oriented economic development, Australia and Canada relied on and cooperated with the private market institution in the promotion of SMEs innovation, or intervene in the market failure areas such as commercialization of scientific researches. However, Canada has limitation in SME policies because of international treaties with the US.

The Australian government's major innovation policies are centered on the five-year $3 billion dollar *Backing Australia's Ability* (BAA) initiative in 2001. It was targeted at three key themes: 1) strengthening Australian ability to generate ideas and undertake research, 2) accelerating the commercial application of these ideas, and 3) developing and retaining Australian skills. In 2004, the government followed up with an additional package –*Building our Future through Science and Innovation*. It provides an additional $5.3 billion for science and innovation – a 75% increase on the BAA. Over the next ten years, the government will spend an additional $8.3 billion into science and innovation over and above ongoing expenditure. The government aims to improve the flow of finance into business innovation and to stimulate growth of innovative firms by enhancing Australia's capacity to commercialize research and new technologies.

As Canada relies mainly on market mechanism in supporting SMEs, the general policy trend tends to use indirect intermediaries (association board, public institutes and NGOs) in supporting SMEs. Canada has very strong private financial institutes to carry out the indirect measures. International policy standards appear to be an important factor to consider, as the economic link with the US is particularly strong. This may limit the ways to support SMEs. Industry Canada announces strategic issues of the SME policy. They are, 1) strengthening the national policy framework supporting small business and 2) building knowledge through communication, consultation and information exchange. The strategic framework outlined in the Small Business Policy Agenda has major focusing on certain segments of micro-enterprises and fast growing, knowledge-based firms.

Japan, Korea and Chinese Taipei

With the high capabilities of SME support systems, which have been established more than decades, Japan, Korea and Chinese Taipei endeavor to improve the innovation-promotion aspects of SME policies. The three member economies including Japan, Korea and Chinese

Taipei, have a mostly banking-centered financial system with the extensive SME support services of governmental policies. These member economies focus on the recent development of IT revolutions and the importance of venture and start-ups companies, and on the promotion of the SMEs' innovation activities. Japan and Korea shifted from the previous policy stance of rectifying the gap between large corporations and SMEs to the competition-based efficiency-enhancement and innovation promotion of SMEs.

Conventional Japanese SME policies had been basically aimed at rectifying the gap between SMEs and large enterprises. The core points of the policies were to remedy disadvantages which SMEs faced in general business activities. However, as the environment surrounding SMEs has undergone severe changes including economic growth and maturation, the IT revolution and spread of globalization, the Japanese government has recognized the importance of venture businesses, small enterprises and merits of SMEs. To this end, the Japanese government fundamentally revised and restructured conventional SME policies and the SME Basic Law in 1999. The new SME Basic Law is based on a new philosophy of promoting diverse and vigorous growth and the development of independent SMEs. The revised Law has three key factors: 1) promoting business innovation and new business start-ups (or self-sustaining enterprises), which consist of business innovation promotion, start-ups and technology-based venture promotion, 2) strengthening the management base of SMEs, which consists of ensuring managerial resources, facilitating collaboration and joint operation, and ensuring public procurement opportunities and 3) facilitating adoption to economic and social change, which provides necessary social safety nets and bankruptcy legal system.

The Korean government tries to depart from its past policy framework formed in the era of factor costs and rather focus on enhancing vitality of small and venture business by strengthening innovation capacity and international competitiveness of SMEs. The shift of policy paradigm was made to promote voluntary competition and cooperation from the protectionist policy of fostering SMEs. The government has designed a SME developmental roadmap to create an environment where all businesses including small firms and micro-enterprises are able to grow into innovative SMEs with voluntary competition and cooperation. It continues to provide customized policy of setting differentiated policy objectives according to the demands and characteristics of SMEs. Focusing on indirect SME assistance such as establishing infrastructure and offering service and information rather than providing direct SME assistance, the government aims to lay the foundation for an innovative-friendly environment where SMEs can grow into innovative SMEs.

Chinese Taipei's SMEs policy has gained more focus on the self-sustaining R&D operations to

increase SME products-value-added. Toward this end, the government has made much effort to promote R&D spending in SMEs already undertaking R&D and to help them increase total R&D personnel in SMEs already undertaking R&D. The overall strategy focus for SME innovation in Chinese Taipei is placed on fostering innovative start-ups. Due to numerous start-ups in the economy, it is impossible to provide all of them in-depth consultation and training. Hence, the assistance programs should be divided into several levels based on the business conditions of start-ups. There are three levels in the assisting system for start-ups. The first level is the *Business Start-up Consulting Service Center*. It offers general and instant consultation services for a wide range of areas in business creation. The second level is the *Entrepreneur Lab*, which provides in-depth, on-site, and individualized services for qualified start-ups. The last level is incubators. They provide very detailed, in-house, and intensive training and consultation services to start-ups that reside in incubators.

Malaysia, Philippines, Thailand, Mexico and China

The other member economies recently renewed their recognition on the importance of SMEs in economic development and innovation. Malaysia, Philippines, Thailand, Mexico and China, all of these APEC member economies recently reformed their SME support systems with the increase of budget allocations and the establishment of SME support intermediaries such as loan guarantee service or consulting service intermediaries. Some of these member economies even enacted SME promotion laws with the long-term perspective of promoting SME innovation and efficiency gains. However, according to their technological capabilities and industrial capacities, the focus of SME innovation promotion policies has subtle differentiation. While Philippines and Malaysia focus on the integration of domestic SMEs into global production networks with MNCs, Thailand and Mexico centered their priority on the development of indigenous technological capabilities. China, which has the basic research capability and substantial industrial capacity, promotes specifically high-tech start-ups through cluster and incubator formations.

Along with the 1997/98 financial crisis, the Malaysian government put greater effort into strengthening the performance of SMEs by initiating many programs and incentives during the second Industrial Master Plan (IMP2) and the Eighth Malaysia Plan 2001-2005 (8MP). The modernization and strengthening of the SMEs sector were seen as a means to encourage domestic investment and also to provide the critical linkage in the development of the broad-based globally competitive industrial sector. The government envisioned the transformation of SMEs from being labor- intensive enterprises to those based on capital, knowledge and technology. In the process, the capabilities of these enterprises are strengthened to enable them

to scale up the value-chain form OEM to own-design and ultimately own-brand manufacturing (OBM).

The Philippines government recognized that the creation and proliferation of young, small, and dynamic enterprises are an important strategy for creating new jobs and the economic growth. The Magna Carta for Small Enterprises is a milestone legislation to foster a dynamic SME sector. There are three major provisions contained in the Act, namely: Creation of the Small and Medium Enterprise Development Council, Creation of the Small Business Guarantee and Finance Corporation, and 8% mandatory allocation to SMEs (6% for small enterprises, 2% for medium). When the Magna Carta for Small Enterprise was introduced, the policy had shifted to emphasize the mandatory role of the government. Overall Policy Strategy is delineated in *the SME Development Plan* 2004-2010, which aims to create globally competitive SMEs in the new industrial economic environment.

The Thai government has emphasized the innovation of SMEs as an alternative engine for economic recovery and sustainable economic development rather than the huge foreign debts and high non-performing loans (NPLs) of large enterprises (LEs), which was identified as the main cause of Asian financial crisis. As one of the ways which enhance SMEs' innovative activities, the Thai government enacted the Small and Medium Enterprises Promotion Act in 2000, and established the Office of the SMEs Promotion (OSMEP). OSMEP works as an independent government agency, acting as a central planning office, and coordinating the strategic plans and actions of all relevant agencies related to SMEs development. In addition to the establishment of OSMEP, the government proposed the Promotion Plan of Small and Medium Enterprises of Thailand (2002-2006) in the line with 'the 4th Social and Economic Development Plan, to emphasize the importance of SME development. The SME bank was established in 2002, as a specialized financial institution, providing financial support to SMEs and promoting new SMEs. Their main strategic priority is placed on the development of the technologic facilities and the innovative development of SMEs.

The Mexican government's support for SME has increased significantly under the President Fox administration. The creation of the Under-ministry for Small and Medium Enterprise in 2001 was identified as one of the major successes of the Fox Administration. The Fox administration allocates approximately 200 million dollars annually. The amount is almost ten folds as compared with the previous administration. The major trend is to encourage founding of innovative firms and connecting them with resources and other organization so that they can achieve the competitive SMEs in both local and global market. For the purpose, the Entrepreneurial Development Program (EDP) within the National Development Program was

delivered. The objective of EDP can be summarized as providing favorable environment for entrepreneur. After the EDP, integrative policy for the development of SMEs was devised and has been put into action recently in 2004. With the introduction of SME fund strategy (SPyME), Mexico has set up a relevant strategy to implement SME related programs. The strategy encompasses three objectives: 1) entrepreneurship encouragement, 2) collective efficiency promotion, and 3) Systemic model for growth.

During the period of the Chinese 11th Five-Year Plan, the National Development and Reform Committee of China will actively implement SMEs' growth programs. The main goals of the SMEs' growth program are to perfect the innovation supporting system for SMEs based on a plan to carry out and complete the innovation policies. The National Promotion Laws for SMEs have been acted from January 1, 2003 and is the first law giving the foundations of promoting SME development in a systematic way. The Promotion Laws specifically define the roles of the government in SMEs promotion, which are 1) providing financial support for SMEs, 2) promotion of SMEs start-ups and new business ventures, 3) promoting technological innovation of SMEs, 4) supporting the efforts of export and domestic marketing, and 5) providing various infrastructure service for the purpose of establishing the SMEs' innovation-friendly business environment.

4.2 Comparison of SME Innovation Policies in APEC

4.2.1 Comparison of Marketing Policy

Introduction

The elements of comparisons in marketing policies, as being suggested in the theoretical part of marketing policy, are 1) government procurement, 2) export promotion 3) Integration of SMEs into the global supply chain of MNCs or LEs. The ten APEC member economies share common characteristics in some aspects, and sometimes reflect different national technological capabilities, economic and political situations, and national assets with regard to SME innovation policies.

Government Procurement

Six economies possess government procurement policy. Each procurement policy has its own characteristic, while the commonality policy is likely to be subject to special laws and

provisions in accordance with the policy direction of each member economy.

The Australian government procurement policy is mainly subject to the law under the *Financial Management Accountability (FMA) Act 1997* to source a minimum target level for SME participation ranging between 10-20% of contract value depending on the proportion of hardware and services (10% for hardware, 20% for software/services). It also publishes AusTender to ensure that procurement processes are transparent and open, and not to discriminate against.

Government procurement in Chinese Taipei accounts for over 40% of the government's annual budget and most of the rest goes to personnel related expenses. *Article 97 of the Government Procurement Law*, which was promulgated in May 1999, clearly stipulates that the regulatory authorities may take appropriate measures to help SMEs secure a specified share of government procurement business opportunities. The SMEA's key work items for 2004 were; (1) provision of information regarding government procurement opportunities and provision of consulting services relating to the Government Procurement Law; (2) holding of seminars regarding SME participation in government procurement activities; (3) ongoing statistical analysis of the level of SME participation in government procurement in Chinese Taipei.

In Philippine the *Magna Carta for SMEs* specifies the quota for SME in government procurement. That is SME should have 10% share of the total procurement value of goods and services supplied to the government.

The Mexico government promotes tender for disadvantaged people and SMEs under a specific law (Article 9). However, there is no specific and major government procurement program dedicated to SME at the moment. The *Secretaría de Comercioy Fomento Industrial* takes the responsibility to promote the participation of SMEs in government procurement contracts.

Government procurement policy in Korea, however, has different characteristics from these member economies in term of the aim of procurement for SMEs. Korea's public institutions are required to purchase SMEs' technological products that have been approved for performance by the government, thereby promoting technology development of SMEs and public purchasing of SME products. Regarding the progress of the public purchasing system, the government introduced the *system of recognizing the performance of technological products* and the *system of priority purchase of technology products*. As for the performance of these systems, the number of priority purchase requests for technological products stood at 58 in 2004, leading to the purchase worth 5.6 billion won for 15 purchase cases. In 2005, the number of priority purchase requests stood at 271, leading to the purchase worth 13.6 billion won for 56 purchase

cases. During July to December in 2005, the purchase amount of *performance-recognized products* recorded 6.5 billion won for 30 SMEs.

Unlike these member economies in which has government procurement policy, the Canadian government has not directly promoted procurement for SMEs to cut procurement costs. The government moved focus into larger contracts with fewer suppliers, and has led SMEs to participate in procurement in the form of local subcontracting contracts. For example, *Supplier Offsets* is the key policy for large procurement contracts [especially in defence] by seeking to have local subcontracting contracts. It is still debated whether to assign special benefit to SMEs in the procurement program. Except this, there are special procurement rights for native firms - majority of them are SMEs - for any contract under $25,000.

Export Promotion

The commonality of marketing policies in the ten APEC member economies can be attributed to the focus on export promotion. The export promotion policies for SMEs could be divided into three groups: 1) financing supports, 2) information and consulting supports, and 3) brokerage supports.

First of all, member economies in which promote export through financing supports include Australia, Canada, China, Chinese Taipei and Malaysia. The main export promotion programs initiated by Austrade, the primary agency responsible for export promotion in Australia, are composed of three major export promotion programs: 1) the *Export Market Development Grants* (EDMG) assists SME exporters and would-be exporters with small grants reimbursing 50% of eligible export promotion expenses in less than AUD15,000, 2) *TradeStart* is designed to improve SMEs' access to Austrade's export promotion services and 3) the *New Exporter Development Program* (NEDP) provides advice and information on exporting business and marketing in foreign markets.

In China, the funds for promoting SMEs' export were established from year 2000 with the annual budget of around RMB10 billion. The funds are provided for SMEs' export promotion activities such as 1) holding or participating international fairs for SMEs, 2) supports for various kinds of international certifications relating to export product qualifications, environmental regulations, 3) new export market development, 4) education and training for export management, and 5) assisting foreign public procurement. The funds are under the control of the National Department of Commerce.

The Malaysian government promotes the participation of SMEs in trade fairs by financing their

participation as a way of promoting export promotion for SMEs. The *Market Development Grant (MDG)* managed by MATRADE assists SMEs by defraying expenses incurred in developing market overseas (such as travel costs, fees for booths and costs of printing brochures) and expenses incurred in setting up sales promotion office overseas. Over the years, it has become popular in attracting a large number of participants.

In particular, export in Chinese Taipei has played a significant role in economic development. The government has been actively working in many ways to assist SMEs in trade promotion, including financing facilitation, e-commerce promotion, export promotion service unit, the plan on product image improvement, and personnel training. Of these export promotion measures for SMEs, it is likely to be that financial support is the most significant. The lack of finance resource is a common problem for SMEs to conduct export. A difficulty for SMEs to access to financial resource is their credit insufficiency. In order to help SMEs to gain financial resource in conducting export, the SMEA provides SMEs with *credit guarantee* when they make a loan for their export business.

In the case of Canada, the main way of supporting export promotion for SMEs has changes from financial funding to new proposal as a part of SME technology business development.

Secondly, export promotion policy for SMEs, centered on information and consulting services, has been mainly implemented in Korea, Japan and Mexico. Like Chinese Taipei, export has played a critical role in economic development in Korea. Recently, as the importance of SMEs in the Korean economy has increased, the export promotion policy for SMEs has been intensified. In particular, the government has focused on providing information and consulting service for SMEs to enhance their capability to enter foreign market. First, *trade missions* are dispatched to overseas exhibitions and overseas niche markets in order to find product markets for SMEs and promote their export. Second, the government designates private consulting companies as *overseas service centers* to help SMEs advance into foreign markets. They are responsible for conducting market surveys on export and foreign investment, identifying partners, and providing consulting for projects such as establishment of a local legal entity.

In the case of Japan, the SME agency provides advice and information service for SME exporters often by the means of corporate match-making (which is run by the *Business Matching and Advice Programs*) and international strategic partnerships. SMRJ(Organization for Small and Medium Enterprises and Regional Innovation, Japan) offers trade and investment experts' advice and information. Advisors or experts are those who are retired from trade companies, manufacturing and banking sectors, etc., and they have experiences in international-

related works. Additionally, SMRJ holds seminars for internationalization of SMEs while JETRO holds SMEs' foreign fairs.

The Mexico government initiated *Impulsoras´ Program for Exportable Offer* program to facilitate SMEs´ exporting activities through various measures. These measures include the coordination and setting of exportable offer contracts, the design and operation of technical assistance, and coaching system to consolidate exporting projects for SMEs.

Finally, there is a member economy which promotes export through brokerage supports between SMEs and foreign buyers include Philippine. DTI's Bureau of Export Trade Promotion (BETP) operates *Export Assistance Network* (EXPONET) to connect government and private trade promotion offices including trade associations, foreign embassies and other entities. BETP also manage *Business Matching Center* to link SME exporters and foreign buyers.

Beside three types of export promotion policy for SMEs, in Thailand, substantial assistance for SME in exports is to be offered by establishing *ISO Certification Program*. This program is to control the quality of products by setting up the standard towards enhancing SME innovation.

Integration of SMEs into the Supply Chain of MNCs

The inclusion of SMEs in the supply chain of MNCs and their indirect involvement in exporting activity can lead to the significant diffusion of technology and more efficient business models, thereby raising the international competitiveness of SMEs in the global market. Of the 10 APEC member economies, there are three economies (Malaysia, Thailand and Mexico) in which have focused this policy as a way of promoting international marketing. The commonality is based on the high reliance of their developing economy on MNCs.

Firstly, in Malaysia, the 8th Malaysia Plan (8MP) emphasized the marketing of SMEs by integrating SMEs into the global supply chain of MNCs. It has been implemented by introducing the *Global Supplier Program* (GSP) and the *Industrial Linkage Program* (ILP). The GSP, which involved a strategic partnership among the SMEs, MNCs and training institutions, was aimed at strengthening the capability of SMEs as global suppliers. It focuses on a skills development/ training program to enhance knowledge and capabilities of SMEs into world-class suppliers of services and products (Economic Report 2003). In short, the program targets that SMEs will develop the capacity to supply parts for MNCs in the world market as well as in the domestic market. The main difference of GSP training program from the other training program is placed on that training program under GSP is all organized by MNCs participated in GSP. In other words, it enables SMEs to integrate into the supply chains of MNCs by upgrading

workforce capabilities to meet the requirement of MNCs (Junichi Mori, 2005). It also provides core competencies to ensure quality and productivity to meet MNCs entry requirements.

In addition, the 8MP clearly mentioned that the GSP was inside the ILP. The main purpose of the ILP initiated by SMIDEC in 1997 is to develop the capabilities of SMEs to meet the requirement of MNCs and LEs. Through this linkage, Malaysian SMEs become an integral part of the MNCs supply chain, thereby increasing the domestic content of foreign investment in the country. The concept of ILP is synchronized with the GSP and they are complementary. While the GSP provides opportunities of training and business linkage with MNCs for local SMEs, the ILP allows tax incentives for both MNCs and SMEs at the national level. In the ILP, qualified SMEs will be eligible for pioneer status with 100 percent tax exemption on statutory income for five years. MNCs that participate in the ILP will be allowed to deduct the expenditure incurred in i) the training of employees, ii) product development, and iii) testing and factory auditing to ensure the quality of vendors' products from the computation of income tax.

Secondly, the Thai government has also made an effort to promote SME marketing by integrating SMEs into the global supply chain of MNCs. It has been implemented through the *National Supplier Development Program* (NSDP) and the *Board of Investment* (*BOI) unit for Industrial Linkage Development* (BUILD). The NSDP is a kind of subcontracting development program to foster linkage with large enterprises, while the BUILD is (1) to stimulate more consumption of local parts and components, (2) to provide chances for the parts' manufacturers to enter new assembly markets, (3) to help the parts' manufacturers understand related businesses, and (4) to encourage more investment in parts and components' manufacturing in Thailand. Thus, they provide opportunity for SMEs to promote international marketing by integrating into the global supply chain of MNCs or LEs.

Finally, the Mexican government initiated the *National Program for Suppliers Development* for promoting SEM international marketing. There are two main objectives. Firstly, it is to integrate SMEs in new productive chains and to promote regional development by creating industrial clusters in different regions of the country. Secondly, this program aims towards the strengthening of local development by efficient substitutions plans for imports as a means to insert local industry into the international market of suppliers. In particular, it encourages competitiveness inside all those participating firms in a productive alliance, participating in a strategic interaction which eventually will drive a continuous improvement of all firms in the group.

4.2.2 Comparison of Human Resource Development Policy

Introduction

HRD policies have a lot of similarity at a high level. All the member economies try to build an incentive system that helps to restructure industries toward high value added business. In general, SMEs do not have options to utilize the recruitment subsidy policy except very unique cases (*e.g.* substitution of a military service duty by working in SMEs in the Korean case). Most member economies design and implement training programs either in government institutions or in universities.

HRD policies are similar but the levels of enrolment of tertiary education differ from member economy to member economy. It provides valuable information on the high calibre human resources. In general, the share of tertiary education graduates and the literacy level indicates the abundance of talented manpower available to SMEs. <Table 4.1> presents the general situations of manpower in member economies. The high share of tertiary graduates usually coincides with high level of literacy. <Table 4.2> presents policy measures of member economies focusing on recruiting and training.

<Table 4.1> Percentage of Population Who Attained Tertiary Education for the Age Band of 25-34

	The share of tertiary graduates (%)		Literacy rate (%)
Year 2000		**2003**	**2002**
Australia	31.37	36.00	99.0(2003 est.)
Canada	48.28	53.00	99.0(2003 est.)
China Mainland	N.A.	N.A.	90.9
Japan	47.25	52.00	99.0
Korea	37.19	47.00	96.6
Malaysia	11.00	18.00	85.4
Mexico	17.37	19.00	90.5
Philippines	N.A.	17.00	92.7
Chinese Taipei	36.20	43.20	95.8(2003 est.)
Thailand	13.80	18.00	90.5
Average (%)	30.31	33.69	93.9

Note: Training of SME employees usually attract greater interests of policy makers. The measure for training SME manpower is very strongly recommended and executed in Malaysia.

<Table 4.2> Comparison of HRD Policy: General Overview

Recruiting	(Incentive f or work in SMEs)	Training for SMEs (Specific)	Unique Policy
Australia	Apprenticeship (not specific to SME)	√ Strong private training centers	Mentoring
Canada	√ IRAP operates CAN $ 5 million per year	√ IRAP Industry Consultants - NSERC operates industrial research fellowship program(not specific)	IRAP both technical and managerial consulting/work
China		√ (the relevant law specifies training of SME employees)	
Japan	-	√ SME University	
Korea	√ Special tax rate for SME employment of Ph.D holders	√ Training SME employees in consortium	√
Malaysia	Apprenticeship scheme (Not specific to SME)	√ 21 skill training centers, Special training subsidy for SMEs PSMB gives special advantage to SMEs	Human Resources Development Fund (HRDF)
Mexico	-	Business development centers also provide some management related consulting and training	-
Philippines	Regional Training Centers (general measure)	√ Institute within University of Philippines and DTI initiated centers	Youth Business Foundation
Chinese Taipei	√ Provisional Statute for the Expansion of Employment / Manpower assistance program	√ SMEA holds conference and operates training centers	
Thailand			

Note: √ means the existence of SME specific policies.

The major tool to train people is to set up training centers inside universities and colleges. Japan has a dedicated university itself to SMEs (not just a center) as well as many training centers in the different regions. In the Philippines, government research institutions also play a significant role.

An interesting trend in member economies is the increasing integration of technology (skills) and management training. Industrial Technology Advisor (ITA) in Canada performs consulting

not only on technical matters but also on management related matters. This caused a kind of training in both areas. University of Philippines in Manila also operates integrated training center in association with Chamber of Commerce. Japan has also strengthened consulting on management related issues and the consequence is training people on both sides.

Recruiting

Every member economy works hard to decrease unemployment rate. General measures to encourage recruitment can include job centers, promotion of formal education, and tax benefit for employers. Therefore, this section mainly discusses SME specific effort to recruit people.

Canada's supports for recruitment are both general and SME-specific. SME specific Human Resources and Social Development Canada fund provide individuals to work in SMEs. The program is implemented through IRAP.

Chinese Taipei also provides special recruitment program for SMEs. Manpower Assistance Program targets people of all ages who want to find jobs.

Korea has an interesting incentive for recruiting people by SMEs. SMBA provides military service substitution program that targets research graduates who want to work in SMEs instead of serving military duty. In addition, SBC also provides subsidy for SME's on-job-training course of 'intern be employees.' In fact, training program itself is one of most powerful measures to promote recruitment.

Training

Training programs for SMEs frequently involves entrepreneurship education. The Australia government has special fund for SMEs which runs training and mentoring program. In addition, Australia has implemented Australian Apprenticeships Incentives Program.

Canada has various private training programs and its government usually provide subsidies. Undergraduate Student Research Award is partially training and partially recruitment related program that helps university students to get job-related experience.

Japan has a dedicated college for SME education and training. Institute for Small Business Management and Technology (ISBMT) undertakes its role.

Malaysia is one of best member economies in implementing training programs, and equipped

with various programs such as SME Human Resource Development, SBL-Khas Scheme by PSMB, and HRD Portal. PSMB, a government bureau responsible for HRD, has a dedicated Human Resource Development Fund for these programs.

Mexico has a dedicated program run by Under-ministry of SMEs, Ministry of Economics, which is named the Program for Training and Strengthening SME Capabilities. There are other programs operated by other government organizations such as *Competencias* and CONACYT training programs.

In Philippines, various training programs are under execution by the provision of Technical Education and Skills Development Authority (TESDA). Technical and Vocational Education and Training is a flagship program. Regional training centers of TESDA operate to help career development of local people.

Thailand has a unique training provided by MNCs. Training courses from NEC make self-developed training material and tools to upgrade competence and skills of SME employees.

Chinese Taipei also operates a human resource development and training program to provide life-long learning opportunities.

Categorization

The level of formal education can define general situation in categorization. Whether the training is a main agenda in government SME policy is investigated in parallel. Therefore, the second category is the strength of direct government training program.

1) Direct training programs with high level of tertiary education graduates: Chinese Taipei and Korea

2) Direct training programs with low level of tertiary education graduates: Malaysia, Mexico, and Philippines

3) Indirect and strong use of private training institutes: Australia, Canada, and Japan

4) Not so strong SME oriented HRD policies identified: China and Thailand

<Table 4.3> Categorization of HRD

	Weak HRD index in terms of tertiary education	**Strong HRD index in terms of tertiary education**
Strong direct training programs	Malaysia, Mexico, Philippines	Chinese Taipei, Korea
Indirect programs with utilization of private Inst.	Thailand, China	Australia, Canada, Japan

Note: China does not have relevant information on tertiary education so it is not included in the table, and 25% enrolment rate in 2001 is used instead.

4.2.3 Comparison of Technology Policy

Introduction

Technology policy is not implemented as stand-alone tool to promote innovation. It accompanies related financial policy, clustering and networking policy (*e.g.* incubation). The most significant associated technology and financial program is R&D related tax programs. In addition, technological collaboration and R&D programs for SMEs are interlinked to incubation programs. In this section, incubating programs are only mentioned when they are integrated to package programs that guide growth from start to established status. Previously the three elements are picked as important to compare technology policy. Direct R&D programs, indirect R&D tax treatment, and technological collaboration. Member economies implement R&D programs but how R&D programs benefit SMEs differ. In certain member economies, major method is to award SMEs through competitive selection processes, and in other member economies it is to provide matching fund for SMEs that participate in government research programs.

The major comparison is based on the balance between following two measures: direct R&D subsidy and indirect R&D tax treatment. The former is usually called R&D grant that is non-repayable. However, in member economies with a limited budget devised a rather deviated form of R&D grant that is partially repayable. The variation of implementing R&D program whether to allow R&D award directly to SMEs or as partner for public R&D program also provides valuable information on the 'national innovation system.' Furthermore, the pattern of technological collaboration between university-industry-government research institutes in member economies enables the readers to grasp the difference between member economies.

<Table 4.4> indicates the convergence of technology policies amongst member economies. Many member economies actually adopted tax credit to invisible assets and also designed special incentive to SMEs. They learn from each other. For example, 'IRAP' program in Canada is benchmarked by Mexico successfully. The overall level of gross expenditure on R&D (GERD) presents that the member economies with GERD share less than 1% of GDP have had development policy based on foreign direct investment (FDI). China is exceptional in that it has both strong inflow of FDI and sizable R&D activities. In addition, the Business Expenditure on R&D (BERD) presents the overall picture of the national innovation system. In general, the high BERD share is considered to be positive sign.

The first trend is the introduction of SME dedicated fund for technological innovation. For example, Korea has increased the SME dedicated portion to 20.6% of total government R&D related budget in 2005. The second trend is the evolution of R&D tax treatment. Previously unaccounted investment in intangible asset – such as R&D – now enjoys full (and even more than 100%) exemption from taxable income. Member economies that gave tax deduction on high technology capital goods are extending the policy measure to non-physical assets. The third trend is increasing level of technological collaboration between SMEs and other innovative organizations. The organization can be large corporations, research universities, and government research institutes that partner SME R&D. ASEAN member economies and Mexico have relatively low business expenditure share, less than 50% of GERD. However, Malaysia has strong business R&D than other ASEAN member economies.

<Table 4.4> Comparison of Technology Policy: General Overview

	R&D tax treatment	R&D grant/subsidy	Technological collaboration policy	R&D /GDP('03)	BERD /GDP('03)
Australia	○	√	○	1.69('02)	0.83('02)
Canada	√	√	√	1.95	1.05(est.)
China	○	√	√	1.31	0.8('02)
Japan	√	√	√	3.15	2.3('02)
Korea	√	√	√	2.63	2.2('02)
Malaysia	○	√	N.A.	0.5('00)	0.37(est.)
Mexico	○	√	√	0.39('01)	0.1('01)
Philippines	○	N.A.	√	0.22('97)	0.1(est.)
Chinese Taipei	√	√	√	2.05('00)	1.43(est.)
Thailand	○	○	√	0.29('99)	0.1(est.)

Note: √ Existence of the SME specific policy upon general R&D tax treatment, ○ Existence of policy but no preference to SMEs , N.A. Not Avaliable.

Source: OECD Science and Technology Outlook 2004, APEC CICC indicators

R&D tax treatment

R&D tax treatment can be delivered in diverse forms. The most prominent tool is R&D tax credit, but R&D expenditure can be deducted from taxable income – R&D depreciation rate is another tool equivalent to R&D tax credit. As such, the international comparison is usually transformed into tax credit or B-index (OECD 1996). The lower B-index means the more generous tax treatment, and amongst APEC members in OECD, Canada leads with the lowest B index. After Canada, Australia, Korea, Mexico, and Japan rank in order. In addition, there are certain variations in applying the benefit such as providing incremental incentives if firms increase R&D compared with R&D investment of previous financial year or providing preferential rates for SMEs (in general more generous than those for large firms).

The policy tool to promote further investment in formal research and development is only effective when the firms have capacity to invest in non-fixed assets. The success of Korean R&D tax credit policy in 1980s is usually quoted for the proper timing. The R&D tax credit is effective in particular when firms want to expand R&D investment. APEC member economies that have achieved the internal capital accumulation for the transition to high-value added economy consider the policy measure seriously, and some went further to give tax credit to individual research personnel as well as the firm. In the case of advanced member economies, the introduction of tax credit has not made much impact if not oriented toward SMEs, for large corporations invest in R&D regardless of the tax credit and SMEs tend to be sensitive to R&D tax credit.[11]

R&D tax treatment is one of major tool for the Australian government, AusIndustry has special tax deduction rate of 125% for R&D investment and devised incremental to 175%. In fact, R&D tax allowance is the most powerful tool in Australia and the amount of support surpass R&D grants and subsidies.

Canada also utilizes R&D tax credit as major tool. Canada has been strong in implementation of R&D tax credit and significantly favors SMEs. SMEs enjoy 35% tax credit against the normal R&D credit rate 20%. There could be additional tax benefit from provincial government. Unlike other tax allowance and tax credit, the Canadian government supply credit to R&D even though firms do not have taxable income (loss making). This resulted in the best performance in terms of the share of SME performing R&D. SMEs perform 41% of Canadian R&D.

[11] R&D tax credits a poor catalyst, **The Times,** December 29, 2005

China employed similar measures to Australia. Its tax allowance rate of 150% is over the level of Australia of 125%. In addition, China has generous depreciation rate for R&D equipments.

<Table 4.5> Comparison of R&D Tax Treatment

	R&D tax treatment	Note
Australia	for general firms – mainly depreciation on R&D investment	R&D concession, incremental
Canada	35% (SME) 20% other firms	SME specific
China	for general firms	
Japan	SMEs enjoy higher rate of tax credit 15~20% level (incremental)	SME specific
Korea	SMEs enjoy higher rate of tax credit	SME specific, incremental up to 50%
Malaysia	Pioneer firms (not specific to SME)	Generally high
Mexico	30% tax deduction not specific to SME	
Philippines	mainly tax deduction on capital goods, so weak subsidy	
Chinese Taipei	Incremental	SME specific, Incremental
Thailand	For general firms	

Japan has moderate tax credit for R&D investment, and the level is reported to be about 20%. The rate for SMEs can be higher for SMEs as 6% additional incentive given to firms with less than 1,000 employees. Japan also employs dual incentive system volume and incremental. The Japanese government spends more money on R&D grant than the R&D tax credit.

Malaysia has tax exemption or 70% reduction of tax on R&D investment for 5 years, and this benefit is for 'pioneer status' firms. However, it does not aim SMEs particularly. Its main aim is to give benefit to high-technology firms.

Mexico has very high level of R&D tax credit (30%), but SMEs do not have prestigious rate of R&D relief. The main beneficiary is generally perceived to be SMEs because of almost none-existence of local MNCs.

The Philippines government uses tax credit measures, but still it mainly targets physical equipment or exporting firms. There is no preference for SMEs either.

Chinese Taipei has high R&D tax credit with volume incentive 30% plus 20% further credit (*i.e.* incremental incentive) for increments over period. For example if the company has increased the R&D from 100 to 120 dollars then the firm may get back 34 (=30 + 20 x 0.2) dollars on the investment. This is by far more generous scheme than tax credit for equipment (5 ~ 20%).

Thailand also has R&D tax allowances of 200%, which is one of the most generous rate among member economies. However, the Thailand's level of business expenditure on R&D is not high, which raises question on the effectiveness of R&D tax allowances.

It is interesting that almost every member economy introduced R&D tax credit only about half of them have introduced 'SME specific' or 'SME favoring' tax credit policy. Japan, Korea, and Chinese Taipei show very similar characteristics in terms of stimulating policy. All of them have SBIR program, though they differ in detailed program structure.

R&D grant

A basic R&D grant exists in all the economies, but some member economies do not have a SME specific R&D programs. All the member economies that have a specific SME department in the government are implementing separate R&D program for SMEs usually dubbed as SBIR because the diverse R&D support programs in different government organizations are centrally controlled in the scheme. In other words, East Asian version of SBIR is rather emphasizing the integrative aspect of program (i.e. coordination of cross-department). Korean style SBIR - KOSBIR has a target to allocate certain amount of public R&D budgets designated for SMEs. KOSBIR has very similar characteristics with Japanese style SBIR. They do not specifically pick up research project manager in an SME (as in the case of US SBIR). Japanese style SBIR aims to foster innovation based SMEs, which is clearly visible in following announcement.

"In order to activate SMEs with technology development capability and to support business activities with originality, relevant ministries and agencies collaborate to grant subsidies and spend outsourcing expenses centering on SMEs for development of new technologies that lead to the creation of new businesses, and take special measures such as expansion of the scope covered by the credit guarantee system to consistently support the commercialization of new businesses."

Australia government's flagship innovation grants program, 'commercial ready', provides SME around $200 million a year from 2004 to 2011. The awarded SMEs can get A$ 50,000~ 5 million for the duration up to three years. In addition, special program exists for pharmaceutical sector. P3 program for pharmaceutical sector gives 30% or up to A $ 10 million grants to R&D expenditure.

Canada and Mexico perform providing R&D grant to SMEs in a very similar way. Canada's NRC-IRAP has implemented IRAP-TPC research program that awards novel innovation project. The program provides award of up to 50% of project cost, which is repayable grant.

Mexico currently operates more than 200 Innovation Labs with other financial assistance and networking for business acceleration (e.g. TechBA). The level of subsidy is up to 50% of project costs. Both of these programs operate on competitive awards.

<Table 4.6> Comparison of R&D Grant

	R&D grant	Note
Australia	√ 'commercial ready' A$200M	A$ 50,000~5M for each SME
Canada	√ (indirect by IRAB and ITC)	
China	√ SME specific innofund and program	
Japan	√ Japanese version of SBIR	SBIR
Korea	√ KOSBIR more than 10 % R&D grant targeted for SMEs	STIP & SBIR
Malaysia	√ SMIDEC provides matching grant for some specific programs. Technology Acquisition Fund available for patent application	RM 4.84 million in 2004. TAF RM 2 million
Mexico	√ Innovation Lab and TechBA	
Philippines	SME sector (e.g. handcraft) specific	
Chinese Taipei	√ Chinese Taipei's version of SBIR	SBIR
Thailand	Sector specific	

Note: √ means that R&D grants specific to SMEs exist

China has implemented a dedicated SME R&D program- Innofund program whose amount is US$ 60 million per annum. Innofund provide start-up capitals for techno-entrepreneurs and partial subsidies for developing technology based SMEs. Technical updating fund for SMEs is another major program that provides R&D grants. It can be a matching fund for R&D or subsidy of loan. In addition, the Torch program aims to help technology based incubators.

The Philippine operates government research institutes under Ministry of Science and Technology. Some of them provide research centers for SMEs but it is slightly different from dedicated sizable R&D program for SMEs.

Chinese Taipei implemented SBIR very similar to that of US, which promotes application of new technology and business model. Its application and award procedure also reflect influence of US SBIR. In another look, the SBIR puts stronger emphasis on technological collaboration and strongly promoting subcontracting R&D organizations or universities.

Thailand provides research strategy that aimed to grow five strategic industrial sectors, but it is not specifically aimed at SMEs.

Technological Collaboration

It is not easy to find SME specific R&D collaboration programs in member economies. This is because policies that encourage R&D collaboration exist in all sized firms (*e.g.* Australia). It seems that policy makers do not recognize needs to set up SME specific collaboration policy. Including SME in university-industry R&D collaboration is not designed in the formal policy. From different perspective, it is because technology incubating centers in universities play equivalent roles in technological collaboration involving SMEs. Established firms may get help in using expensive experiment instruments and machines in local technology centers, but they are not prime targets for technological collaboration.

<Table 4.7> Comparison of R&D Collaboration

T	echnological collaboration	Note
Australia	Industry Cooperative Innovation Program, Cooperative Research Centers	Not specific to SME
Canada	Precana, CANARIE	SME specific
China	General measures by law	
Japan	New Tie-Ups	SME specific
Korea	Joint industry-university research program	SME specific
Malaysia	The second National Science and Technology Policy encourage partnerships between public-funded organizations and industry	
Mexico	TechBA implement internal sub-program that provide networking of SMEs	SME specific but too small resources
Philippines	General measure like University of Philippine and Ayala center	SME specific
Chinese Taipei	Industry-academia collaboration centers, Academia Science and Technology Project	SME specific
Thailand	Vendors Meets Clients (VMC) program	SME specific

Australia has implemented the Industry Cooperative Innovation Program that encourages business to business collaboration.

Canada has a technological collaboration program for SMEs. In general, not-for-profit organizations functions as portal for implementing cooperative program between large and small firms. Canada's flagship program for SME - IRAP - utilizes government laboratories - National Research Council, IRAP industrial technology advisors build technological collaboration between IRAP and SMEs.

China has national program that promotes international cooperation on R&D, but this is not specific to SMEs. China's strength lies in a natural bond between universities and venture firms.

Since 2001, the Chinese Taipei government has launched the *Academia Science and Technology Project,* which increased the number of technology transfer centers of universities. In addition to these technology transfer centers, 6 regional industry-academia collaboration centers were established in 2002. Chinese Taipei has traditionally strong in collaboration between government research institutes (e.g. Industrial Technology Research Institute: ITRI) and SMEs, but recently it achieved the increased technological collaboration between universities and SMEs. SBIR projects with R&D alliances can apply higher level of R&D grant (five times) up to NT $ 5 million for phase I and $ 50 million for phase II.

Malaysia has implemented the Second National Science and Technology Policy for encouraging partnerships between public funded organizations and industry as well as between local and foreign enterprises. Malaysia has very low level of higher education R&D[12] which suggests that the technological collaboration occurs between private firms or between government laboratories and private firms.

The Philippines has moderate R&D activities in university and government research institutes, but business R&D is weak. Government research institutes play important partner roles for SME R&D. University also hosts the center for SME innovation.

Thailand has special program to build strong linkage between part suppliers and assembling vendors. Vendors Meets Clients program provides R&D subsidy for the R&D collaboration between component suppliers and assembly firms.

In general, Australia, Mexico and Thailand focus on industry-industry technological collaboration. Another group focuses on industry-university partnership. They are Chinese Taipei, Japan, and Korea. The pattern of technological collaboration depends whether university characteristics are close to education or to research. It is well known that the US has many research universities, and Japan and Chinese Taipei try to duplicate the success of US universities by building Technology Licensing Office (TLO) in universities. Korea also strengthened the linkage through industry-university joint R&D program. In the case of China, universities and spin-off firms have good relationship, though it seems to be natural process regardless of government intentional policy.

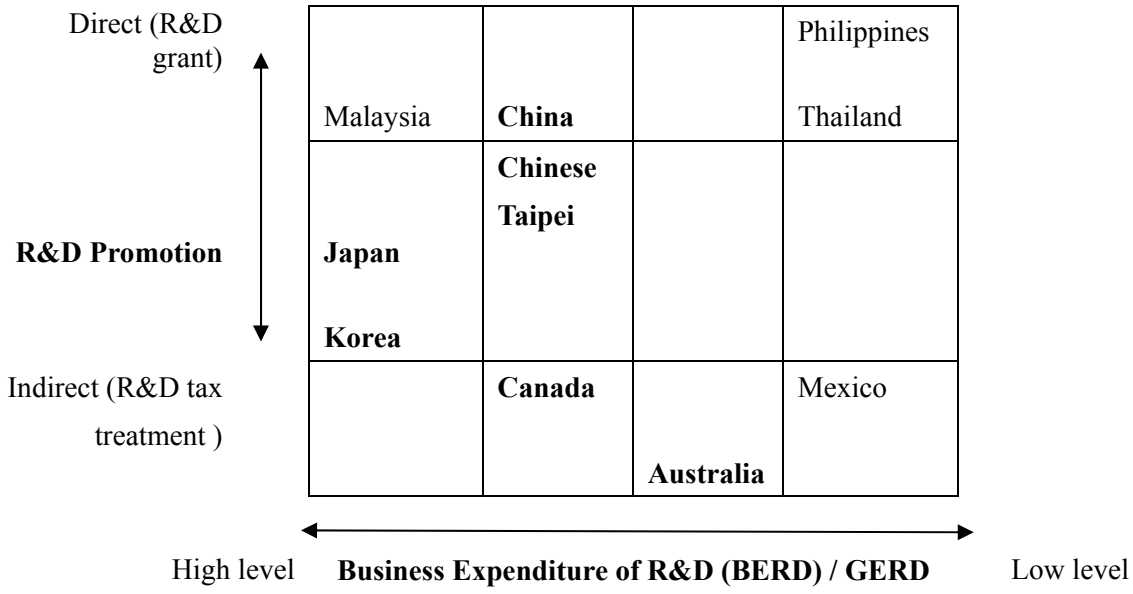
Philippines and Canada utilized government research institutes and not-for-profit organizations to encourage technological collaboration. Malaysia also depends much on public research

[12] ASTNET web page, http://www.astnet.org/index.php?name=Main&file=stindicators

organizations for the purpose.

Categorization

Although technological collaboration can be important to identify how national innovation system works, the technology policy can be categorized by emphasis on indirect vs. direct measures: R&D tax treatment or R&D grants. It is possible to divide member economies into three groups based on direct/indirect measures to support SME R&D. Member economies that depend heavily on R&D tax credit are Australia, Canada, and Mexico. Member economies that rely much on R&D subsidy or R&D grant/ loan programs are China, Malaysia, Philippines, and Thailand. The third group that is mixing direct and indirect measures includes Chinese Taipei, Japan, and Korea. Korean R&D grant is less direct because majority of R&D grant is directed for those who participate in national R&D programs.



Note: member economies with bold indicates R&D share of GDP more than 1%

<Figure 4.1> Categorization of technology policy in APEC members

The categorization is not straight forward, as the level of business R&D expenditure also matters in the categorization of technology policy. High level of business expenditure on R&D (BERD) is preferable for vibrant innovation. Japan and Korea have high level of BERD. Even though the Japanese government invests a great amount of R&D budget, major players are private firms. Consequently, the contribution from the government is relatively small. Korea and Malaysia also show the same pattern as BERD take lion's share in total gross expenditure on R&D (GERD). In this sense, Mexico, the Philippines, and Thailand have too low level of BERD

as high-technology firms are small in numbers.

Mexico has taken a biased measure to prop up business R&D with massive R&D tax credit. The measure is only working when the R&D potential in business sector is strong. Contrary to Mexico, Malaysia has high level of BERD, but it has not done much to encourage R&D of SMEs with strong tax credit for SMEs. Malaysia tax credit is mainly targeting foreign owned MNCs' R&D by giving pioneer status for these firms. There is no panacea, but this report hints that keeping balance between R&D grants and R&D tax treatment and increasing BERD share around 65~75% level would be recommendable.

4.2.4 Comparison of Financing Policy

Introduction

The 10 APEC countries have diverse financial systems and lie on the different stages of financial market development. The financing policies of each APEC country are also in accordance with each country's financial market environments. Roughly speaking, Canada, Australia possess Anglo-Saxon type's financial market oriented system. On the contrary, Japan, Korea, and other Asian member economies, which are extensively influenced by German and Japanese financial system, possess banking-oriented loan system. However as the global trend has shifted to venture capital and high-tech start-up companies, the financial system and the financing policies of banking-oriented member economies is also adopting the elements of venture investments and equity financing policies.

The elements of comparisons in financing policies of the 10 APEC member economies, as being suggested in the theoretical part of financing policy, are 1) Equity program: either direct equity financing program or hybrid-funds with private venture capitals, 2) BANs(Business Angel Networks) policy to promote networks of venture capitalists, 3) Direct loan program, and 4) Loan guarantee program.

Equity Investment for High-tech Start-ups

The ten APEC member economies share common characteristics in some aspects, and sometimes reflect different governmental philosophies with regard to SME innovation policies.

The commonality of financing policies in the ten APEC member economies can be attributed to

the recent establishment of governmental equity investment program, especially in strategic high-tech industries. Turing from the 21st century, IT and BT are booming as new technological frontiers with leap-frog opportunities for innovative SMEs to become global competitors. During the periods of pioneering new technological frontiers, SMEs experimenting diverse technological paths with high risk and high returns are indispensable. Thus, the financial market with venture capital and angel capital, which can handle the investment opportunities with high risk and high returns, could be appropriate forms of financing instead of traditional banking system.

The ten member economies are generally involved in equity financing program for innovative SMEs in high-tech new industry either directly or indirectly, observing the market failures of immature financial markets especially for the early high-tech start-ups with no sufficient collaterals. However, some economies with active financial venture capital markets, such as Canada, China and Mexico, did not operate direct equity financing programs but indirectly take the roles of connecting venture capitals and new high-tech firms such as BANs. On the other hand, some economies, in which high tech industries are not mature enough to finance innovative SMEs, such as Philippines, direct or indirect equity programs were not yet implemented.

Republic of Korea has established the fund of funds program in 2005, under the guidance of the Act on Special Measures for the Promotion of Venture Businesses. The program designated the private financial company, Korea Venture Investment Corp. to manage the fund for the purpose of providing the seed money to innovative SMEs and venture firms. The program resources are to be created to 1 trillion won until 2009, and so far 385 billion won are created in 2005 and 2006.

Chinese Taipei initiated the ‘SME Incubation Investment Trust Accounts’ in 2003 in order to provide the secured working capital to newly established SMEs less than five years with strong growth potentials. The program is scheduled to be allocated NT$2 billion during 4 years of operations.

Malaysia established two venture capital funds of RM 150 million in 2000 in order to encourage the development of new technology industries such as information technology, communications, advanced manufacturing and life science as the engine of economic growth.

Thailand raised the OSMEP Venture Capital Fund of THB 5,000 million in 2003, in order to promote investment in innovative start-ups and technological SMEs with high potentials in

target industries such as Software and IT, Automotive Parts, Fashion and Design and export oriented business.

Australia started the Innovation Investment Fund program in 1997, which was designed for the promotion of commercialization of R&D through the injection of venture capital to small and high tech start-ups or early expansion companies for the target industries such and IT and Bioscience. The Australian government invests AU$ 221 million in the funds matched by private investors.

Japanese government, through SMRJ(Organization for Small & Medium Enterprises and Regional Innovation), also invest into limited partnership for venture capital investment in order to promote investment to venture business. Japan established the private investment company, Small and Medium Business Investment and Consultation Companies, which are owned by local governments or financial institutions, in order to invest in SMEs with less than 300 million Yen.

Canada, Mexico and China do not have explicit forms of direct equity financing programs, but mostly play the roles of investment networks through BANs. Canada does not have direct equity financing program for innovative SMEs, but, venture capital groups are closely linked with local incubators and clusters. For example, in Ottawa an ITA would participate in a local business organization which would review proposals seeking angel funding. Angel funding, which are more broadly based geographically, is estimated to be 1 to 3 times of venture capital funding in Canada. Mexico installed the 'SMEs Investor Club', which is a group of private or public businessman with financial resources, in order to promote syndicated investment into productive early-stage SMEs during the courses of the Program of Entrepreneurial Development 2001-2006. China also does not have specific equity financing programs or BANs in central governmental programs. However, as Chinese government pursued the cluster and incubator development strategy for promotion of high-tech start-ups and venture firms, the local incubators have close networks with angel investors and venture capitalists, who can provide investment into highly-promising high tech SMEs and start-up companies in the incubators.

Direct Loan Programs and Credit Guarantee

Direct loan programs are traditional tools of providing funds for SMEs, which lack in collaterals and credit and thus unable to finance from banking system. Thus, mostly developing member economies and banking-system-based member economies utilize direct loans programs often with credit guarantee schemes.

While Japan and Korea are most extensive in their direct loan programs for SMEs, most of Asian member economies such as Malaysia, Philippines and China, and Mexico operate diverse direct loan programs. However, Chinese Taipei only provides extensive credit-guarantee schemes.

Australia and Canada, which have market-oriented financial systems, do not operate direct loan programs nor credit guarantee schemes. Thailand also does not have direct loan programs to promote SMEs development unlike other developing member economies and most of Asian member economies.

Japan has three channels of providing direct loans to SMEs: 1) the Japan Finance Corporation for Small Business (JASME) established in 1953 for long-term capital, 2) National Life Finance Corporation (NLFC) established in 1949 for small loans to very small business, and 3) the Shoko Chukin bank established in 1936 for member companies' loans. These three governmental financial institutions have 26.8 trillion yen as total outstanding loans to SMEs, which is 10.3% of total financial loans to SMEs. Besides these direct loan programs, Japan has two institutions for credit guarantee schemes, which are Credit Guarantee Corporations, of which outstanding guarantee is 329,739 billion yen in 2005, and JASME, 14,278 billion yen.

Korean SMBA provides policy loans to SMEs for the purpose of promoting innovative SMEs. The policy fund amounted to 2.75 trillion won in 2006. For credit guarantee schemes, Credit Guarantee Fund and Technology Credit Guarantee Fund were established respectively in 1976 and in 1989. With the budget for guarantee, as of June 2006, the government provided 300 billion won for credit guarantee funds, 600 billion won for technology credit guarantee fund, and 14.5 billion won for guarantee foundations.

Philippines established Small Business Corporation (SB Corp) in 1991, which provide credit financing and guarantees to Philippines SMEs. SB Corp provide wholesale funds with low interest rates to bankable SMEs, credit guarantees for near bankable SMEs and direct loans to non-bankable but promising SMEs. Beside, all lending institutions are required to provide at least 6% of total loans to SMEs.

Malaysian governments allocated a total of RM 555.6 million for direct lending to SMEs, of which RM 100 million was channeled through SMIDEC. And also in 2005 SME Bank was created through the merge of two banks, BITMP and BPIMS in order to provide financial, non-financial services (such as development of entrepreneurial community) and credit guarantee to SMEs. China provide direct loans or grants to innovative SMEs from the Innovation Fund for

Small Technology-Based Firms, which was established in 1999, and also from the Funds for SME Development, which was established in 2004, with annual budget of 3 billion yuan in 2006.

Mexico established the Seed Capital Program to operate in 2005 in order to direct financial resources to entrepreneurial projects, which are previously identified, developed and evaluated by business incubator centers. Direct loans are granted based on the technological level of the new business model. The Seed Capital Program had the budget of 100 million pesos in 2005. Besides, National SME Guarantee Program was established under the administration of Ministry of the Economy and two Development Banks, NAFIN and BANCOMEXT. Chinese Taipei does not provide direct loan programs but established the SME Credit Guarantee Fund in 1974 for facilitation of SMEs loan financing. The Fund provides credit guarantees for micro-enterprises start-up loans, for R&D loans of industrial upgrading, and for knowledge economy enterprise financing. In 2004, the Fund provided 265,139 credit guarantees with a combined value of NT$315,658 million, helping 126,457 enterprises to secure financing worth NT$517,037 million from financial institutions.

Categorization

The ten APEC member economies are diverse in their economic development stages and financial market systems, and thus the methods of financing policies are inevitably various. When comparing financial market sizes of the 10 APEC member economies, Japan, Canada possesses the stock market capitalization more than US$ 1,000 billions, while Philippines, Thailand, Mexico and Malaysia are far behind in terms of financial market size less than US$ 200 billions. Korea and Chinese Taipei shows relatively similar stock market capitalization, which are little above US$ 400 billions. Australia and China Mainland also showed relatively similar stock capitalization, which are around US$ 700 billions.

Even though China Mainland recorded the high volume of stock market capitalization, which is comparable to Australia, the efficiency of Chinese financial market in providing financial capital to companies is quite not satisfactory according to survey data. The average answer to the 1st question of “Stock markets provide adequate financing to companies” is the second lowest next to Mexico among 10 APEC survey. The 2nd question about “Venture Capitals: venture capital is easily available for business development” produces a relatively similar answer, which recorded the lowest among 10 APEC member economies, with the 1st question. Australia, Canada, Japan forms the highest country group in the 1st stock market adequacy and 2nd venture capital availability questions, while China, Mexico, Philippines forms the lowest

country group. Thus from the perspective of financial market development stages, Australia, Canada, Japan are categorized as the high development group, and Chinese Taipei, Korea, Malaysia and Thailand can be categorized into the Medium development group, and China, Mexico, Philippines can be categorized into the low development group.

<Table 4.8> Stock Market Capitalization

(US$ billions)	2000 2001		2002	2003	2004
Australia	372.79	375.13	378.85	585.48	776.40
Canada	841.39	700.75	575.32	893.95	1,177.52
China	580.99	523.95	463.08	681.20	639.77
Japan	3,157.22	2,251.81	2,126.08	3,040.67	3,678.26
Korea	148.65	220.05	249.64	329.62	428.65
Malaysia	116.94	120.01	123.87	168.38	190.01
Mexico	125.20	126.26	103.14	122.53	171.94
Philippines	25.96	21.22	18.55	23.57	28.95
Chinese Taipei	247.60	292.62	261.47	379.02	441.44
Thailand	29.49	36.35	46.17	119.05	115.40

Sources: IMD WORLD COMPETITIVENESS YEARBOOK

<Table 4.9> Stock Market Survey: **Stock markets provide adequate financing to companies (10.0 scale)**

(US$ billions)	2000 2001		2002	2003	2004
Australia	7.71	7.79	8.18	7.64	7.98
Canada	7.75	7.09	8.14	7.44	7.81
China	5.05	4.82	4.94	4.17	4.53
Japan	4.96	4.37	5.90	5.85	7.04
Korea	6.11	5.06	5.79	5.48	5.69
Malaysia	6.51	6.36	7.00	6.06	6.33
Mexico	3.73	3.64	3.34	3.24	4.18
Philippines	4.22	3.60	4.14	4.76	4.78
Chinese Taipei	7.03	6.94	7.35	6.78	6.80
Thailand	5.16	5.76	7.01	6.55	6.61

<Table4.10> Venture Capital Survey: **Venture capital easily available for business development(10scale)**

(US$ billions)	2000	2001	2002	2003	2004
Australia	5.64	5.75	5.95	5.93	6.25
Canada	6.42	6.10	6.59	6.26	6.52
China	2.99	2.95	3.37	2.98	2.92
Japan	3.20	3.33	4.08	4.68	5.53
Korea	5.67	4.29	4.50	5.10	4.40
Malaysia	5.30	5.70	6.29	4.78	6.56
Mexico	2.36	2.46	2.20	2.62	3.38
Philippines	3.23	3.52	3.00	3.38	3.57
Chinese Taipei	6.47	6.36	6.76	6.44	6.40
Thailand	4.35	4.81	5.23	5.17	5.00

The SME financing policies of ten APEC member economies can be divided into two broad groups, while still possessing diversities even within the groups: 1) investment-focused group and 2) loans-focused group. The investment-focused group consists of Canada, Australia, Thailand, China and Mexico. These economies all share the characteristic that government does not provide or provide only small proportion in recent years for systematic direct loan facilities. These economies do not have special banks or credit guarantee institutions for SMEs. But still the diversities remain within the group. First of all, Canada and Australia have most developed financial market system, while Mexico, China and Thailand lag behind. Moreover, while Australia and Thailand governments are directly involved in creating Venture Capital Funds to provide investments for innovative SMEs, Canada, China and Mexico only participates in the network formation of market venture capitalists with start-ups.

The loans-focused group consists of Japan, Korea, Chinese Taipei, Malaysia and Philippines. These economies all share the characteristic that governmental financing programs are centered about bank loans and possess special banks or guarantee institutions to operate for systematic loans and guarantee services to SMEs. However, these economies except Philippines have created equity investment programs in recent years especially targeting for high-tech innovative SMEs. But still the loans programs are the main channel of financing support to SMEs. Japan, Korea, and Chinese Taipei have the longest history of governmental loans programs while Malaysia and Philippines relatively newly established the public loan systems. Chinese Taipei has the uniqueness that it does not have direct loan programs but has extensive loan guarantee systems.

<Table 4.11> Categorization of Financing Policies

		Investment-focused group		Loans-focused group	
		Government Direct equity programs	BANs-centered	Loans Only	Loans+VC
Development Stages of Financial Systems	High	Australia	Canada		Japan
	Medium	Thailand			Korea Chinese Taipei Malaysia
	Low		Mexico China	Philippines	

4.2.5 Comparison of Management Innovation Policy

Introduction

There are several elements in promoting management innovation in company management strategy: search for external environment, an explicit management strategy, internal R&D support, and e-business service activities. In general, provision of policy information, SME counseling, spread of an innovation mindset and e-business support programs are regarded as policies to support the previously mentioned elements.

This section presents comparison analysis of management innovation targeting 10 APEC member economies and examines 1) provision of policy information and spread of management innovation mindset 2) SME consulting 3) e-business projects.

Integrated policy information and spread of management mindset

Today, challenges that confront SMEs such as lack of finance and technological resource, unskilled work force and irrational organizational system have given them limited access to required information in business activities and limited access to information collection of government-support policy. Therefore, an efficient way to solve such deep-rooted problems is to create a SME-friendly environment. In other words, it is strongly recommended to establish an integrated information portal site (or system) which can provide a bird's eye view of the information about SME management and government-sponsored SME policies from SMEs start-ups to closure, depending on the stages of SME venture businesses and infrastructure for

SMEs (technology, fund, work force, market/ export, start-up, tax and administrative regulations).

There are three APEC member economies that have built integrated portal sites: Australia (http://www.business.gov.au), Canada (http://canadabusiness.ca, http://strategis.ic.gc.da/sbrearch), and Korea (www.spi.go.kr). In particular, Canada and Korea provide a free telephone consulting service, while a Malaysia's financial support system portal site offers information service of financial support policy for SMEs.

Overall, member economies in APEC are conducting various support policies to disseminate SME management innovation mindset. Now, we look at management policies of each economy.

Chinese Taipei has built SME knowledge management service website, focusing its policy for management innovation on knowledge management. As a way to strengthen the information management capability of SMEs, the government established e-learning platform, which is called Business Zone. So far, 51 issues and reports have been published in e-paper and magazines in e-Land portal site. The government offers a 90-hour training course for enhanced CEO management capacity and digital file for management knowledge. It has also established Knowledge Base by holding international conferences & information fairs and introducing government policies.

<Table 4.12> Websites for Policy Information and e-Learning

Website	SME Support Policy	
	Available	**Not available**
policy information (website)	Australia, Canada, Korea, Malaysia,	Japan, Chinese Taipei, Philippines, China, Thailand, Mexico
Establish e-learning website	Chinese Taipei	Other economies

In an effort to foster a number of start-ups and to develop SME network, SMRJ in Japan hosts various events, such as Venture Fair Japan, Venture Plaza and SME Expo, ranging from occasions for SMEs to meet with investors and business partners to events that provide information to inspire the creation of new business area. Government-affiliated agencies, such as SME comprehensive support centers and SME financial corporations, provide a wide range of information on SME support policy.

Australia's National Innovation Awareness Strategy(NIAS) aims to raise awareness among young Australians, small to medium sized businesses(SMEs), and the broader community, of

economic benefits of innovation and entrepreneurship and it aims to promote the achievements of Australian's scientists and science teachers. The program also seeks motivating CEOs and young people to aware the significance of innovation so that young people can pursue innovative and entrepreneurial careers.

DTI in the Philippines initiated and held a variety of forums and seminars, providing an opportunity to share SME best practices. The SME Awareness Program of the *Philippine Center for Entrepreneurship* (PCE) works in association with various schools, NGOs, and private corporations to improve entrepreneurship education. As a government-award program, Awards for SME Excellence are granted to SMEs biannually and this program is contributing to strengthening SME competitiveness and innovation.

Korea also holds seminars and forums in an effort to spread SME innovation mindset and has a separate training program to enhance management innovation mindset for CEOs.

Consulting

Canada, Japan, Australia and Korea introduced highly advanced SME consulting policies in APEC economies.

Consulting policies are well established in nine member economies out of ten in APEC. For example, although Australian and Canadian governments adopt indirect support policy by providing related information rather than providing direct way of services, they have the SME consulting project by giving for free or grants partially offered by the government.

In Australia, the Building Entrepreneurship in Small Business (BESB) and Small Business Assistance Program in Australia offer information on SME assistant policy and advice on the improvement of SME management capacity. In particular, Small Business Field Officer, as one-stop service for government assistant program and information, delivers free general advisory services to small businesses. Australia offers the industry and academia cooperation course in order to foster consultants. After completing the course, candidates can obtain MBA and provide consulting services.

The Industrial Research Assistant Program in Canada, hires about 235 Industrial Technology Advisors(ITA: Industrial Technology advisors) with the support of the NRC Industrial Research Program (NRC-IRAP) and it provides SME management and technology consulting service. They are located in 90 communities around Canada. NRC-IRAP also offers a range of technology and business-oriented advisory services for SMEs.

The SME and Venture Business Support Centers in Japan have 81 locations in the main large city level, while the Prefectural SME Support Centers have 57 locations in prefecture level and Regional SME Support Center have 261 locations in local city level. Its government consulting policy focuses on management consulting, mainly providing services for new business and start-ups. The government also has a program to select qualified consultants, while a graduate-level SME consulting program fosters SME-specialized consultants

Korea's SMBA (Small and Medium Business Administration) supports the SME consulting service as a matching grant program. For consulting quality for SMEs, it has implemented a training program for quality and ability of consultants, and evaluation of consulting for SMEs.
As for SME Coupon Consulting Service, the Korean government has established an online portal site (www.smbacon.go.kr), which introduces digitalized processes from the application to ex-post monitoring with the establishment of the voucher system (e-coupon). The government has established a consultant ethics principle to offer quality consulting service for SMEs and eradicate illegal practices.

Chinese Taipei has an open consultant selection system, through which 120 consultants are selected and provide advisory services of SMEs. The Venture and Innovation Response Service Center offers free consulting telephone service, offering consulting service of SME management activities. Chinese Taipei launched the website (http://law.moeasmea.gov.tw) which provides legal advisory services for SMEs. It also has a training program to foster consultants.

Thailand has the in-house consultancy service such as 'the coordination & service center for SMEs.' The center focuses on encouraging business cooperation between SMEs and MNCs or LEs, and provides a general consulting service for SMEs.

In Malaysia, the government-support SMEs' technology innovation is delivered by technical advisory service through the *SME Experts Advisory Panel* (SEAP). 35 experts have registered under this program, whereby the experts provided advice to improve efficiency and productivity of SMEs. The objective of this program is to provide technical advice for start-ups and a government-offered matching grant is still at its initial stage.

For SME management and technology consulting, Mexico has the Business Accelerator Program and Program for Training and Strengthening SME capabilities.

In Philippines, 25 regional SME centers provide SME counseling and advisory program. The focus of this program is to provide technical consulting and advice for SMEs, but this program is still at its initial stage.

Currently, there is no SME consulting program directly given by the Chinese government. The government, however, has an advisory support system for SMEs, in which managers from venture support centers or international student venture support centers offer advice or introduce consultants concerning SMEs.

<Table 4.13> SME Consulting Support Policy by Economy

economies	SME consulting support policy			Main consulting focus	consulting policy infrastructure	Selecting and fostering consultants
	Direct support	Type of support	Support agency			
Australia	O	Free or Grant(partly provided)	O	management (small business)	Strong	Strong
Canada	O	Grant(partly provided)	O	management, technology	Strong	Strong
China	-	-		-	-	-
Japan	O	Grant(partly provided)	O	management	Strong	Strong
Korea	O	Matching grant	O	management	Medium	Strong
Malaysia	-	Matching grant		technology	-	Medium
Mexico	?	?	?	management, technology	?	?
Philippines	-	?	O	management, technology	?	Medium
Chinese Taipei	-	Indirect support	O	legal, management	Medium	Strong
Thailand	-	?	O	Cooperation between industries	?	?

Promotion of e-business and e-commerce

Promotion of e-business in APEC shows different policy aspects depending on the current condition of information. Canada, Japan, Australia, Japan, Chinese Taipei and Korea which are considered as having advanced information infrastructure focus on developing general infrastructure for e-business related laws, system or collaborative e-business and information counseling policy. The Philippines and Malaysia appear at an early stage, indicating that their e-business policies center around basic system support or basic system training.

The *Information Technology Online Program* (ITOL) was launched in Australia, offering competitive grants for implementing B2B solutions in order to promote e-commerce adaptation. ITOL is an Australian government funding program administered by the *Department of Communications*, *Information Technology and the Arts* (DCITA) designed to accelerate the

national adoption of e-business solutions, especially by SMEs. *Australian Electronic Business Network* (AUSe.NET) has been formed to encourage small business awareness and adoption of electronic commerce. AUSe.NET seeks to create awareness among SMEs of the benefits and relevance of doing business electronically via the Internet, and to assist small business to get on-line

Canada's e-business and e-commerce are highly developed compared with other member economics in APEC. The government, however, tries to create an e-business friendly environment, mainly focusing its policy on establishing legal systems related to a violation of privacy, certification and electronic signature, instead of providing direct supports to SMEs through a system for SME information or financing.

Japan has a program which dispatches IT exports to SMEs that are considering the introduction of IT. SMRJ dispatches IT experts to SMEs who seek management improvement through IT so as to promote e-business in Japan. It also supports build-up of homepages and electronic shopping malls. In addition, Perfectural SME Support Centers, SMRJ, the Chamber of Commerce and Industry, and others hold IT programs and seminars.

E-business support policies in Korea consist of the *Cluster for Digitalization Innovation Program*, the *Information Management System* (IMS) program, the *Total Information Management Providers* (TIMPs) program, and information training programs. As for government grants, SMBA has a matching grant program in which the government and SMEs pay some amount of the total digitalization costs. In addition, the *Cluster for Digitalization Innovation Program* supported by SMBA, is designed to establish a broadband Internet infrastructure and internal network in an effect to lay the foundation for digitalization in the cluster. The main propose of the project is to accelerate the digitalization of SMEs in economically poor areas. IMS offers the information consulting support program to induce IT tasks at SME level by working with IMS audit agency and IT companies. TIMPS is a support program of e-business system establishment for collaboration between IT companies and SMEs. Under the TIMPS program, IT companies build e-business systems and then the SME pays the expenses incurred when the e-business project succeeds.

To strengthen the capacity of IT capability, the SME Information Management Guidance System of Chinese Taipei was established for 58 industries from 1999 to 2004. This is industry-specific online databases and e-business mechanism, which is called *e-Enablement system***.** The second way in which the government strengthens the IT capability of SMEs is the promotion of e-learning, the establishment of a high-speed internet connection as well as information system

service.

The Malaysian government offers a variety of government grants and incentives to promote to utilize ICT. SMIDEC launched Soft Loan Scheme for ICT Adoption(SLICT) to assist SMEs in manufacturing activities to upgrade their engineering design capabilities and Enterprise Resource Planning(ERP) software. E-business in Malaysia, therefore, enables SMEs to participate in the supply chain of the MNCs(Multinational Corporations) or LEs(Large Enterprises).

The Philippine Trade Training Center conducts e-commerce training/seminars regarding webpage development and Microsoft Office programs for the entrepreneurs as basic training for e-commerce.

Mexico has e-business infrastructure for SMEs similar to that of Canada.

Comparison Analysis of Management Innovation

<Table 4.14> Management Innovation Policies by Economy

Economy	Search of external environment (provision of policy information)	Explicit management strategy (consulting)	Internal R&D support (spread of management mindset)	E -business (business activities)
Australia	strong (website)	Strong (grant/ partly provided)	Strong	Strong (direct support)
Canada	strong (website)	Strong (grant/partly provided)	Strong	Strong (indirect support)
China	Weak	Weak	Weak	Weak
Japan	Strong	Strong (grant/partly provided)	Strong	Strong (direct support)
Korea	Strong (website)	Strong (Matching grant)	Medium	Strong (direct support)
Malaysia	Medium (website)	Medium	Medium	Medium (loan assistance)
Mexico	Weak	Medium (indirect support)	Weak	Medium (indirect support)
Philippines	Weak	Medium	Medium	Medium
Chinese Taipei	Medium	Medium (indirect support)	Strong (e-learning portal)	Strong (direct support)
Thailand	Weak	Weak	Weak	Weak

There are several elements in promoting management innovation in company management strategy: search for external environment, an explicit management strategy, internal R&D

support, and e-business service activities. In general, provision of policy information, SME counseling, spread of an innovation mindset and e-business support programs are regarded as policies to support the previously mentioned elements.

Nine out of ten economies in APEC has consulting programs for management innovation targeting SMEs having less capability to promote innovation. Although Australian and Canadian policies are rather focused on creating a SME-friendly environment than providing direct assistance to SMEs, they have financing programs in the area of SME Consulting programs..

Overall, out of 10 APEC members, Australia, Canada, Japan, Korea and Chinese Taipei conducts strong support policies for management innovation. As for type of support, Australia, Canada, Malaysia and Mexico have indirect support systems such as the establishment of infrastructure and provision of information, while Korea, Japan and Chinese Taipei have direct support systems such as direct financing and the establishment of e-business system.

<Table 4.15> Type of Support Policies: Management Innovation

Type of support		Support Policies of Management Innovation		
		Weak	Medium	Strong
Indirect Support (Provision of Information	High Low	Malaysia	Mexico	Canada Australia
Direct Support (Direct Financing)	Low High	Philippines Thailand	Taiwan Korea	Japan

In case of e-business, Canada has indirect support program by establishing related infrastructure and providing information, but it undertakes a number of consulting initiatives to improve management skills of SMEs. As direct support programs, Australia partly introduces programs for SME consulting and e-business support policy, while Chinese Taipei works hard on establishing e-learning portal to enhance knowledge base in SME management innovation.

4.2.6 Comparison of Clustering and Networking Policy

Introduction

This section offers a clustering policy category identified within the comparative study of the 10 selected APEC economies. Considering SMEs' innovation policies in the 10 APEC economies, clustering policy measures are not directly related to SME innovation itself while policy makers recognize the significance of clustering for facilitating SMEs' innovation. The main reason is that the fundamental nature of clustering policies of each economy is placed upon the core engine of the national innovation system rather than promoting SMEs' innovation, although it is likely to result in the promotion of SMEs' innovation. However, among clustering and networking policies investigated, business incubation policies have played an important and direct role in stimulating SMEs' innovation in terms of knowledge production through connecting research institutes and start-ups and established SMEs. Therefore, this section focuses mainly on the classification of business incubation policies in the 10 APEC economies.

Classification of Business Incubation Policy

The Business incubators (BIs) are generally regarded as an effective mechanism for linking research and industry to inspire technology and knowledge based entrepreneurship and innovation of start-up SMEs. However, the performance of BIs for SMEs' innovation could be differentiated in accordance with technology capacity, the national entrepreneurial culture and character in each economy. There is a need to consider the issue of member economies' specific strategies, functions and characteristics in various focused programs. This section identifies the status, initiatives, experiences and features of BIs in the 10 APEC economies and categorizes them.

The organizational format of BIs varies and could generally be categorized as government sponsored model, private enterprise model and multi-invested cooperation model. The public sponsored model is supported by the government and non-profit organizations, whose primary purpose is to promote economic development. The private enterprise model is run by venture and seed capital investment groups or by corporations and real estate development partnerships. These incubators generally seek a return on their investment often through a stake in the firm. The multi-invested cooperation model is joint efforts between government or other non-profit organizations and a private developer.

In the case studies, it seems that the BIs in the 10 APEC economies could be classified into 4 types; public sponsored, private enterprise, multi-invested and transitional type from public

sponsored to multi-invested cooperation model. Along with the organizational forms of BIs, they could be classified into the range of their functional supports from hardware supports centering on real estate (offering affordable space and facilities) to highly specialized software supports related to high technology transfer services, linking global R&D community and the significant level of technology capacity.

<Table 4.16> Classification of Business Incubation Policy in the 10 APEC economies

Hardware supports	Public sponsored model	Private enterprise model	Multi-invested cooperation model	Transitional model
	• Thailand (1999)	• Philippine (1991)		
↕	• Malaysia (1997) • Mexico (2003)			• China (1987) • Korea (1992)
Specialized software supports	• Canada	• Australia	• Japan (1988)	• Chinese Taipei (1996)

Note: ( ) refers the year that BIs launched in the first.

1) Public sponsored model

The first type, public sponsored incubators are well present in member economies such as Thailand, Malaysia, Mexico and Canada.

The main Thai government business incubation policies have been governed and coordinated by the Department of Industrial Promotion (DIP), the Institute of SME Development (ISMED)[13], OSMEP and National Science and Technology Development Agency (NSTDA). The first government incubation program was created under the Thai national master plan for the development of SMEs in Southern Thailand. With funding and technical supports from the EU, the first incubation center was established in 1999 by the DIP, and the ISMED. The pilot center was set up on the grounds of the Regional Industrial Promotion Center in Hat Yai, Songkhla (www. ismed.or.th /IASBIA.php).

A significant business incubator emerged in 2002 using a new budget from 'New Entrepreneurs Creation (NEC)' program which aims to promote entrepreneurship development throughout Thailand. The incubation center was one of the major activities under the NEC program. The representative business incubation programs are *Young SMEs entrepreneurship project, Creative*

[13] The ISMED has been set up since 1999 as a core technical center that serves as an interface between SME owners and the government.

Technician transform to SMEs business project and *Technopreneur training project* by OSMEP and Thammasat University. Notwithstanding these kinds of preferential BI policies the performance has been limited in terms of institutional reach and collaboration between tenants and academic institutes since most of BIs are in the early and pilot stage of development. Furthermore, the number of BIs is not more than 5 at present.

The status of BIs in Malaysia is likely to be similar to Thailand in terms of ownership and development stage of BIs. However, Malaysia has been at the forefront of setting up BIs focused on selected high-tech sectors including ICT, advanced materials, aerospace, BT and other environmentally sound technologies (Lakshminarayanan 2004). BIs have been mainly located in universities, R&D institutes and technology parks. There are a number of business incubation models being undergone in Malaysia. The first BI models established in Technology Park Malaysia (TPM)[14] are for individuals and start-ups expanding from prototype or preproduction. There are 3 BIs in the TPM. The second BI model could be found in Technology Development Clusters (TDCs) program promoted by Malaysian Technology Development Corporation (MTDC). TDC is an incubation center established within university to allow companies within specific industries such as BT and multimedia to operate in close collaborations with lecturers and scientist. It also strengthens linkage between universities and industry. Four BIs under TDCs program are located in four different universities[15]. The third model is Multimedia Super Corridor (MSC) incubator. It is another initiative of the MTDC to support budding entrepreneurs, SMEs and start-ups to become successful IT and multimedia enterprises. It is located within the multimedia university campus. Finally, SIRIM Berhad has established the 'one stop techno business incubator center.' It serves as a hub incubator to all other incubator activities within and outside SIRIM. However, the performance data is yet to be built up like Thailand since most BIs in Malaysia are at an infancy stage.

At the beginning of the Fox administration (2000-2003) in Mexico, the number of BIs created during the last 12 years reached only 15. Since 2003, however, BIs in Mexico has been stimulated under the supervision of the Under-ministry for SMEs, thanks to the *Nation System* as a part of application of new SME's policy that includes and connects all BIs in the country. The scheme contributes to the economic development of regions, states and territories. As a result, the number of BIs reached 220 in 2005. However, as most of them are at an infancy stage,

[14] Technology Park Malaysia (TPM) was the first science park established in 1988 by MOSTE.

[15] Under TDCs program, four universities in which BIs are located are as follows: University Putra Malaysia (UPM) in 1996; University Malaya (UM) in 1999; University Kebangsaan Malaysia (UKM) in 1999; and University Technology Malaysia (UTM)

major policy and program's impacts on SMEs and its consolidated data is not available. Nonetheless, what is clear in BI policy is that the technical assistance and the services supply to entrepreneurs should be secured on concrete bases. These include grants support in different categories of Fondo PyME to all business incubators approved by the Under-ministry. Available funds are allocated through academic institutions, entrepreneurial organizations and NGOs, and they are capable of assigning human and material resources to set and operate a business incubator. This mechanism ensures complementary financial resources from the state, country and private sector spreading a multiplier effect of this program.

The representative feature of BI policy in Canada is the strategy for strengthening collaboration between SMEs and research institutes established within NRC by the government. NRC has 22 institutes. A few years ago, an incubator policy was put in place: to have one incubator attached to each of the institutes, which is called 'Industrial Partnership Facilities.' It represents that the focuses of BIs in Canada is likely to be on knowledge production by enabling their tenants to be embedded in research institutes although the number of them is only 110.

2) Private enterprise model

The second type of BIs classified is a private enterprise model. It could be found in the Philippines and Australia.

Although the first business incubator in the Philippines was launched in 1991 in Bichtan with 30 tenant working very closely with two R&D institute of the Department of Science and Technology (DST) and technology business incubators was included as one of the 'Science and Technology Agenda' initiated in 1993, the facilitation of BIs was followed by 'the medium-term national action agenda' for productivity 2000-2004 (UNESCAP 2005). In particular, the strategies and policies were focused on promoting private sector investment in R&D and upgrading S&T support services. The government is now encouraging private sector initiatives to set up BIs by providing a number of special fiscal and tax incentive for private BIs (i.e. tax holiday, duty free importation, tax credit, etc.). It resulted in the rapid increase in private BIs, accounting for 61 out of 68 BIs in 2003.

Another country where the type of BIs is dominated by private enterprise model is Australia. There are three main features. First, while the federal government is not involved in the operation of BIs, it provides thorough *ex post* management for private BIs in monitoring contract execution between BIs and government (both federal and local). Second, there are two kinds of incubating fund program: establishment funding and post-establishment growth

funding. The *establishment funding* involves the acquisition of an existing building (whether by purchase or lease) and fitting out that building or the construction of a new building. The support for an establishment funding project is conditional on the project plan demonstrating that the incubator will be operating, tenanted and fully functional within two years of the execution of the Establishment Funding agreement. The project plan submitted as part of the application must also indicate a period within which the incubator business will be financially self-sustaining. The *post-establishment growth funding* can support establishing clusters of incubator facilities, upgrading the capacity of existing facilities and extension and/or enhancements of mentoring and other skills development services that meet their tenant needs. It will only be available to BIs that have commenced operation, can demonstrate their financial viability or capacity to achieve self-sustainability and, where applicable, have completed the incubator establishment project to the Commonwealth's satisfaction.

Third, they are focused on specific industry oriented development implemented through ICT incubator program (ICTIP) under the Department of Communications, Information Technology and Arts. It is originally established in 1999 under the name of 'building on information technology strengths (BITS) incubator program. Its main objective is to support the better-performing incubators previously funded under the BITS Incubator Program to continue making a significant contribution to the national innovation system by: 1) identifying and supporting high potential ICT start-ups; 2) facilitating growth in employment, revenue and exports for ICT start-ups; 3) assisting these ICT start-ups to secure financial and other support from third party sources (including VC firms, private investors, other technology firms, universities and government); 4) establishing mutually beneficial linkages with other elements of the NIS; and 5) adopting strategies to achieve ongoing financial self reliance without further government supports.

3) Multi-invested cooperation model

The third type of BIs classified is a multi-invested cooperation model. It could be found in Japan. Although Ministry of International Trade and Industry (MITI) is the nodal agency for incubators promotion in Japan, most of BIs are joint efforts of local government along with private corporations (UNESCAP 2005). In addition, some of BIs have been established by SMRJ to provide comprehensive assistance to the start-up phase of a business. There are three types of BIs operated by SMRJ: 1) establishment of BI facilities to foster business in local economies (11 facilities); 2) establishment of university affiliated BI facilities (12 facilities); and 3) capital invested with local governments to the JVs who establish BI facilities (5 facilities). BIs started to spread from 1988 and a total of 45 BIs were established up to 1993. Of

the 70 S&T parks that had been established in 1994, 45 have incubators. The number of BIs in Japan reached 203 up to 2003. The main feature of Japanese BIs is that they do not function to hatch new corporations, but rather nurture hatched corporations. Both the purpose and function of a Japanese incubator differ greatly from those of the European and United States type of incubator which is intended for entrepreneurs newly establishing a corporation (UNESCAP 2005:28). It implies that the functional focus of BIs in Japan should be on specialized software supports centering on the upgrading technology capabilities of tenants.

4) Transitional model

The final type of BIs is a transitional model from public sponsored to multi-invested cooperation model. It could be found in China, Korea and Chinese Taipei. In reality, the dominant type of all of these three member economies is still public sponsored model. However, the recent BI policy direction of them has been placed on multi-invested cooperation model to make self-reliant operation possible.

In the initial stage of BI development in China, provincial or city level science committees sponsored the majority of BIs and later, most BIs were sponsored by the Science and Technology Industrial Parks (STIPs) coordinated and administered by the Torch program initiated in 1988 and implemented by the Ministry of Science and Technology (MOST). During this period, the government has been China's business incubators' main investors by direct appropriation and loan from banks, which is typical government-sponsored model. In recent years, however, there has evolved enterprise-sponsored and multiple-invested incubators such as those funded by SOEs, privately owned enterprises, foreign enterprises, international organizations and other types of sponsors. BIs also have gradually evolved into corporate management as self-reliance organizations independently responsible for their own incomes and expenses.

One of the main features of Chinese BIs is that the type of BIs is diversified. There are six different types of BI: general BIs, specialized technology BIs, University related S&T parks, Incubators for Returned Overseas Scholars (IROS), International BIs (IBI) and SOE incubators. First, general BIs are the mainstay of incubators in China, providing small firms with necessary services from space and facilities to financial supports. Second, specialized technology BIs target at transformation of scientific achievements and cultivation of SMEs of a special technology field. It pays attention to design and use of incubation space and service with expertise orientation. It shows one of the development trends of Chinese BIs. Third, University-related S&T parks are generally set up by universities to take advantages of technology

resources in university by collaborative relationships with universities. Forth, IROS is a special kind of incubator open to Chinese students studying abroad and overseas Chinese scholars. It provides better infrastructure and policy according to the characteristics and demands of overseas scholars. Fifth, IBIs are designed to assist both international and Chinese start-up firms enter international market and to promote international cooperation. Sixth, SOE incubators have played an important role in reconstructing traditional industries by utilizing high technology. They can also promote the transfer of technology achievements. Up to 2005, more than 10 SOE incubators have come into being, concentrated mostly in Beijing (UNESCAP 2005). These strong policy back-ups from the government and diversified BI types have led to significant increase in the number of BIs in China, accounting for 489 in 2003, which is only next to the USA.

Promotion of incubator center establishment in Chinese Taipei began in 1996. Within the period of eight years, a total of 1,883 enterprises had benefited from SME incubation services, of which 12 went on to secure stock market or OTC listing. As the main agency involved in promoting BIs, SMEA has adopted a variety of innovative measures since the 'Five year plan for strengthening SME incubator functions' was implemented in 2001. In particular, in 2002 the government formulated the Asia Entrepreneurial Development Center (AEDC) plan. It set three major strategic objectives: 1) to establish an incubation center network that would strengthen the incubation of start-ups; 2) to build up a start-up knowledge and information platform that would stimulate the development of knowledge-based entrepreneurial society; and 3) to establish sound, effective financing channels to stimulate investment in start-up activity. By the end of June 2006, there were 95 incubator centers in Chinese Taipei. Three of these were established directly by the SME Development Fund, and the Fund provided a support for the establishment of 79 others so as to strengthen Chinese Taipei's overall incubation capabilities. It shows that the type of BIs is dominated by public-sponsored model. However, as National Taiwan University Innovation and Incubation Center (NTUIIC) has appeared as the most successful incubator by corporaterizing it in 2002 with investment from banks, VC, NTU employees and private investors, the policy direction of BIs has been placed on the reduction of funds and encouraging self-reliance model. According to interview with Mr. Michael Liu, who is general manager of NUTIIC, over 90% of incubator centers in Chinese Taipei receive funding support from the SME Development Fund. However, as the Fund is already making a loss, there is a clear need to review the necessity of the current subsidy mechanism.

Regarding the progress of BI program in Korea, in 1992, Small Business Corporation extended loans to BI centers. In 1998, the program began to be funded by the government, which bore some costs for establishing BIs at universities, national and public research institutes. In 1999,

the government increased the number of BIs to create jobs and resolve unemployment. As of the end of 2003, 333 BIs were in place in the nationwide. Of 333 BIs, 322 BIs were government-sponsored model. It shows the type of Korean BIs is dominated by government-sponsored model. In addition to this, venture capital and service companies started to operate incubators for their member companies. What is more, the government has planned to increase self-reliance BIs from 30 in 2005 to 150 in 2010. It represents that the policy direction of BIs in Korea is placed on corporate management and multi-invested cooperation model based on self-reliance organizations independently responsible for their own incomes and expense. Thanks to the strengthening BIs, the government has led to the great number of venture incubation effects, compared to Chinese Taipei and Japan, accounting for 4,287 in terms of the number of start-ups in BIs and 4,255 in terms of the number of the incubated in 2006. Nonetheless, the number of BIs in Korea has decreased from 333 in 2003 to 268 in 2006. Its reason is because BIs were consolidated under the supervision of SMBA.

<Table 4.17> Classification of Business Incubators in the 10 APEC economies

Type	Selected Country	Number of BIs	Feature Pr	ograms
Public Sponsored Model	Thailand	5 in 2006	-Public sponsored model Early development stage since 1999 -Mainly located in universities, but not be stimulated due to weak collaboration	Incubation programs under NEC program - *Young SMEs entrepreneurship project* - *Creative technician transform to SMEs business project* -*Technopreneur training project*
	Malaysia	10 in 2004	-Public sponsored model -Specific industry oriented: ICT, BT, multimedia, aerospace, etc -Mainly located in universities, Technology Parks	Network incubator network MSC start-up development program Technology Park Malaysia incubation (3) Technology development clusters program by MTDC (4 in universities) One stop techno business incubator center by SIRIM Berhad (serve as hub incubator to all other incubator activities)
	Mexico	220 in 2006	-Public sponsored model (under-ministry for SME) -*The Nation System* connects all business incubators -BIs are operated through fund from academic institutes, entrepreneurial organizations and NGOs	Grant support of Fondo PyME

			-Since 2003 BIs has stimulated, but there is no policy impact due to early development stage	
	Canada	Over 110 in 2006	-Public sponsored model -Concept of 'industrial partnership facilities' by attaching BIs to institutes in NRC	
Private Enterprise Model	Philippine	68 in 2003 (private:61) (public: 7)	- Private driven model (2000-2004 medium-term national action agenda) by DST - S&T agenda for national development includes Bis	A number of fiscal and tax incentives for private BIs (tax holiday, duty free importation, tax credit)
	Australia		- Private enterprise model, self-reliance - Specific industry oriented: ICT incubator program and Building on IT strengths incubator program - Thorough *ex post* management	-Small Business Assistant Program -Small Business Enterprises culture Program (SBECP) Small Business Incubator Program -ICT incubator program Incubator Funding
Multi-Invested Cooperation Model	Japan	203 in 2003 (Public: 159, Private: 44)	- Multi-investor cooperation model (MITI, SMRJ, local government and private) - BIs do not hatch new corporations, rather nurture hatched firms (branch: 67% HQ: 37%) - Located mainly in science parks, universities	
Transition Model	China	489 in 2003	- Strong public sponsored model (Torch program), but transitional stage to enterprise-sponsored and multi-invested model - Tax incentives (income tax) - Diversified model (general BIs, specialized technology BIs, University-related S&T parks, BIs for returned overseas scholars, International BIs, SOE Incubators)	Incubation fund (seed fund)
	Chinese Taipei	95 in 2006	- Public sponsored model, but transitional stage to multi-investor cooperation model (SMEA) - Mostly located in universities	Asia Entrepreneur Development Center (collaboration meeting, building up a comprehensive platform that would integrate incubator centers, access to knowledge and information, and venture capital funding)

	Korea	-268 in 2006 (Public: 361, Private: 11)	- Multi-investor cooperation model, but government driven (Government and private) - Managed by a number of ministries (SMBA, MICT, MIT, MOST), later by SMBA - Location (university: 72%, PRIs: 6.1%, local government: 3.1%, other: 18%)	Seed money fund program Interest-free loan program

4.3 Analysis of Best Practices and Case Studies

The ten APEC member economies were asked in the survey questionnaire to choose the best practice among the SME innovation policies in their member economies. These best practices of each APEC member economy were researched in order to analyze the detailed aspects of the SME innovation policies and to induce the lessons which can be utilized by other APEC member economies. The detailed program's overviews, operations and learned lessons of these best practices are presented in the Part III.

The selected best practices are 1) Australia, COMET program, 2) Canada, IRAP program, 3) China, Business Incubator of Zhongguancun Haidian Science Park, 4) Japan, SME support centers, 5) Korea, SME Technology Innovation Development program, 6) Malaysia, ILP & GSP program, 7) Mexico, TechBA program, 8) Philippines, Financing Program Magna Carta, 9) Chinese Taipei, Business Incubator of Asia Entrepreneurial Center, and 10) Thailand, ITAP program. Among these selected best practices, the general pattern can be found out that most of best practice programs include extensive consultation programs for SMEs innovation and often accompanies financial supports or at least networks to private intermediaries. Malaysia and Philippine are the exceptions to this general pattern.

Australia, Cananda and Mexico

Australia, Canada and Mexico operate the extensive consultation program with financial grants, which provide technological and managerial consultation to SMEs and start-ups. These programs, among which Canada's IRAP program has the longest history while the others has been recently established, are renowned for their success in stimulating SMEs' innovation and commercialization. The combinations of financial supports and customized-consultation

services are identified as the critical factor in their successes.

The Australian Commercializing Emerging Technologies (COMET) program is designed to support early-growth stage companies, spin-off companies and individuals to commercialize their innovation. COMET is a merit based assistance program which provides business assistance through access to private sector consultant Business Advisers as well as access to merit based financial assistance. At 31 December 2004, outcomes include more than $313 million raised in equity capital by COMET customers, over 600 strategic alliances, licenses and agreements, and around 265 manufacturing commencements and products / services launched. COMET has been extended until June 2011 with additional funds of $100 million. The success of the COMET program is due to the combination of financial support and management advisory services. Often newly start-ups face difficulties in raising long-term stable capital and also difficulties in obtaining managerial talents to handle with business growth. Thus with financial assistances to start-ups, managerial advisory and consultation services should be accompanied for the successful commercialization and production of high-tech research results.

The Canada's Industrial Research Assistance Program(IRAP) is the longest serving policy program for SMEs for almost 6o years. IRAP aims to directly support SMEs to develop technology, enhance competitiveness and grow their business. Its functions are not defined with a word. IRAP is 1) providing R&D guidance to SMEs through each stage of innovation cycle covering from early stage of development to small pilot stage, 2) working partner in building innovative clusters and promoting collaboration, 3) coordinating international technology missions (including match-making assistance by linking SMEs and foreign partners), 4) providing information and technology transfer service (in association with Federal Partners in Technology Transfer), 5) working as connection point for external organizations, such as venture capital, HRSRC on internship program and DFAIT on trade issues. The wholeness of the IRAP program that integrates R&D subsidy, advising and networking are identified as the critical factor of success.

The Mexico's Technology based Business Accelerator (TechBA) program benchmarked the Canadian IRAP network program and modified the program with emphasise on building strong linkage with the international hub of high technology. The 25 high-technology companies from Mexico participated in the TechBA acceleration program in 2005. 30 new companies are participating in the 2006 TechBA program. The program set up its establishment in Silicon Valley, Texas Austin, Canada Montreal and Europe Madrid. TechBA program involves collaboration between Under-ministry for SMEs and other foreign (local) organizations. The Mexico-U.S. Foundation for Science (FUMEC) and The Entrepreneur Network (TEN) are the

major partners for TechBA in Silicon Valley. The TechBA program in Texas has similar cooperative partnership with IC² at the University of Texas in Austin, and Montreal TechBA with Inno-center in Montreal, Canada. As TechBA provides necessary network to accessing top-edge research, the potential ex-pat entrepreneurs can be attracted to establish companies in Mexico to get the benefit of TechBA.

Japan and Thailand

The selected best practices of Japan and Thailand are both the consultation services to SMEs, but Japanese consultation services focus on the management side while Thailand's ones focuses on technological capabilities developments.

Japanese SME support centers are the integrated services center for SMEs' innovation and growth. The strengths of Japanese management consultation services lie on 1) comprehensive and systematic supports for SMEs innovation, and 2) expert and incubator dispatch program for consistent and long-term supports modified to specific needs of SMEs. The Small and Medium Enterprises Agency established three types of a business support system for SMEs: 1) SME and Venture Business Support Centers, 2) Prefectural SME Support Centers, and 3) Regional SME Support Centers. These centers, in collaboration with the private SME support institutions such as Commerce and Industry Associations and Chambers of Commerce and Industry, work as one-stop service counters and extensive management consulting services providers. Expert dispatch program, which cannot be easily found out from other country's policy measures, has the strength to provide appropriate advices according to the level of company development stages. Because of this intimate long-term residency of specialists in SMEs, the management consultation services can be practical and appropriate for each SME and can easily lead to management restructuring for efficiency gains.

One of the key activities to build SMEs' indigenous technology capability in Thailand is the Industrial Technical Assistance Program (ITAP) launched by the National Science and Technology Development Agency (NSTDA), affiliated to the Ministry of Science and Technology. The ITAP, a program of the Technology Management Center (TMC), has successfully diagnosed and found solutions to the problems and needs of SMEs by sourcing qualified experts in the field, either from Thailand and overseas. The main contents of the program are composed of two: industrial consultancy and technology acquisition services. Firstly, industrial consultancy is served through the diagnosis of preliminary technical problems by experts, both local and overseas, to solve technical problems as well as assist in production research and development which may include technology management but excluding

administration and marketing. Secondly, the ITAP facilitates the process of searching for, and acquiring, appropriate technology. The ITAP provides SMEs with the opportunity to obtain first-hand information on technological advancements and innovations.

China and Chinese Taipei

The selected best practices of China and Chinese Taipei are both the incubator policy focusing high-tech start-up companies. Both economies' SME innovation policies focus on the innovative high tech start-ups, and thus the governmental financial resources and policy focus are centered around the business incubators that facilitate the creations of technology-based start-ups and spin-offs from PRIs or universities. Both economies share the commonality that PRIs have technological capabilities to disseminate scientific researches into domestic SMEs and or to promote high-tech spin-offs. With this strength of National Innovation Systems in both economies, the business incubator policies were highly successful in nursing and stimulating high-tech start-ups.

The Business Incubation Center of Zhongguancun Haidian Science Park in China, which is the first national high-tech pioneer service center, is a non-profit public science & technology service provider invested and established by Zhongguancun Haidian Science Park in August 1989. The Incubator accomplished high success in IT industries' ventures and R&D commercialization. The Business Incubation Center provides business services, financing services, technical services, logistics services, and recruitment services to tenant start-up companies. While these successes are basically due to economic environmental factors such as the world-class PRIs and universities' scientific researches, the easy access to high-quality human resources, the several policy elements are the critical success factors, which are the merit-based competition principal, customized management consultation, network brokerage role connecting financial institutions, governmental assistance programs, human resources, and the substantial incentives for overseas-students return

The strategy for the development of Chinese Taipei's BIs comes from the Challenge 2008 National Development Plan (2002-2007) in Chinese Taipei. One of the elements of the Plan was the establishment of various types of innovation and R&D centers with a sub-plan for developing Chinese Taipei into an Asia Entrepreneur Center (AEC). SMEA implemented the 'Five-year Plan for Strengthening SME Incubator Functions' in 2001. By the end of June 2006, there were 95 incubator centers in Chinese Taipei. Over the last decade, a total of 2,331 SMEs benefited from SME incubation service. The SMEA sets three major strategic objectives for the development of BIs under the establishement of the Asia Entrepreneurial Center in Chinese

Taipei: which are (1) enhancing the function of incubation service, (2) building up an entrepreneurail knowledge and information plaftform, and (3) providing financing supports for start-ups. The success of BIs in Chinese Taipei can be contributed to 1) intermediating between all kinds of resources and the tenants, rather than providing simple financial and space supports only, 2) the establishment of Entrepreneurial Lab service facilitating systematic knowledge production, 3) the stimulation of interaction between universities/research institutes and tenants SMEs, and 4) the cultivation of professional manager for BIs.

Korea

SMBA established a basic plan to support R&D project and created the *SME Technology Innovation Development program* in 1997. This program was designed to foster SME technology innovation by partly providing fund to SMEs capable of their own product development so that they can use it for new product development. The government-led program to support SMEs, therefore, is being implemented to enhance SME development capacity and technology competitiveness.

SMBA set up *strategic tasks* to assist high tech areas which can create a new growth engine for SME in 2001. It then designated a specialized institute for the program oversight in 2002, and introduced a credit card system in 2003 in order to increase transparency of technology development fund. Meanwhile, 100milion for one year project is offered for *general tasks*, in which SMEs freely apply for a project. 300 million won at maximum for two years is also offered for *strategic tasks,* of which areas are specially selected after the government conducts studies on technology demand for SMEs. For the SME Technology Innovation Development program, fund is provided within 75% of total technology development costs. SMEs whose projects are evaluated as successful by a specialized institute should repay 30% of the government contribution in five years in installments one year after completion. The success rate of the program was 92.3% in 2002 and 93.7% in 2003, respectively.

Malaysia

Malaysia has the strategic focus of SMEs' innovation policies in integrating domestic SMEs into global production networks mainly through MNCs. Thus the selected best practice also emphasizes the technological linkage and technological collaboration of domestic SMEs with MNCs.

The 8th Malaysia Plan emphasized the marketing of SMEs by integrating SMEs into the global supply chain of MNCs. It has been mainly implemented by introducing the Industrial Linkage

Program (ILP) and the Global Supplier Program (GSP) as good practices. The ILP initiated by SMIDEC in 1997 aims at enhancing SMEs participation as reliable and competitive suppliers of parts and components or services to MNCs. The GSP is a skills development/ training program to enhance knowledge and capabilities of SMEs into world-class suppliers of services and products. Under the GSP, training and assistance are provided to SMEs with an aim at enhancing their ability to provide high quality goods and services to MNCs in Malaysia, as well as to their global production network. The GSP is divided into two stages. The first stage consists of training for manufacturing and materials suppliers in critical skills, and more importantly, acquiring competencies to adopt and use new technologies. The second initiative promotes technology transfer from MNCs to SMEs under the close monitoring of progress.

Philippines

The Philippines recently established the SME support system, of which the major methodology are the financial loan and guarantee programs. Since the technological capabilities of Philippine domestic SMEs are still in infancy, the targets of governmental SME policies are placed on the creations of jobs and SMEs growth. This job creation role of SMEs can best be achieved by financial provisions such as loan and loan guarantee program. Philippine governments mandate the domestic banks to allocate a designated portion of loans to SMEs.

The Philippines' Magna Carta for Small Enterprises, which was enacted in 1991, and revised in 1997, is a milestone legislation to support SMEs. The Magna Carta for Small Enterprises resulted in the creations of loan and guarantee programs for SMEs, which are 1) the Small Business Guarantee and Finance Corporation (SB Corp.) and 2) Mandatory Allocation of Credit Resources to Small Enterprises. The SB Corp. is government owned firm that provides various alternative modes of financing for SMEs. According to the mandatory allocation rule, all lending institutions, which are defined under Bangko Sentral ng Pilipinas (BSP) rules, whether public or private, shall set aside at least six percent (6%) and at least two percent (2%) of their total loan portfolio for small and medium enterprises respectively. The main source of the wholesale financing for SMEs is through government-owned institutions, such as The Land Bank of the Philippines (LBP) and the Development Bank of the Philippines (DBP), and BSP microfinance bureau. The SME Unified Lending Opportunities for National Growth (SULONG) Program is the standardized loan program coordinated by diverse government agencies. The conservative investment behavior of Philippines' banks can lead to underfinanced situation for SMEs even though there are ample financial resources. That was the case of Philippines where over-liquidity and under-finance of SMEs co-exist. The Magna Carta tries to break the deadlock by compulsory measures to set proportional lending quota for SMEs.

4.4 Typology of SME Innovation Policies

Overall strategy or directions of SME innovation policies in ten APEC member economies should be considered in the context of economic and technological environments. The development/innovation policy and strategy for each member economy' SMEs should be based on 1) the technological capabilities of SMEs in each member economy, and 2) the economic and industrial structure of each member economy. And thus, before proceeding to categorize the directions and overall strategies of ten APEC member economies, two-dimensional analysis of each member economy's context are necessary in terms of technological capabilities and industrial structures.

In terms of technological capabilities, each member economies can be divided into categories of pre-adaptive technological capability, adaptive technological capability, indigenous technological capability and basic research capability. While adaptive and indigenous capabilities are associated with private sectors' technological capabilities, basic research capabilities are linked to public organizations such as universities and public research institutions (PRIs). It is possible that, while the indigenous technological capabilities of private sectors are still in infancy or in decline stage, the basic research capabilities of universities and PRIs can be remarkable. Such cases could be found in China, UK and Australia.

Malaysia and Philippines can be categorized into a group of pre-adaptive technological capability, while Thailand and Mexico into a group of adaptive technological capability. Japan, Korea and Chinese Taipei can be grouped into indigenous technological capability. Canada, Australia and China can be included into a group of basic research capability.

Philippines, Malaysia, Thailand and Mexico have relatively low R&D and technological inputs in terms of total R&D expenditure and total R&D personnel, which are less than 3,000 million US$ and less than 50 thousands R&D personnel respectively. It shows a relatively weak and less than indigenous technological capability in aggregate size. In terms of technological outputs and performances, Philippines and Malaysia can be differentiated from Thailand and Mexico, in which Thailand and Mexico showed relatively high performances in scientific research and patents. It means that Thailand and Mexico may have an adaptive technological capability to learn and catch up with advanced economies' technological progress. Thailand's R&D investments and personnel is less than Malaysia while Thailand's scientific researches and patents results are greater than Malaysia. This can be interpreted that Thailand has a higher

efficiency in R&D investments and an adaptive technological capability than Malaysia.

Canada, China and Australia possess high total R&D expenditure and R&D personnel comparable to Japan, Korea and Chinese Taipei. However, the composition of R&D expenditure and R&D personnel can be differentiated with private and public R&D capabilities. In terms of the business R&D intensity (the ratio of business R&D expenditure over total GDP), Canada(1.07), China(0.66) and Australia(0.86) record around 1.0, while Japan records 2.36, Korea 1.90, and Chinese Taipei 1.37. R&D performances showed this distinctive feature of these two groups. In terms of scientific papers, which showed basic research capabilities, Japan, Canada, China and Australia produce more amounts of papers than Korea and Chinese Taipei. But in terms of patent activities, Australia(501.0), China(5,912.67) and Canada(1,057.0) is far behind from Japan(109,822.67), Korea(31,914.67) and Chinese Taipei(29,772.67). This performance difference between scientific research and patents activities show that Australia, China and Canada has relatively weak in private sectors' indigenous technological capabilities while strong in basic research capabilities.

<Table 4.18> Total R&D expenditure

(US$ million)	2000	2001	2002	2003	2004
Australia	6,035.39		6,975.92		
Canada	13,824.88	14,685.39	14,248.42	16,637.86	18,821.69
China	10,819.72	12,595.14	15,556.36	18,600.94	23,756.77
Japan	142,013.37	127,924.43	124,114.21	135,318.41	
Korea	12,248.80	12,488.80	13,848.98	16,010.63	19,375.81
Malaysia	439.87		658.05		748.34
Mexico	2,167.72	2,452.64			
Philippines			107.00		
Chinese Taipei	6,329.26	6,064.32	6,491.05	6,996.92	7,804.77
Thailand	317.29	306.14	327.59	373.20	444.32

<Table 4.19> Total R&D expenditure per capita

(US$ per capita)	2000	2001	2002	2003	2004
Australia	315.11		355.19		
Canada	451.06	474.18	454.93	526.02	589.47
China	8.54	9.87	12.11	14.39	18.28
Japan	1,119.36	1,004.98	973.94	1,060.33	
Korea	260.57	263.73	290.85	334.61	402.97
Malaysia	18.92		26.83		29.25
Mexico	21.62	24.10			
Philippines			1.35		
Chinese Taipei	284.12	270.66	288.22	309.53	343.99
Thailand	5.16	4.94	5.23	5.91	6.98

<Table 4.20> Total R&D personnel

Number in 1000	2000	2001	2002	2003	2004
Australia	95.62		106.84		
Canada	167.86	178.98	177.12		
China	922.10	956.50	1,035.10	1,094.80	1,152.60
Japan	896.85	892.06	857.30	882.41	
Korea	138.08	165.72	172.27	186.21	194.06
Malaysia	10.06		10.73		17.89
Mexico		43.46			
Philippines			5.46		
Chinese Taipei	104.57	107.76	114.30	119.59	129.39
Thailand		32.01		42.38	

<Table 4.21> Business expenditure on R&D

(US$ million)	2000	2001	2002	2003	2004
Australia	2,886.77	3,199.94	3,569.49	4,682.37	
Canada	8,313.82	8,945.09	7,887.28	8,816.40	9,634.11
China	6,523.00	7,611.45	9,544.52	11,598.41	15,875.70
Japan	100,774.50	94,247.01	92,393.04	101,457.72	
Korea	9,070.12	9,514.42	10,372.01	12,182.78	14,864.45
Malaysia	254.71		442.89		535.11
Mexico	644.84	743.01			
Philippines	61.84	71.25	70.96		
Chinese Taipei	4,025.56	3,854.91	4,036.70	4,372.51	5,022.83
Thailand	115.93	125.05	138.36	142.73	182.38

<Table 4.22> R&D personnel in business per capita

per 1000 peoples	2000	2001	2002	2003	2004
Australia	1.48	1.66	1.81	1.92	
Canada	3.26	3.71	3.57		
China	0.38	0.42	0.47	0.51	0.54
Japan	4.59	4.41	4.36	4.55	
Korea	1.85	2.47	2.54	2.68	2.76
Malaysia	0.14		0.26		0.24
Mexico			0.12		
Philippines			0.01		
Chinese Taipei	3.14	3.23	3.31	3.50	3.88
Thailand		0.11	0.12	0.11	0.11

<Table 4.23> Total R&D intensity

% of GDP	2000	2001		2002	2003	2004
Australia	1.55			1.69		
Canada	1.91		2.05	1.94	1.92	1.90
China	0.90		0.95	1.07	1.13	1.23
Japan	3.05		3.13	3.18	3.20	
Korea	2.39		2.59	2.53	2.63	2.85
Malaysia	0.49			0.69		0.63
Mexico	0.37		0.39			
Philippines				0.14		
Chinese Taipei	1.97		2.08	2.20	2.33	2.42
Thailand	0.26		0.27	0.26	0.26	0.28

<Table 4.24> Business R&D intensity

% of GDP	2000	2001		2002	2003	2004
Australia	0.74		0.87	0.86	0.89	
Canada	1.15		1.25	1.07	1.01	0.97
China	0.54		0.57	0.66	0.71	0.82
Japan	2.17		2.31	2.36	2.40	
Korea	1.77		1.97	1.90	2.00	2.18
Malaysia	0.28			0.46		0.45
Mexico	0.11		0.12			
Philippines	0.08		0.10	0.09		
Chinese Taipei	1.25		1.32	1.37	1.46	1.56
Thailand	0.09		0.11	0.11	0.10	0.11

<Table 4.25> Scientific articles

	2000	2001	2002 2003 2004		
Australia	12,525.00		14,788.00		24,803.00
Canada	19,685.00		22,626.00		15,809.00
China	11,675.00		20,978.00		29,186.00
Japan	47,826.00		57,420.00		60,067.00
Korea	8,386.00	9,386.00	11,037.00	11,745.00	13,746.00
Malaysia	416.00		494.00		520.00
Mexico	2,291.00		3,209.00		3,747.00
Philippines	164.00		158.00		179.00
Chinese Taipei	5,655.00		8,082.00		9,270.00
Thailand	470.00		727.00		1,072.00

<Table 4.26> Patents granted to residents

	2000	2001	2002 2	003 2	004
Australia	1,312.67	1,270.00	1,026.00	749.00	501.00
Canada	1,137.67	1,224.67	1,118.67	1,084.33	1,057.00
China	3,741.67	4,989.00	5,912.67		
Japan	123,977.67	118,534.67	109,795.00	109,030.33	109,822.67
Korea	34,052.33	29,363.33	24,957.33	27,464.00	31,914.67
Malaysia	28.00	27.00	24.67	27.00	
Mexico	124.67	117.00	121.67	123.33	137.67
Philippines	6.33				16.00
Chinese Taipei	19,402.00	24,699.67	26,964.33	29,370.33	29,772.67
Thailand	44.00			60.00	

With respect to industrial structure analysis, dominant players of industries, which can be MNCs, domestic global firms or domestic SMEs, should be identified because the dominant players of an industry rule over the supply value chains of an industry and strongly influence the industrial technological developments. The dominant players are important since SMEs in most industries are closely connected to the dominant players such as large global firms, MNCs or even to PRIs and universities. In industrial structure analysis, the dominant players in the industry should be considered and also its relationships with SMEs should be also checked. In terms of the dominant players of industries, the group of MNCs should include Philippines, Malaysia, Thailand, Mexico and Australia. While the group of domestic global firms consists of Japan,

Korea, Canada and China, the group of domestic SMEs should be Chinese Taipei.

The Fortune Global 500 can identify who the global players in APEC member economies are. This can be proxy as the dominant players in the member economy. If APEC member economies do not have their own global players, it can be assumed that the dominant players are 1) domestic SMEs participating global production networks or 2) MNCs.

The Fortune Global 500 companies in APEC 10 member economies showed that Malaysia, Philippines and Thailand possess only one or none Global 500 companies, while Mexico(5), Chinese Taipei(3) and Australia(8) records less than ten Global 500 companies. These member economies can be considered as possessing relatively weak domestic large firms. However, since Global 500 companies include banks and infrastructural industries, the global players in high tech industries should also be analyzed in order to identify dominant players in high tech industries. Industrial Fortune Global 500 showed the rankings and nationality in high tech industries, which are Aerospace, Computer Services and Software, Electronics, Electrical Equipment, Motor Vehicles & Parts, Networks and Other Communication Equipment, Pharmaceuticals and Semiconductors and Other Electronic Components. The Industrial Fortune Global 500 table showed the dominance of US, Japan and Germany in high tech industries. While Korea showed high rankings in Electronics and relatively high ranking in Motor Vehicles, Canada, China and Chinese Taipei listed one or two industrial global firms in Aerospace(Canada), Semiconductor(Canada), Electronics(Chinese Taipei) and Motor Vehicles & Parts(China).

Korea and Japan are famous for their global business groups and their dominances in their domestic economies. While Chinese Taipei developed high technological capabilities, this has been achieved through the growth of domestic SMEs, rather than large global firms, participating GPN(Global Production Networks). China pursued the strategy of developing global business groups such as Korean and Japanese ones, but still in infancy, especially in high tech industries. In Canada and Australia, even though their economies and sizes are advanced, global foreign MNCs are still dominant in main high tech industries such as electronics, networks, pharmaceuticals and motor vehicles. The dominant players of industrial development and technological capabilities in Philippines, Malaysia, Thailand and Mexico are MNCs.

The ten APEC member economies can be categorized in the two-dimensional economic environmental analysis with respect to technological capabilities and economic dominant players.

<Table 4.27> Two-Dimensional Economic Environment Categorization

Technological Capabilities	Basic Research Capabilities	Australia	Canada China	
	Indigenous Technological Capabilities		Japan Korea	Chinese Taipei
	Adaptive Technological Capabilities	Mexico Thailand		
	Pre-Adaptive Technological Capabilities	Malaysia Philippines		
		MNCs	Domestic Global Firms	Domestic SMEs
		Dominant Players		

Based on the analysis of ten APEC member economies' economic context in terms of technological capabilities and the dominant players in their economy, and also with survey responses and interview results, the overall strategy and directions of SME innovation policies can be divided into four categories. They are a group of High Tech. Start-Ups Development (HTSUD), a group of SMEs' Competitiveness and Innovation Enhancement (SCIE), a group of Indigenous Technological Capability Development (ITCD), and a Group of Technology Transfer Utilization (GTTU). The HTSUD can be characterized as the economies in which their governments promote high-technology venture firms, start-ups and spin-offs, which are based on both the basic technology capabilities of universities or PRIs and high entrepreneurship spirit in the society. These economies possess high capabilities of basic research but lack in the ability of leading basic research results to a market success because private sectors' indigenous technological capabilities are neither mature nor existent. Thus, the governments of member economies in this group have focused on the promotion of high tech venture, start-ups, spin-offs. They also focus on commercialization of R&D results, while utilizing high potentials of basic research capabilities. Australia, Canada and China belong to this group.

The SCIE can be characterized as the economies in which government promotes the competitiveness and innovation activities of SMEs. Since these economies already possess substantial groups of innovative actors with indigenous technological capabilities, which are global players, governmental roles for these innovative actors has been changed to be quite limited. Thus governmental roles have been shifted to more focus on the innovation and

competitiveness of SMEs, which can be considered as relatively weak in the supply chains of production compared to domestic global firms. The measures for SMEs innovation policy are also mainly composed of direct supports for SME innovation and competitiveness, such as direct financing and extensive technology/management counseling services. Japan, Korea and Chinese Taipei can be included in this group. Chinese Taipei has little different aspects since the dominant players in the economy are mostly SMEs in global production networks. Chinese Taipei has more focused on the innovation and competitiveness relatively weaker parts of SMEs, which are start-ups and early stages of new business. The ITCD and the GTTU have commonality in the respect that member economies pursue development of indigenous and adaptive technological capabilities on their own. Even though MNCs, which are dominant players in these member economies, provide employment and economic growth, the economies cannot be guaranteed for future economic growth especially in high tech industries without developing their own indigenous technological capabilities. However, the ITCD and the GTTU are different about the paths or methodologies to achieve indigenous technological capabilities. The ITCD endeavors to focus on the development of R&D capability of domestic SMEs with increase in its own R&D expenditures, while the GTTU promotes the industrial linkages with global MNCs and to utilize the technology transfers from MNCs to domestic SMEs. Thus, the policy measures for the ITCD are relatively focusing on technology financing and investment, while the policy measures for the GTTU are relatively focusing on collaboration with MNCs and direct financial loans support for SMEs. The ITCD consists of Thailand and Mexico, while the GTTU includes Malaysia and the Philippines.

<Table 4.28> Categorization of the Focuses of SME Innovation Policies

	Member Economies	Goals T	echnological Levels	Dominant Players in High Tech Industry	Major Policies	Financing Policies
HTSUD Group	Australia Canada China	promotion of high tech venture, start-ups, spin-offs and also on the commercialization of R&D results	Basic Technological Capability, but weak in Indigenous technology by private sector	MNCs	Support for for commercialization and new start-ups such as Equity Investment and counseling services	Equity-Based Financing Support
SCIE Group	Japan Korea Chinese Taipei	promotes the competitiveness and innovation activities of SMEs	Indigenous technological capability	Domestic Global Firms or Global SMEs	Direct supports for SME innovation and competitiveness, such as direct financing and extensive technology/management counseling services	Loans-based Financing Support Shifting to Venture Capital Support
ITCD Group	Mexico Thailand	develop indigenous and adaptive technological capabilities on their owns	Adaptive technological capability	MNCs	R&D technology Policies with its own public R&D expenditures and investment	Equity-Based Financing Support
GTTU Group	Malaysia Philippine	develop indigenous and adaptive technological capabilities on their owns	Pre-Adaptive technological capability	MNCs	Promotion of the industrial linkages with global MNCs and to utilize the technology transfers from MNCs to domestic SMEs: collaboration with MNCs and direct financial loans support for SMEs	Loans-based Financing Support

Chapter 5: Conclusion and Suggestion

5.1 Conclusion

The ten APEC member economies show great diversities in their economic development stages, industrial structures, technological capabilities and market economic systems. The diversities naturally lead them to various SME innovation policies in terms of strategies, priorities and approaches. Advanced member economies in APEC with a long history of industrial development and market economic systems show extensive SME support systems covering a wide range of SME innovation policies from marketing and procurement policies for SME innovative products to consultation and technology grants programs. Developing member economies with weak technological capabilities only recently recognized the importance of SMEs' economic roles and SMEs' innovative activities. Among the developing economies, SME policies can be differentiated according to their focus on technological development. While some of them make efforts to develop and acquire indigenous technological capabilities through technology grants and technology collaboration policies, others focus on the size-wise growth and export promotion of SMEs through integration with global production networks.

5.1.1 Summarized SME Innovation Policies of Member Economies

Australia

The Australian government has the priority in promoting the commercialization and high-tech start-ups in SME innovation policies. Because of high risk embedded in high tech new start-ups, market failures could occur in creations of venture firms and commercialization activities. The Australian government has a priority and focus on high technology new start-ups and commercialization. This priority and focus can vitalize SME innovation especially in high-tech industries such as BT and IT and also eliminate governmental budget inefficiency. The institutional environments are friendly and effective for the SME innovation processes. Australia experienced significant institutional changes during 1990s improving national competitiveness, overall economic and regulatory/governmental efficiency in labor market, financial market and final goods market is quite advanced compared to other member economies. The regulatory environments for SMEs and new start-ups are especially suitable and friendly for high- tech industries development, which requires various and lively business experimentation. For efficiency of policy intervention, the Australian government entitled the operations of equity investment strictly to private institutions, and do not intervene in

government-sponsored incubators' operations and investments. Despite of these strengths, Australian economic environments have several weaknesses in promoting SME innovation such that Australian economy does not possess large-sized global players in high tech industries and thus has very low business R&D intensity compared to other advanced economies. The Australian government may need to consider a strategic development plan for specific technologies or industries.

Canada

Canada is a high-income member economy that boasts a high population of R&D performing SMEs. The flagship program is carried out by the largest government research institution, NRC. It is named as NRC-IRAP program, which has long history of fostering innovative SMEs. NRC-IRAP and strong R&D tax credit policy underlies behind the innovative SMEs research and development. In addition, the well-developed human capital and venture capital resources enable to fund SMEs that engaged in emerging technologies. The strength of Canadian system can be also identified with the well-woven support from both federal and provincial governments. In many cases, these supports can be delivered through not-for-profit organizations. These organizations play a critical role in building high value added cluster of SMEs, such as the medical research cluster in Montreal, Québec. As Canada has a relatively strong link with US economy through NAFTA, the strong support for SMEs can attract the US high-technology SMEs. Canada has to attract high-value added facilities of foreign MNCs as well. However, inviting R&D centers of MNCs demands further incentives to attract talented personals regardless of nationality. Therefore, it would be plausible to consider a special tax rate for those who work in R&D. In fact, Québec has already started the personal income tax credit for foreign researchers, which provides implication for other provincial governments.

China

China has favorable environments for SMEs innovation such as 1) huge-sized domestic markets, *i.e.* high consumer purchasing powers, 2) basic research capabilities of PRIs and universities in high technology areas, and 3) a large number of high quality human resources. These favorable economic environments are all conducive to SMEs innovation. Based on these favorable economic environments, the Chinese government has chosen cluster-based SMEs innovation policies. National clusters and incubators, which were established by the central government and local governments, provide diverse supports for spin-offs and high-technology start-ups. Since these clusters and incubators are closely located with PRIs and universities with high technology capabilities, new start-ups and SMEs can have technological supports. Incubators

provide consulting and financial network services for SMEs innovation. Clusters can also provide natural networks with other competitive firms, information flows and financial networks. Even though China possesses high potential of basic researches and high technology, these capabilities are only confined to small portion of total Chinese SMEs. Most of Chinese SMEs are still in low-skilled, labor-intensive industries based on cost-competitiveness. The upgrading of overall competitiveness of Chinese SMEs is challenging tasks for the Chinese government. Moreover, Chinese policy measures for SMEs innovation are still in infancy, which only started in the late 1990s. Compared to other advanced member economies with long history of SMEs supports, Chinese SME innovation policy measures are small in size and in extents.

Japan

The Japanese government has the foremost comprehensive and extensive supports for SMEs innovations and competitiveness acquirements. The financial supports, especially through direct loan programs and guarantee programs for SMEs innovations, are quite enormous in a way that governmental direct loans to SMEs consist of more than 10% of total outstanding lending to SMEs in Japan. Financial guarantees for SMEs liabilities are more than 10 times of direct loans programs. These financial supports for SMEs have a long history more than 40 years. Management consulting services, on which recently Japanese government has a policy priority, even dispatches the fulltime-hired-specialists and -consultants to SMEs in a specific time period. Concerning SMEs technological innovation promotion, the Japanese government introduced US-styled SBIR programs to enhance governmental efficiency in technology supports. Beside these substantial governmental supports for SME innovation, the existence of a large number of global players in high tech industries such as in the areas of electronics, automotives, engineering and information technology is certainly favorable to SMEs innovation. With technological collaboration and, sometimes, fierce competitions with global business groups, Japanese SMEs are inevitable to innovate and upgrade competitiveness for survivals. On the contrary, the governmental supports for SMEs still have the tendency of supporting weak SMEs to sustain its financial viabilities. The governmental intervention beyond market-failures can result in lagging industrial restructuring and overall economic inefficiencies and also to SME innovation.

Korea

The characteristics of SME support policy in Korea lie in a government's unified system, in which SMBA, as a strong policy executor, is responsible for both establishing and implementing

the SME support policy. In 2005, SMBA laid out and pushed for a strategy that helps SMEs develop into innovative SMEs. The Korean government has also introduced certification systems of innovative SMEs. *Venture business certification*, introduced in an effort to overcome the 1997 financial crisis, *technology innovation certification* and *management innovation certification* are major certification systems that are being implemented. In case of SME support program, the government and SMEs are providing a program in a way that is equivalent to the type of matching grants. With the development of Korean e-business, the government has established the online system from the application to ex-post monitoring and provided support programs which help improve conveniences for SMEs.

Malaysia

For more than four decades Malaysia's economic growth has been sustained through an open global trading environment. In particular, Malaysia strives to sustain itself as an attractive investment location for FDI. 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 MNCs. As a main way of innovating SMEs, the government introduced the Industrial Linkage Program (ILP) and the Global Supplier Program (GSP) initiated by SMIDEC. They aim at enhancing SMEs participation as reliable and competitive suppliers and parts and components or services to MNCs. In other words, they are to develop the capability of SMEs to meet the requirement of MNCs by providing skills development/ training program. 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.

Mexico

Mexico has upgraded its policy for SMEs significantly in terms of both institutional aspect and the amount of subsidy. Mexico realized the high value added economy cannot be achieved just by simply clinging to the previous strategy of utilizing '*maquiladoras,*' the assembly MNCs. Although MNCs are critical in vitalizing Mexican economy, a new approach must be added. The increased incubation activities and recently unfolding of TechBA program exhibits the confidence of Mexico in generating new knowledge economy. TechBA is a package program

that provides international business acceleration centers for SMEs. The Mexico government may consider the types of SMEs that apply for the package. Many of them are high-growth SMEs - 'would be' large firms in the future, but some could be niche players. Therefore, differentiated cares for the different types could be considered. Mexico has potential to exploit double positioning of Latin America and North America. Innovative products can be mixed with cultural advantage. Fostering IT based SMEs will provides the opportunities for developing technology-based service SMEs. For the purpose, the development of human resource with multi-lingual capability is critical.

Philippines

The strength of Philippine's SME policy lies in the integrated approach as can be observed in the *Margna Carta for SMEs*. Under the law, the subsequent development of strategic plans has been written down, and the Philippines government has implemented diverse policy measures covering wide areas including marketing and financing. However, the resources are too limited to produce visible impact. The institutional structure is sound, but the investment in research and development is still far short of provoking sizable business clusters of technological innovation. The concentration of R&D personnel in university and government research institutes reflects weakness of technology-based SMEs. To encourage innovative SMEs, the current tax incentive schemes and debt-financing oriented strategy needs to be reviewed. The Philippines has to build infrastructure to attract the foreign direct investment. The infrastructure development policy must address the educational infrastructure as well as the construction of road and other physical infrastructures. As for technological innovation, the low share of science and engineering graduates is reported. What kinds of skill are in need to attract foreign investment can be surveyed and targeted for future HRD policy. In addition, a special incentive scheme to link MNCs and local suppliers is preferable to foster value-added suppliers and to create jobs.

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 non-performing 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 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.

Chinese Taipei

The most apparent characteristic of Chinese Taipei is that the economy has been dominated by SMEs, rather than large enterprises. It enabled Chinese Taipei to have little suffering from Asian financial crisis. However, during the 1990s the significant increase in the outward FDI of Chinese Taipei has led to the increase in unemployment rate. Thus, the government has made great efforts to reduce it by nurturing new technology start-ups and expanding the scope of SME business operations. Toward this end, the Chinese Taipei government has focused on the establishment of BIs as one of foundation of economic development. The strategy for the development of BIs comes from the "Challenge 2008 National Development Plan." In particular, Asian Entrepreneur Development Center (AEDC), one of the elements of the plan, has played a critical role in building a high quality incubation network that stimulates start-up and innovation activity. The main SME innovation policy in Chinese Taipei shows that the role of BIs has been critical in stimulating the knowledge production and technology innovation of tenant SMEs by intermediating between all kinds of resources and the tenants, rather than providing only simple financial and space assistances.

5.1.2 Summarized Comparison Analysis of Six Policy Areas

Marketing

The elements of comparison in marketing policy are government procurement, export promotion and integration of SMEs into the global supply chain of MNCs. First of all, in terms of government procurement, three of the ten APEC member economies, Australia, Canada and Korea, have mainly considered it as a measure of SME innovation policy. The Australian government procurement process is transparent and open, and not to discriminate against. In the

case of Korea, public institutions are required to purchase SMEs' technological products that have been approved for performance by the government, thereby promoting technology development of SMEs. Unlike two member economies, the Canadian government has not directly promoted procurement for SMEs and instead stimulated it by having SMEs seek local subcontracting contracts. Secondly, the commonality of marketing policies in the ten APEC member economies can be attributed to the focus on export promotion. The export promotion policy for SMEs could be divided into financing, information and consulting, and brokerage supports. The focus of export promotion in China and Chinese Taipei is on financing supports such as loan guarantee and grants. The focus in Korea and Japan is on information and consulting services that enable SMEs to participate in the global market. In the Philippine, the main focus of export promotion is on brokerage supports that link SME exporters and foreign buyers. Finally, as a way of marketing, the inclusion of SMEs in the supply chain of MNCs and their indirect involvement in exporting activity can lead to the significant diffusion of technology and more efficient business models, thereby raising the international competitiveness of SMEs in the global market. This policy is dominated in member economies in which their economy is mainly dependent on MNCs. The representative member economy is Malaysia.

HRD

As for the general education, HRD policy is not specifically designed for SMEs. However, the training programs that target SME employees can be observed in many member economies. SMEs do not have resources to provide well-designed internal training programs. Therefore, trade associations may work in collaboration with SMEs to build common training centers with the subsidy of the government. The investigation on training programs revealed the direct and indirect training programs in member economies. Chinese Taipei, Malaysia, Mexico, Philippines and Korea have reported direct training programs. Australia and Canada have rather indirect training programs by utilizing private training facilities. Japan has shifted from direct to indirect. China and Thailand reported no significant direct training programs, thus categorized as utilizing the indirect training. Direct training program is not in exclusive relation with indirect programs. When private education institutes do not function well, the government needs to act strongly, but if not it needs to act complementarily.

Technology

Technology policy has been reviewed mainly on the level of R&D tax treatment. It would be possible to divide member economies into groups based on the weighing between R&D tax

treatment and R&D programs. Mexico has not invested enough in R&D to provide the growth momentum, considering the level of Mexican economy. It recently set up strong R&D tax credit policy. Canada has a reasonable level of R&D programs but strong R&D tax credit policy outweighs the government R&D program. Australia's main tool is R&D tax credit. The second group, Japan, Korea, and Chinese Taipei belong to the group with high R&D investment and with balanced level of R&D program and R&D tax treatment. China, Malaysia, Philippines, and Thailand are biased to R&D program. Malaysia's R&D tax credit is mainly for pioneering large firms and foreign MNCs, thus grouped in this category. The policy measures must consider the appropriate policy for development stage. The mixture of direct and indirect R&D subsidy for SMEs depends both on financial resources and on the strength of business R&D. R&D tax credit is critical to encourage business R&D but a precedent direct R&D program to fostering technology-based entrepreneurs could be required as the 'seeds.' In the similar manner, technological collaboration also needs to be conditioned depending on the situation. The relative strength of public research is to be checked before importing a successful foreign policy.

Financing

The ten APEC member economies are diverse in their economic development stages and financial market systems, and thus the methods of financing policies are inevitably various. The SME financing policies of ten APEC member economies can be divided into two broad groups, while still possessing diversities even within the groups: 1) investment-focused group and 2) loans-focused group. The investment-focused group shares the characteristics that government does not provide or provide only small proportion in recent years for systematic direct loan facilities. These economies do not have special banks or credit guarantee institutions for SMEs, but directly involve in creating venture capital funds to provide investments for innovative SMEs, or actively participate in the network formation of venture capitalists with start-ups. The loans-focused group shares the characteristics that governmental financing programs are centered on special banks or guarantee institutions to operate for systematic loans and guarantee services to SMEs. Only in recent years, these economies (except the Philippines) have created equity investment programs in recent years especially targeting at high-tech innovative SMEs. But still the loan programs are the main channel of financing support to SMEs. Japan, Korea, and Chinese Taipei have the longest history of governmental loan programs while Malaysia and the Philippines have relatively newly established the public loan systems after the Asian crisis.

Management Innovation

Support policies for management innovation include provision of policy information, SME

counseling, spread of an innovative mindset and e-business support programs. As for management innovation, member economies' support policies are varying depending on the development of economies and support systems. In general, Canada, Australia, Japan, Korea and Chinese Taipei are categorized as economies that implement strong support policies of management innovation. Our study shows that, among ten member economies, nine economies considered as weak in building an internal capacity of SMEs have established and offered consulting programs in order to enhance management innovation. In addition, Australia and Canada that have adopted an indirect support system have offered a direct support system for a SME consulting support program. This indicates that government's active involvement(as types of a free or grant program) is needed to support SMEs which fail to build an innovative capacity by themselves. Meanwhile, lack of a systematic organization has made SMEs vulnerable to collect information on government support programs. An effective way to address such a problem SMEs face is to support SME e-business and to establish an integrated policy information system which can provide one stop service of government's SME support program or business activities. Australia, Canada and Korea have built and operated an integrated policy information system, while Chinese Taipei has established an e-learning portal site to enhance knowledge base regarding SME management innovation. In case of e-business, Canada, Australia, Japan, and Korea have created a strong support policy. Even Australia that has adopted an indirect support system has a direct support system of paying part of the costs when establishing infrastructure for cooperative e-business. This clearly shows that government's active support is a must in building infrastructure, such as broadband services or e-business systems, in which SMEs are successfully conducting e-business.

Clustering and Networking

BIs in the ten APEC member economies could be classified into 4 types; public sponsored, private enterprise, multi-invested and transitional type. Along with the organizational forms of BIs, they could be classified into the range of their functional supports from hardware supports centering on real estate (offering affordable space and facilities) to highly specialized software supports related to technology transfer services, linking global R&D community and the significant level of technology capacity. Public sponsored incubators are well presented in member economies such as Thailand, Malaysia, Mexico and Canada. In Thailand, Malaysia and Mexico, although there are a number of incubator programs, the performance has been limited in terms of institutional reach and collaboration between tenants and academic institutes since most of BIs are in the early and pilot stage of development. Unlike these three economic members, the representative feature of BI policy in Canada is the strategy for strengthening collaboration between SMEs and research institutes by attaching an incubator into each of the

institutes within NRC. A private enterprise model could be found in the Philippines and Australia. Philippine encourages private BIs by providing a number of special fiscal and tax incentive (tax holiday, tax credit, etc). In Australia, the federal government is not involved in the operation of BIs. Instead, it provides supports for the self-reliance of BIs mainly in high tech industries. Multi-invested cooperation model could be found in Japan. Although MITI is the nodal agency for incubators promotion in Japan, most of BIs are joint efforts of local governments along with private corporations. The transitional model could be found in China, Chinese Taipei and Korea. In reality the dominant type of all of these three member economies is still public sponsored model. However, the recent BI policy direction of them has been placed on multi-invested cooperation model to make self-reliant operation possible.

5.1.3 Differences and Commonalities of the SME innovation Policies

The big differences exist between the financial market based economic system and the banking centered economic system. The financial market based economic system shows a market-oriented SME support system that connects private intermediaries with SMEs and that intervenes in market failures areas such as the financial equity investment for the early-stage start-ups or commercialization of scientific researches. The economies with the financial market based economic system do not provide loans or loan guarantee services to innovative SMEs but utilize private venture capital networks or participate in equity funding for high tech SMEs. The banking centered economic system possesses extensive SME support programs with supporting SMEs' economic growth. Instead of emphasizing market competition and efficiency growth, the economies with the banking centered economic system stimulate and promote SMEs' economic successes with the purpose of rectifying the capability gap between large corporations and SMEs. These economies mostly utilize direct loans, or governmental guided or guaranteed loans programs for SMEs' innovation supports.

This research identified general trends of SME innovation policies. One of the trends is that APEC member economies promote high-technology start-ups and spin-offs with incubators and cluster formations. Even the banking centered economic system established governmental equity financing program in order to support high tech start-ups or early staged high tech SMEs. Recognizing the SMEs' role in job creation and economic growth, developing member economies in APEC recently established SME support systems and laws to promote technological capabilities of SMEs and to integrate domestic SMEs into global production networks. Another trend of SME innovation policies is that APEC member economies combine several policy programs for a comprehensive and customized support for SME innovation. Escaping from a monotonous financial support for SMEs, they recognize that management and

technology consultation, information services, and network brokerage services are essential for the SMEs' innovation and commercial success. The programs combining financial supports and consultation services are identified as the most successful ones according to the best practice studies.

5.2. Suggestions for APEC cooperative agendas

5.2.1 Implications from the Comparison Analysis

Six categories of policies were selected as critical ones to the success of SME innovation. They are marketing, human resources development, technology policies financing, management innovation and clustering and networking. The policy comparison of the ten member economies was made in each category in the previous chapter. The comparative analysis could provide an opportunity for extracting meaningful implications, from which we can offer more productive suggestions to APEC.

First of all, the policy of government procurement is regarded as one of the important policies for SMEs to market their newly developed products. Australia, Korea, the Philippines and Chinese Taipei stipulated that the public sector should purchase some quota of SME products from their total procurement amount. Canada has not directly promoted procurement for SMEs and instead stimulated it by having SMEs seek local subcontracting contracts. On the other hand, Malaysia, Mexico and Thailand do not have procurement programs for SMEs' products. Thai SMEs, for instance, have to market their products personally to the public sector since each government agency makes procurement individually without using its government tendering system. It implies that the public sector should purchase the products newly developed by SMEs and the purchasing process be open and transparent to SMEs. The cooperative discussions and efforts made in the APEC region may help find a better way for *non-government-procurement* member economies to adopt government procurement programs and open tendering systems.

Qualified human resources are crucial to SME innovation. Every member economy does its best to train and educate SME employees who are qualified for technological innovation. Australia has implemented the Australian Apprenticeships Incentives Program that relates to an area of innovation. Likewise, all other member economies provide similar training programs. Since most SME employees hardly allocate their time for training on a full time basis, the best way is to get them involved in the real project. For instance, they can join collaborative research with universities or research institutes. It implies that the *on-the-job* training and education are

superior compared to general ones. This kind of training may take the form of a research collaborative team in universities or research institutes. The general training and education programs, whose topics can be designed as keen and practical to SME innovation, could be developed by a joint work among member economies and be disseminated to SMEs either via collective workshops or e-learning system.

As for technology policies, there are two general measures: R&D tax credit and R&D grant. Australia and Canada are stronger in R&D tax credit. Japan, Korea and Chinese Taipei exercise both measures. China, Malaysia, Philippines, and Thailand lean much toward R&D grant. It implies that R&D grant may be more appropriate for SMEs when corporate income is near to or below its taxable limit, which usually happens in SMEs. The other issue regarding R&D grant is that the exact amount of grants must be paid to SMEs for their timely use once their applications have been approved by the government within the planned R&D budget. In Malaysia, for instance, most R&D grants disbursed are much lower than approved R&D grants. It is likely to result from the R&D grant system based on the reimbursement of uncompleted or low quality research output. The responsible public sector for R&D grant should redesign its R&D grant system in a way to minimize the amount reimbursed from SMEs from the beginning.

With respect to financing policy, there are two types: investment-focused and loan-focused. Australia and Canada strongly pursue investment-focused financing policies. Japan, Korea and Chinese Taipei move towards investment-focused policies from current loan-focused ones. Most high-tech start-ups, spin-offs and newly expanding SMEs are in need of finance, whereas capital markets are reluctant to invest. They do not have sufficient collateral from which to borrow money except their technologies. The government should be able to lend money to SMEs based on their technologies. Since governmental budget is limited enough to support all SMEs, the financing policy needs a system to screen out right beneficiaries from all candidate SMEs. It implies that a sound evaluation system of technologies should be established to assess a success rate of technologies in terms of commercialization by specific SMEs. The evaluation system may require many revisions to adequately measure the success rate, and hence the cooperation at the APEC level may bring up a better evaluation system instead of efforts made by individual member economies.

Among many elements of policies for management innovation, counseling is paid a special attention because most entrepreneurs and their employees at high-tech start-ups and spin-offs have a strong background in engineering. The innovative ideas and technologies generated by start-ups need to be elaborated to resort to financing organizations. The financing organizations require a business plan, which contains not only technology including production, but also

management related information such as commercialization plan, self-financing plan, market research, intellectual property rights study, etc. Australia, Canada, Japan, Korea and Chinese Taipei show successful cases of counseling in its individual program. Since excellent counseling assumes existence of counselors qualified in counseled areas, the policy should be accompanied with developing such counselors domestically or bringing them from overseas. The ITAP program of Thailand, for instance, provides experts from 10 overseas countries. It implies that building a network of and exchange of experts among member economies may reduce difficulties in searching qualified counselors. In addition, it may be considered to introduce a qualification testing system of counselors in APEC. Those who are once qualified by the system could be dispatched to the member economy in need.

The business incubator (BI) policy in the clustering and networking category was previously classified into four types. High-tech start-ups and spin-offs are necessary drivers for SME innovation and they are nurtured in BIs. Since the success of BIs lies in incubating them as tenants to be self-reliant SMEs, all kinds of supports are supposed to be provided in an integrated manner. However, the operation is not so successful regardless of the BI types. There are many aspects to be supplemented like financing, marketing, technology collaboration, advice, etc. As seen in Chinese Taipei, the AEDC program may be one of the best ones. It implies to do benchmarking of successful cases in the BI policy in APEC. Scrutiny of the cases would bring up issues to remedy the current operation problems.

5.2.2 Implications from the Best Practices

The study of the best practices in Part Ⅲ indicates general guidelines to SME innovation policies. Either startups or established SMEs are in need of basic or advanced management skills as well as technological counseling.

Some advanced member economies like Australia and Canada combine financial support and management advisory services. Under Tailored Assistance for Commercialization (TAC) of the COMET program in Australia, eligible firms collaborate with private-sector business advisers on strategies such as developing a proper business plan, and a product prototype and market analysis. The IRAP program of Canada integrates R&D subsidy and advising, and domestic and international networking.

As for counseling support, Japan and Thailand present SME Support Center and ITAP, respectively. Korea and Malaysia show their approaches to indigenous technology acquisition, while China and Chinese Taipei show their integrated approaches in the area of BIs. The case of

the Philippines may be referenced for SME development by those member economies which are about to initiate their own plans.

The best practice study implies that innovative technology support cannot be successful without counseling support for commercialization. This kind of combined supports can manifest themselves at individual firm level like Australia and Canada or at BI level like in China and Chinese Taipei. Japan and Thailand definitely possess R&D promotion programs in addition to separate counseling support. Likewise, Korea and Malaysia possess various counseling programs along with technology support. Those four member economies may have to consider the design of separate programs into combined ones.

5.2.3 Typology of the SME Innovation Policies and Implications

The ten APEC member economies are grouped into four categories according to their strategic priorities of SME innovation policies and their economic/industrial development stages. Two groups represent the advanced economy's SME innovation policies, which can be seen respectively as the financial market based economies and the banking centered economies. The other two groups represent the developing economies which recently established SME innovation policies framework. China stands out as the most unique model of SME innovation policies in which the Chinese government promotes high-tech start-ups and spin-offs through extensive support of business incubators and cluster formations.

However, the SME innovation policies contained in one group can not be easily implemented to another group without considerations of economic, industrial and technological context. Australia, Canada and China have all possess strong basic research capabilities to accomplish high-tech start-ups and spin-offs. With this basis, these economies can successfully promote the commercialization of scientific research and the high-tech start-ups through business incubators and consultation services. Meanwhile Japan, Korea and Chinese Taipei, which have the banking centered financial system, all possess the private sectors' strong indigenous technological capabilities. With this basis of private sectors' technological capabilities, SME innovation policies to promote management capabilities of SMEs can be successful. Thus the strategies of developing economies to acquire technological capabilities are on the right track to develop SMEs' innovative capacity either through integration into global production networks or through technological collaborations and technology grant programs. However, the other attempts to benchmark SME innovation policies such as direct equity investments or high-tech cluster formations may not be highly successful.

The advanced two groups can also learn policy lessons from each other's SME innovation policies. The banking-centered group has already adopted equity-financing programs and venture capital networks programs to promote high tech start-up companies. But the group still needs to learn the financial market based SME innovation policies framework in which entrepreneurship spirit can be fostered and CEO's loan guarantee are not required for bank loans. The financial market based group can also learn from the banking centered group in which the private sectors successfully develop indigenous technological capabilities. The financial market based group does not specify strategic technology sectors to concentrate governmental resources. However the banking centered economies has developed the private sectors' technological capabilities by concentrating governmental financial resources and service programs for strategic technology sectors. The financial market based economies may learn from this policy focus and concentration of resources for specific targeted technology sectors.

5.2.4 Impediments to SME Innovation

Recognizing that SMEs usually lack financing, skilled labor, their own technologies, information and others, member economies of APEC have worked hard to take every measure to promote innovation of their SMEs. Every member economy devised diverse strategies and implemented their policy programs. Some member economies deployed comprehensive programs; and some recently realized the importance of SME innovation and embarked on various programs. However, developing member economies have difficulty in accomplishing their planned goals. It is worthwhile to take a special attention to roadblocks or impediments to the success of their programs. Once the impediments are identified, they can be resolved by individual member economy or joint efforts at the APEC level.

The most significant impediment to SME innovation is the lack of confidence to build technology-based SMEs in developing member economies. The lack of confidence leads to the use of financial resources for a short term benefit, and the level of R&D investment cannot be increased as a result. Developing member economies may learn from the past, and thus it is recommended to review Chinese Taipei experiences of how it has created innovative SMEs. In these days, Mexico and Korea have demonstrated the coordinated action to foster technology-based SMEs.

Related to the impediment as mentioned just above, mutual mistrust exists between the government and SMEs. The review and execution of financing support should not be longer than promised regardless of any reasons since the financing is most precious to SMEs for their survival. This happens in Thailand because financing is considered to be inefficient

institutionally. Some other example regarding mistrust can be found in the low disbursement rate of the R&D budget as described for Malaysia. Their approach seems that SMEs spend approved expenses first and then the government repays the amount. Government procurement programs would be another example of mistrust in the sense that it is unclear or non-existent. In particular, the government procurement program must be open to all first of all and transparent at the same time. If allowed, the public sector has to be even mandated to purchase innovative products developed by high-tech start-ups or spin-offs.

One of the impediments to SME innovation is that SMEs are not aware of the existence of the support programs provided by the government. They cannot afford to spend their time in identifying the programs. Inefficient communication between the government and SMEs may lead the programs to fail due to a low participation rate from SMEs. It would be advisable to build and operate integrated internet portals for policy guides, announcements, and advice both on-line and off-line.

5.2.4 General Suggestions for APEC cooperative agendas

APEC member economies have diversities in their economic growth stages, technological capabilities, R&D investments, economic and cultural institutions and SMEs' innovativeness. However, because of the rise of IT revolution, the spread of high-tech usages and the extensive policy learning practices among APEC member economies, the common grounds have been established for several APEC cooperative agendas for SME innovation. Moreover developing member economies in APEC, which renewed their recognition of the importance of SMEs' innovation and economic roles, can benchmark and customize the development paths of the advanced member economies in APEC. This policy learning should accompany the understanding of the economic, social and cultural institutions of the advanced economies. However, the policy application to each developing member economy should be customized according to institutional contexts.

From the point of financing policy, the developing economies in APEC should choose the path of development in financing policy whether to follow the investment-focused group or to follow the loan-focused group. The most of Asian member economies under the influence of the Japanese economic system follows the loan-focused group's financing policies. The loan-focused policies are suitable for the development of SMEs' growth and innovation when the SMEs' technological capabilities and innovation are low and inefficient. Through loan programs and guarantee programs, SMEs can develop manufacturing capabilities and adaptive technological capabilities from the collaboration with large corporations or MNCs in global

production networks. However, if, as like China, a developing member economy possesses strong basic research capabilities, the investment-focused financing policies can be highly suitable for high-tech early stage SME innovation.

The cooperative agenda for venture capital networks can be also established. Since the investment focused group have the relative strengths in venture capital, BANs and the investment-related policies, the several APEC cooperative agendas can be established for the promotion of international venture capital networks and policy learning. The APEC can initiate a formation of the APEC international venture capital network connecting the investment-focused advanced APEC member economies' venture capitalists and BANS to the loan-focused APEC member economies' high-tech start-ups.

The APEC can initiate the policy learning program that the loan-focused APEC member economies benchmark the experiences of the investment-focused advanced APEC member economies' venture capital policies and specific BANs practices. With the long history of venture capital promotion policies in the investment-focused APEC member economies, the loan-focused APEC member economies, which newly started venture capital program, may need to benchmark critical success factors of investment-related policies and specific practices. On the reverse, the investment-focused group may need to benchmark the strategic development and governmental focus of future technology and promising industries in the loan-focused group. Since most of the investment-focused group followed the market-failure rules in governmental intervention, the strategic industries have not been effectively developed. The APEC policy learning program may incorporate this aspect in the exchange of policy benchmarking between the investment-focused APEC member economy and the loan-focused APEC member economy.

5.2.5 Specific suggestions for APEC cooperative agendas

To achieve the Bogor goals, "free and open trade and investment in the Asia-Pacific by 2010 for developed economies and 2020 for developing economies," APEC Leaders and Ministers recognized that innovation is the driving force of economic growth to meet the goals, and urged continuous cooperation in promoting innovation. APEC Leaders and Ministers recommended innovation policies for start-ups to have access to a variety of financing resources, research and development, commercialization, and marketing tools. They subsequently emphasized cooperation in building appropriate environments for SMEs in APEC.

As part of follow-up actions, the 2005 APEC SMEMM agreed upon the *Daegu Initiative* that

member economies should voluntarily review Individual Action Plans (IAPs) about their economic and policy environments for SME innovation, both individually and collectively. Another follow-up action initiated establishment of the *APEC SME Innovation Center* which serves as the foundation for sharing policy experiences to effectively enhance the innovation capacity of SMEs in APEC.

Continuous cooperation in APEC is essential for SMEs to be equipped with innovation capabilities and thus to be prosperous in the coming globalized and competitive marketplace. The APEC SME Innovation Center accordingly commenced with survey research of SME Innovation policies in APEC early 2006. It held a forum with experts from 7 member economies in APEC to discuss their SME innovation policies in June, 2006. It also had a training workshop by inviting policy makers from 11 member economies on SME innovation policies and practices in November, 2006.

Prerequisite to Cooperation in APEC

Trends and directions of SME innovation activities in each of APEC member economies should be understood ahead of developing an APEC-wide cooperation framework. For the sake of this, holding forums or workshops on SME innovation in APEC are highly important to enhance awareness of stakeholders including governments, intermediaries, and SMEs. It is strongly recommended that the stakeholders should be encouraged to raise their capabilities to become successful entrepreneurs as well. Then, member economies can make joint efforts to substantiate progress in management of innovation and innovation in management at individual, organization, member economy, and APEC levels.

Joint Efforts Suggested

For APEC member economies to facilitate the SME innovation, the following three approaches are proposed and their respective actions are individually suggested as below:

To explore ways to share innovation policies, best practices and outcomes in APEC: APEC-wide benchmarking should be provided with reference to exemplar cases in APEC. It is suggested that funding for the benchmarking should be made available to effectively facilitate the undertaking of industry-specific collaborations among governments, industries, academia, and research institutes in the APEC region.

To cooperate in developing policies for technology and management innovation, and human capacity building: It is suggested to draw a general framework for designing, deploying and

assessing SME innovation policies in APEC. The framework particularly needs to focus on commercializing innovation in products and processes. Templates for human capacity building are also suggested to be included in the framework to cultivate innovation specialists.

To build a network of SME innovation policy experts and to support their continued cooperation: All the participants in forums or workshops associated with SME innovation in APEC are suggested to be developed into the *APEC SME Innovation Leaders Club*, a community of SME innovation leaders. The APEC SME Innovation Leaders Club should polish the network further.

Reference

Abernathy, W. J. and Utterback, J. M., 1978, Patterns of Industrial Innovation, Technology Review, June July, 41-47.

Acs, Z. J., 1996, Small Firms and Economic Growth, Cheltenham, UK; Brookfield, Vt., US, E. Elgar Pub.

Acs, Z. J., 2000, Regional Innovation, Knowledge, and Global Change, London, Pinter.

Agarwal, S., 2005, Strategy for enhancing competitiveness of SMEs based on Technology Capacity Building, 2006 UNESCAP Regional Consultative Meeting, Seoul, Korea, January 18-20, 2006.

Archibugi, D. and Simonetti, R., 1998, Objects and subjects in Technological Interdependence. Towards a Framework to Monitor Innovation, *International Journal of the Economics of Business*, Vol. 5, No. 3, 1998, pp. 295-309.

Argyris, C. and Schon, D. A., 1978, Organizational Learning: A Theory of Action Perspective, Reading, MA, Addison-Wesley.

Arora, A., Fosfuri, A. and Gambardella, A., 2002, Markets for Technology in the Knowledge Economy, *International Social Science Journal*, 54, 115-+.

Arora, A. and Gambardella, A., 1994, The Changing Technology of Technical Change: General and Abstract Knowledge and the Division of Innovative Labor, *Research Policy*, 23.

Autio, E., 1997, New Technology-Based Firms in Innovation Networks, IN JONES-EVANS, D. and KLOFSTEN, M. (Eds.), Technology Innovation and Enterprise, London, MacMillan.

Alvaiez, S. A., 2001, How Entrepreneurial Firms Can Benefit from Alliances with Large Partners. *Academy of Management Executive,* 15, 139-148.

Arrow, K., 1962, The Economic Implications of Learning by Doing, *Review of Economic Studies,* 29**,** 155-173.

Asheim, B. and Isaksen, A., 2003, SMEs and the regional dimension of innovation, in B.

Asheim, A. Isaksen, C. Nauwelaers and F. Tödtling(eds.), *Regional Innovation Policy for Small-*

Medium Enterprises, Edward Elgar, pp. 21~46.

Audretsch, D., 1995, *Innovation and industry evolution*, Cambridge, MA: MIT Press.

Audretsch, D. and Feldman, M., 1996a, Innovative cluster and the industry life cycle, *Review of Industrial Organization*, 11(2), 253-273.

Audretsch, D. and Feldman, M., 1996b, R&D spillover and the geography of innovation and production, *American Economic Review*, 86(3), 630-640.

Audretsch, D., 2004, Sustaining Innovation and Growth: Public Policy Support for Entrepreneurship, *Industry and Innovation*, Vol. 11, No. 3, 2004, 167-191.

Audretsch, D., 2005, Entrepreneurship, cluster formation and the strategic management of places, paper prepared for presentation at the APEC Symposium on Industrial clustering for SMEs, Taipei, March 7-9, 2005.

Baldwin, C. Y. and Clark, K. B., 1997, Managing in an Age of Modularity, *Harvard Business Review*, 75, 84-&.

Bell, M. and Albu, M., 1999, Knowledge Systems and Technological Dynamism in Industrial Clusters in Developing Countries, *World Development*, 27, 1715-1734.

Black, G., 2004, The Geography of Small Firm Innovation, Black.

Bollinger, L., Hope, K., Utterback, J.M., 1983, A review of literature and hypotheses on new technology-based firms, *Research Policy*, 12, 1-14.

Breschi, S. and Lissoni, F., 2001, Localised knowledge spillovers vs. innovative milieux: Knowledge "tacitness" reconsidered, *Papers in Regional Science*, 80, 255-273.

Brock, W.A and Evans, D.S., 1989, Small business economics, *Small Business Economics*, 1(1), pp. 7-20.

Burgel, O., Fier, A. and Murray, G., 1993, The Internationalization of Young High-tech Firms, Physica-Verlag: Springer-Verlag.

Burgelman, R. A. and Sayles, L. R., 1986, Inside Corporate Innovation: Strategy, Structure and Managerial Skills, New York, Free Press.

Cabral, L. M. B. and Mata, J., 2003, On the Evolution of the Firm Size Distribution: Facts and Theory, *American Economic Review*, 93, 1075-1090.

Carlsson B. and Jacobsson S., 1996, Diversity Creation in Technological Systems: A Technology Policy Perspective, in C. Edquist (ed.) Systems of Innovation: Technologies, Institutions and Organizations, Cassell.

Canback, S., 2002, Bureaucratic Limits of Firm Size: Empirical Analysis Using Transaction Cost Economics, Brunel University.

Carroll, G. R. and Hannan, M. T., 1995, Resource Partitioning, IN CARROLL, G. R. & HANNAN, M. T. (Eds.) Organizations in Industry: Strategy, Structure, and Selection. Oxford, Oxford Univ. Press.

Cohen, S.I., 2001, Microeconomic Policy, Routledge, New York.

Cohen, W. M. and Klepper, S., 1992, The Tradeoff between Firm Size and Diversity in the Pursuit of Technological-Progress, *Small Business Economics*, 4, 1-14.

Cooke, P., Heidenrech, M. and Braczyk, H., 2004, Regional Innovation System: The role of governance in a globalized world, Routledge.

Cooke, P. and Morgan, K., 1993, The network paradigm-new departures in corporate and regional development, *Environment & Planning D: Society and Space*, 11.

Craggs, A. and Jones, P., 1998, UK results from the Community Innovation Survey, *Economic Trends*, 539(October), pp. 51-57.

De Meza, 2002, Overlending?, *Economic Journal*, 112, 17-31.

Dodgson, M., 1993, Organizational Learning: A Review of Some Literatures, *Organization Studies*, 14, 375-394.

Dunning, J., 1992, Multinational Enterprise and the Global Economy, Washington D.C.

Dyer, J. H., 1996, Does Governance Matter? Keiretsu Alliances and Asset Specificity as Sources of Japanese Competitive Advantage, *Organization Science*, 7, 649-666.

ETRI, 2005, Identifying and Promoting 30,000 Innovative SMEs, ETRI 2005.

Etzkowitz, H. and Leydesdorff, L. (Eds.), 1997, Universities and the Global Knowledge Economy: A Triple Helix of University Industry Government Relations, London, Cassell Academic.

Faulkner, W. and Senker, J., 1994, Making Sense of Diversity: Public-Private Sector Research Linkage in Three Technologies, *Research Policy*, 23, 673-695.

Feldman, M. and Audretsch, D., 1999, Science-based diversity, specialization, localized competition and innovation, *European Economic Review*, 43, pp. 409-429.

Fontes, M., Commbs, R, 2001, Contribution of new technology-based firms to the strengthening of technological capabilities in intermediate economies, *Research Policy*, 30, 79-97.

Fransman, M., 1994, Information, Knowledge, Vision and Theories of the Firm. Industrial-and-Corporate-Change, *Industrial and Corporate Change*, 3, 713-758.

Galbraith, J. K., 1956, American Capitalism, Harmondsworth, Penguin.

Garud, R., Kumaraswamy, A. and Langlois, R. N., 2002, Managing in the Modular Age: Architectures, Networks, and Organizations, Malden MA, Oxford.

Gelsing, L., 1992, Innovation and the Development of Industrial Networks. IN LUNDVALL, B. A. (Ed.) National Systems of Innovation. London, Francis Pinter.

Gemser, G., Leenders, M. A. M. and Wijinberg, N. M., 1996, The Dynamics of Inter-Firm Network in the Course of the Industry Life Cycle: The Role of Appropriability, *Technology Analysis & Strategic Management*, 8, 439-953.

Gherardi, S., 1996, Organizational Learning. IN WARNER, M. (Ed.) International Encyclopedia of Business and Management. London, Routledge.

Gibbons, M., Limoges, C., Nowotny, H., Schwartzman, S., Scott, P. and Trow, M., 1994, The New Production of Knowledge: The Dynamics of Science and Research in Contemporary Societies, London, Sage.

Gompers, Paul A. and Josh Lerner, 2001, The venture capital revolution, *Journal of Economic Perspective*, 15, 145-168.

Grant, R. M., 1996, Toward a Knowledge-Based Theory of the Firm, *Strategic Management*

Journal, 17, 109-122.

Grossman, G. M. and Helpman, E., 1991, Innovation and Growth in the Global Economy, Cambridge, Mass., MIT Press.

Gelsing, L., 1992, Innovation and the Development of Industrial Networks. IN LUNDVALL, B. A. (Ed.) *National Systems of Innovation,*. London, Francis Pinter.

Griliches, Z., 1990, Patent Statistics as Economic Indicators - a Survey, *Journal of Economic Literature,* 28**,** 1661-1707.

Hsu, Y.-G., Shyu, J. Z. and Tzeng, G.-H., 2005, Policy Tools on the Formation of New Biotechnology Firms in Taiwan, *Technovation,* 25**,** 281-292.

Hannan, M. T. and Freeman, J., 1989, Organizational Ecology, Cambridge, Mass., Harvard University Press.

Hicks, D., Hegde, D., 2005, Highly innovative small firms in the markets for technology, *Research Policy,* 34, 703-716.

Holmstrom, B., 1989, Agency Costs and Innovation, *Journal of Economic Behavior & Organization*, 12, 305-327.

Hall, P., 1985, The geography of the Fifth Kondratieff, in Hall, P. and Markusen, A. (eds.), *Silicon Landscapes*, Allen & Unwin, pp. 1-19.

Hassink, R., 1996, Technology transfer agencies and regional economic development, *European Planning Studies*, 42(2), pp. 167-184.

Hwang, J., 2006, *The Role of Small Innovative Firms in Multi-technology Innovation*. Ph.D. Thesis, SPRU, Univ. of Sussex, Brighton.

Isaksen, A., 2003, 'National and regional contexts for innovation', in B. Asheim, A. Isaksen, C. Nauwelaers and F. Tödtling(eds.), *Regional Innovation Policy for Small-Medium Enterprises*, Edward Elgar, pp. 49~77.

Iansiti, M., 1995, Technology Integration: Managing Technological Evolution in a Complex Environment, *Research Policy*, 24, 521-542.

Jeong, In-Eok, 2000, Research on How to Stimulate SME e-commerce in APEC.

Kay, N., 1998, Some Rude Thoughts on the Growth of Firms. IN DRUID (Ed.) Competences, Governance and Emtrepreneurship. Bornholm, DRUID.

Kaufmann, A., and Tödtling, F., 2003, Innovation patterns of SMEs, IN B. Asheim, A. Isaksen, C. Nauwelaers and F. Tödtling(eds.), Regional Innovation Policy for Small-Medium Enterprises, Edward Elgar, pp. 78~115.

Khalil, T. M. and Ezzat, H. A., 2005, Management of Technology and Responsive Policies in a New Economy, *International Journal of Technology Management,* 32**,** 88-111.

Kim, D. H., 1993, The Link between Individual and Organizational Learning, *Sloan Management Review*, 35, 37-50.

Kim, Y., 2005, Innovative SMEs: characteristics, technology learning and business performances, *STEPI*.

Kline, S. and Rosenberg, N., 1986, An Overview of Innovation. IN LANDAU, H. & ROSENBERG, N. (Eds.) The Positive Sum Strategy, New York, National Academy Press.

KIMI, 2003, APEC Informatization Survey for Small and Medium Enterprises.

KISDI, 2001, IT Implementation Plans for SMEs in Japan, Mar, 2001.

KISDI, 2004, Research on Identification of New Policies and Drawing up 2010 Roadmap for Strengthening Competitiveness of e-Business in Korea, Aug 2004.

Kline, S. and Rosenberg, N., 1986, An overview of innovation, in Landau, R. and Rosenberg, N.(eds.), The Positive Sum Strategy, Washington: National Academy Press.

Kogut, B. and Zander, U., 1996, What firms do? Coordination, identity and learning, *Organization Science*, **7,** pp. 502-518.

Krugman, P., 1991, Geography and trade, MIT Press, Cambridge MA.

Laamanen, T. and Autio, E., 1996, Dominant Dynamic Complementarities and Technology-Motivated Acquisitions of New, Technology-Based Firms, *International Journal of Technology Management*, 12, 769-786.

Langlois, R. N. and Robertson, P. L., 1992, Networks and Innovation in a Modular System: Lessons from the Microcomputer and Stereo Component Industries, *Research Policy*, 21, 297-313.

Lawson, C. and Lorenz, E., 1999, Collective learning, tacit knowledge and regional innovative capacity, *Regional Studies*, ***33(***4), pp. 305-317.

Lee, K., Lee I., Kim S., Kwon J., Han J., 2003, The effect of firm certification by government and market, *KISDI* 03-10.

Lee, W., 2005, Formulation of a Comprehensive Policy Framework: Applied to Finnish and Korean National Innovation Policies, *STEPI*.

Lee, Y., etc., 2005, SME Promoting Policies in Korea, the US and Japan, the KOSBI(Korea Small Business Institute), Dec, 2005.

Lerner, Josh, 1999, The government as venture capitalist: the long-run impact of the SBIR program, *Journal of Business*, 72, 285-318.

Lerner, Josh, 2002, When bureaucrats meet entrepreneurs: the design of effective 'public venture capital' programme, *Economic Journal*, 112, 73-84.

Levitt, B. and March, J. G., 1988, Organizational Learning, *Annual Review of Sociology*, 14, 319-340.

Leonard-Barton, D., 1992, Core Capabilities and Core Rigidities: A Paradox in Managing New Product Development, *Strategic Management Journal*, 13, 111-125.

Loasby, B. J., 1999, Knowledge, Institutions, and Evolution in Economics, London, Routledge.

Lucas, R. E. J., 1988, On the Mechanics of Economic Development, *Journal of Monetary Economics*, 22, 3-42.

Lundstrom, A. and Stevenson, L., 2001, Entrepreneurship Policy for the future, Swedish Foundation for Small Business Research.

Lundvall, B.-A., 1992, National Systems of Innovation, Towards a Theory of Innovation and Interactive Learning, London, Pinter.

Lundvall, B., 1992, Introduction, in Lunvall, B.(ed), National System of Innovation, London: Printer publisher, pp. 1-19.

Malerba, Franco, 1996, Public Policy and Industrial Dynamics: an Evolutionary Perspective, Final draft of "Systems Theories of Innovation: Policy Implication" sub-project of "Innovation Systems and European Integration."

Malerba, F. and Orsenigo, L., 1997, Technological Regimes and Sectoral Patterns of Innovative Activities, *Industrial and Corporate Change*, 6, 83-117.

Mansell, R. and Wehn, U., 1998, Knowledge Societies, Information Technology for Sustainable Development, New York, Oxford Univ. Press.

Mansfield, E., 1986, Patents and Innovation: An Empirical Study. *Management Science,* 32**,** 173-181.

Malecki, E., 1997, Technology and Economic Development: The Dynamics of Local, Regional and National Competitiveness, 2nd edition, London: Longman, Addison Wesly.

Marshall, A., 1890[1961], Principles of Economics, Two Volumes, London: Macmillan and Company.

Min, C-G., Kim, W-D., and Kim, J-S., 2005, Policy Alternatives for promoting Innovation-driven SMEs: the Supply Value Chain Perspective, *STEPI 2005-07*.

Motohashi, 2001, Use of plant level micro-data for SME innovation policy evaluation in Japan, RIETI Discussion Paper Series 01-E-006.

Mowery, David C., 1994, Science and Technology Policy in Interdependent Economies, Kluwer Academic Publishers.

Nonaka, I., 1994, A dynamic theory of organizational knowledge creation, *Organization Science*, **5**, pp. 14-37.

Nonaka, I and Takeuchi, H., 1995, The Knowledge-creating Company, Oxford University Press: New York.

Nonaka, I., Toyama, R. and Nagata, A., 2000, A firm as a knowledge-creating entity: a new perspective on the theory of the firm, *Industrial and Corporate Change*, 9(1), pp.1-20.

Nonaka, I. and Takeuchi, H., 1995, The Knowledge-Creating Company: How Japanese Companies Create the Dynamics of Innovation, New York, Oxford Univ. Press.

OECD, 1999, Managing National Innovation Systems.

OECD, 2000a, Science, Technology and Industry Outlook, Paris: OECD.

OECD, 2000b, Enhancing the competitiveness of the SMEs through innovation, paper presented in Conference for Ministers responsible for SMEs and Industry Ministers, Bologna, Italy, 14-15 June 2000.

OECD, 2004, Promoting entrepreneurship and innovative SMEs in a global economy: Towards a more responsible and inclusive globalization, 2nd OECD conference of Ministers responsible for SMEs, Istanbul, Turkey, 3-5 June 2004.

OECD, 2004, OECD Information Technology Outlook.

OECD, 2005, SME and Entrepreneurship Outlook.

Onida, F. and Malerba, F., 1989, R&D cooperation between industry, universities and research organization in Europe, *Technovation*, 9, pp. 132-195.

Orsenigo, L., Pammolli, F. and Riccaboni, M., 2001, Technological Change and Network Dynamics - Lessons from the Pharmaceutical Industry, *Research Policy*, 30, 485-508.

Ouchi, W. G., 1993, Japanese Style Business Partnerships: Giving Companies a Competitive Edge, *Sloan Management Review*, 35, 51-63.

Parker, J. E. S., 1978, The Economics of Innovation: The National and Multinational Enterprise in Technological Change, London, Longman.

Pavitt, K., 1984, Sectoral Patterns of Technical Change: Towards a Taxonomy and a Theory. *Research Policy,* 13**,** 343-373.

Pavitt, K., 1991, Key Characteristics of the Large Innovating Firm, *British Journal of Management*, 2, 41-50.

Pavitt, K., Robson, M. and Townsend, J., 1987, The size distribution of innovating firms in the UK: 1945-84, *Journal of Industrial Economics*, 45, pp.297-306.

Pearce, David W., 1986, Macmillan Dictionary of Modern Economics, the 3rd edition, Mcamillan Reference Books.

Penrose, E. T., 1959, The Theory of the Growth of the Firm, Oxford, Oxford Univ. Press.

Porter, 1980, Competitive Strategy, Free Press.

Porter, M. E., 1998, The Adam Smith address: Location, clusters, and the "new" microeconomics of competition, *Business Economics, 33*(1), pp. 7-13.

Porter, M. E., 2000, Location, competition, and economic development: Local clusters in a global economy, *Economic Development Quarterly, 14*(1), pp. 15-34.

Potter, J., 2005, Local innovation system and SME innovation policy, in *OECD SME and Entrepreneurship Outlook*, OECD.

Pyke, F., 1994, Small Firms, Technical Services and Inter-firm Cooperation, Geneva: International Institute for Labor Studies.

Romer, P. M., 1986, Increasing Returns and Long-Run Growth, *Journal of Political Economy*, 94, 1002-1037.

Rothwell, R., 1991, External Networking and Innovation in Small and Medium-Sized Manufacturing Firms, *Technovation*, 11, 93-112.

Rizzoni, A., 1991, Technological innovation and small firms; a taxonomy, *International Small Business Journal,* 9(3), pp. 31-42.

Rosenberg, N., 1982, Inside the Black Box:Technology and Economics, Cambridge Cambridgeshire, Cambridge University Press.

Santoro, M. D. and Chakrabarti, A. K., 2002, Firm Size and Technology Centrality in Industry-University Interactions, *Research Policy,* 31**,** 1163-1180.

Saxenian, A., 1990, Regional networks and the resurgence of Silicon Valley, *California Management Review*, 33, pp. 89-111.

Saxenian, A., 1994, Regional Advantage: Culture and Competition in Silicon Valley and Route 128, Boston, MA: Harvard University Press.

Schumpeter, J. A., 1942, Capitalism, Socialism and Democracy, New York, Harper and Row.

Smallbone, D., North, D. and Vickers, I., 2003, The role and characteristics of SMEs in innovation, IN B. Asheim, A. Isaksen, C. Nauwelaers and F. Tödtling(eds.), Regional Innovation Policy for Small-Medium Enterprises, Edward Elgar, pp. 3~20.

Smith, Keith, 1996, System Approaches to Innovation: Some Policy Issues, Final draft of "Systems Theories of Innovation: Policy Implication" sub-project of "Innovation Systems and European Integration."

Stoneman, Paul, 1987, The Economic Analysis of Technology Policy, Clarendon press, Oxford.

Storper, M., 1997, The Regional World: Territorial Development in a Global Economy, New York and London: Guilford Press.

Stuart, T. E., 1998, Network Positions and Propensities to Collaborate: An Investigation of Strategic Alliance Formation in a High- Technology Industry, *Administrative Science Quarterly,* 43**,** 668-698.

Sutton, J., 1998, Technology and market structure: theory and history, Cambridge, Mass: The MIT Press.

Tether, B.S., 1997, Growth diversity amongst innovative and technology-based new and small firms: an interpretation, New Technology, Work and Employment 12, 91-107.

Tether, B., Smith, I. and Thwaites, A., 1997, Smaller enterprises and innovation in the UK: the SPRU Innovations Database revisited, *Research Policy*, 2, 19-32.

Ulrich, K., 1995, The Role of Product Architecture in the Manufacturing Firm, *Research Policy*, 24, 419-440.

UNCTAD, 2004, Promoting the Export Competitiveness of SMEs, UNCTAD, TD/B/Com.3EM.23/2, October 20, 2004.

Vernon, R., 1966, International Investment and International Trade in the Product Cycle, *Quarterly Journal of Economics*, 80, 190-270.

Yoo, Ji-Won, 2005, Basic directions for New IT Strategies in Japan, ETRI, Nov, 2005.

Appendix 1

- Survey Questionnaire

A Research on the Innovation Promoting Policy for SMEs in APEC: Survey and Case Studies

Survey Questionnaire

2006

APEC SME Innovation Center

EXPLANATORY NOTE

1. PURPOSE OF RESEARCH AND QUESTIONNAIRE

The objectives of this research are set as follows: 1) to compare SME innovation policies among APEC member economies and identify best practices for policy makers in APEC, 2) to bring up a coherent environment scheme conducive to SME innovation at national, regional, local and firm levels; and, 3) to suggest joint efforts and cooperative activities by which to resolve impediments to SME innovation encountered by governments and firms in APEC.

This purpose of this questionnaire is to survey the 10 selected APEC member economies, which are Australia, Canada, China Mainland, Japan, Korea, Malaysia, Mexico, Philippine, Chinese Taipei and Thailand in order to collect detailed information about 1) the innovativeness of SMEs in the member economy, 2) strategy and progress of SME innovation policies, 3) major policies and projects for promoting SME innovation, 4) best policies and practices for SME innovation.

Thus, this questionnaire consists of two parts:

(1) General overview, which includes questions about 1) the innovativeness of SMEs in the member economy, 2) strategy and progress of SME innovation policies and 3) best policies and practices for SME innovation

(2) Major policies and projects for promoting SME innovation, which includes 6 areas of policy actions

2. GENERAL GUIDELINES FOR COMPLETING THE QUESTIONNAIRE

- The research framework divided SME innovation policies into 6 areas. However, If certain good practices would by their comprehensive nature fit in different sections, please choose the most appropriate one and make simple reference to this in the other sections.

- The focus of the report should be on most recent developments. Description of specific results/conclusions of measures is most useful.

- Please identify clearly the measures that are specifically targeted at small and medium enterprises.

- Each policy measure should constitute examples of good practices and wherever possible, illustrate measures with examples and data.

- Please insert relevant references to publications and web sites.

SECTION 1: GENERAL OVERVIEW

INNOVATIVENESS OF SMES IN YOUR ECONOMY

1. Please describe the innovativeness of SMEs in your economy in terms of innovation inputs (e.g. R&D investments, personnel, or even qualitatively, etc.), and innovation outputs (e.g. patents, market sales proportions or competitiveness of SMEs).

Strategy and progress of SME innovation policies

2. Please describe the overall strategic focuses (in terms of SME innovation promotion tools, strategic industries, specific SMEs targets, strategic purposes and etc.) and recent progress of SME innovation policies in your economy.

Best policy and practice for SME innovation

3. If you recommend only one best policy, what is the best policy of your economy for SME innovation, which can be a candidate of an in-depth case study of this research? Please, describe the reasons of the recommendations with specific examples of SME innovation.

SECTION 2: SPECIFIC SME INNOVATION POLICIES

I. NAME CONTACT POINT FOR EACH POLICY.

Please name the **department** and **personnel** in charge of following specific policy areas for **SME innovation**, including their **contact points**: **email, fax, phone, web site address**.

- ***Marketing policy***
- ***Technology Policy***
- ***Financing Policy***
- ***Management Innovation Policy***
- ***Networking and Clustering Policy***
- ***Human Resources Development Policy***

II. Describe major policies and programs of each area

When you describe the major policies and programs of each area, please include 1) brief history of the policy implementation, 2) the specific purposes and goals of the policy, 3) the governmental inputs and contents of the policy (such as amount of public finance, or tax incentive etc.) and 4) the output performance of the policy.

Part One

Marketing Policy

Please provide **major policies and pr ograms** ***for SME marketing policies and programs***, and explain what they are.

1) Policy to promote government procurement for SME's new technology products and technology development
2) Policy dedicated to export promotion for SME international marketing
3) Policy to enhance the integration of SMEs into the global supply chain of foreign investors and large firms for SME international marketing

Technology Policy

Please provide **major policies and pr ograms** ***for SME technology policies and programs***, and explain briefly what they are.

1) Policy to promote research and development in SME
2) Program designed to stimulate large firms and institutions to help SME technological development
3) Policy that promotes technological collaboration among SMEs

Financing Policy

Please provide **major policies and pr ograms** ***for SME financing policies and programs***, and explain what they are.

1) Policy for government equity programs, which can be either direct equity financing programs or hybrid-funds with private venture capitals
2) Policy to promote networks of venture capitalists, which are often called business angel networks (BANs)
3) Policy for government direct loan programs for SME innovation
4) Policy for loan guarantee programs and technology evaluation intermediaries

Part Two

Management Innovation and e-Business

Please provide **major policies and pr ograms** ***for SME management innovation, e-business and awareness programs*****,** and explain what they are.

1) Policy to support for SME business counseling (consulting services)
2) Policy for promoting e-Business
3) Policy for raising the awareness of SME innovation
4) Describe your information provision system to offer the comprehensive information on SME support policies and for SME operations

Networking and Clustering Policy

Please provide **major policies and pr ograms** ***for networking and clustering policy***, and explain what they are.

1) Policy for business incubating to encourage start-up SMEs
2) Policy as a network broker among SMEs, large firms, research organizations, and professional service providers

Human Resource Development Policy

Please provide **major policies and programs *for recruiting and training* in SME innovation activities**, and explain briefly what they are.

1) Manpower policy for promoting the recruiting of R&D personnel for SMEs
2) Policy that helps training people in SMEs

Please, submit answered sheets to jooykim@tipa.or.kr and/or ye4317@tipa.or.kr no later than June 30, 2006.

Thanks for your kind cooperation.

For further inquiry about this questionnaire, please contact:

Joo-Yong KIM, Director

APEC SME Innovation Center

e-mail: jooykim@tipa.or.kr

Phone: (82) (2) 3787 0430

Appendix 2

- APEC 10 Member Economies: Fortune Global 500 Companies

- Industrial Fortune Global 500 and Nationality

APEC 10 Member Economies: Fortune Global 500 Companies (2006)

Australia (8)	Canada (14)	China (20)	Japan (71)	Korea (12)	Malaysia (1)	Mexico (5)	Philippine (0)	Chinese Taipei (3)	Thailand (1)
BHP Billiton	Manulife Financial	Sinopec	Toyota Motor			Pemex			PTT
Coles Myer	George Weston	State Grid	Nippon Telegraph & Telephone			CFE			
National Australia Bank	Royal Bank of Canada	China National Petroleum	Honda Motor	Samsung Electronics		America Telecom			
Woolworths	Magna International	Industrial & Commercial Bank of China	Hitachi	LG		Carso Global Telecom			
Commonwealth Bank of Australia	Power Corp. of Canada	China Mobile Communications	Nissan Motor	Hyundai Motor		Cemex			
Telstra	Alcan	China Life Insurance	Matsushita Electric Industrial	SK					
Australia & New Zealand Banking	Sun Life Financial Services	Bank Of China	Sony	Samsung Life Insurance				Hon Hai Precision Industry	
Westpac Banking	EnCana	Hutchison Whampoa	Nippon Life Insurance	POSCO	Petronas			Cathay Financial Holdings	
	BCE	China Southern Power Grid	Toshiba	Korea Electric Power				Quanta Computer	
	Canadian Imperial Bank of Commerce	China Construction Bank	Tokyo Electric Power	Kookmin Bank					
	Toronto-Dominion Bank	China Telecommunications	Nippon Oil	Hanwha					
	Bank of Nova Scotia	Baosteel Group	Dai-ichi Mutual Life Insurance	KT					
	Bombardier		Mitsubishi	Samsung					
	Onex		NEC	SK Networks					
			Fujitsu						

		Sinochem							
		Agricultural Bank of China China Railway Engineering COFCO China First Automotive Works Shanghai Automotive China Railway Construction China State Construction	AEON Mitsubishi UFJ Financial Group Mitsui Seven & I Holdings Sumitomo Life Insurance Nippon Steel Canon Meiji Yasuda Life Insurance Sumitomo Mitsui Financial Group Mitsubishi Electric Mizuho	Japan Financial Group, Millea Holdings, Denso, Marubeni, JFE Holdings, KDDI, Mazda Motor, Idemitsu Kosan, Sharp, Mitsubishi Heavy Industries, Bridgestone, Suzuki Motor, Nippon Mining Holdings, Fuji Photo Film, East Japan Railway, Sumitomo, Kansai, Electric Power, T&D Holdings, Mitsubishi Chemical Holdings, Sanyo Electric, Itochu, Japan Airlines, Cosmo Oil, Chubu Electric Power, Aisin Seiki, Mitsubishi Motors Mitsui Sumitomo Insurance, Japan Tobacco, Sumitomo Electric Industries, Sompo Japan Insurance, Nippon Yusen, Japan Post, Mediceo Paltac Holdings, Ricoh, Nippon Express, Nomura Holdings, Kajima, Taisei, Komatsu, Daiei, Kobe Steel, Tohoku Electric Power, Isuzu Motors, Asahi Glass, Sumitomo Chemical					

Appendix 2

Industrial Fortune Global 500 and Nationality

Aerospace and Defence	Computer Services and Software	Electronics, Electrical Equipment	Motor Vehicles & Parts	Networks and Other Comunications Equipment	Pharmaceuticals	Semiconductors and Other Electronic Components
Boeing (USA)	Microsoft (USA)	Siemens (Germany)	General Motors (USA)	Nokia (Finland)	Pfizer (USA)	Intel (Japan)
United Technologies (USA)	Electronic Data Systems (USA)	Hitachi (Japan)	DaimlerChrysler (Germany)	Motorola (Japan)	Johnson & Johnson (USA)	Flextronics International (Singapore)
EADS (Netherland)	Accenture (USA)	Samsung Electronics (Korea)	Toyota Motor (Japan)	Cisco Systems (USA)	GlaxoSmithKline (Britain)	Onex (Canada)
Lockheed Martin (USA)	Computer Sciences (USA)	Matsushita Electric Industrial (Japan)	Ford Motor (USA)	L.M. Ericsson (Sweden)	Sanofi-Aventis (France)	
Northrop Grumman (USA)		Sony (Japan)	Volkswagen (Germany)	Alcatel (France)	Novartis (Swiss)	
Honeywell Intl. (USA)		LG (Korea)	Honda Motor (Japan)		Roche Group (Swiss)	
Raytheon (USA)		Toshiba (Japan)	Nissan Motor (Japan)		AstraZeneca (Britain)	
General Dynamics (USA)		Tyco International (USA)	Peugeot (France)		Abbott Laboratories (USA)	
BAE Systems (Britain)		Royal Philips Electronics (Netherlands)	BMW (Germany)		Merck (USA)	
Finmeccanica (Italy)		Mitsubishi Electric (Japan)	Fiat (Italy)		Bristol-Myers Squibb (USA)	
Bombardier (Canada)		Hon Hai Precision Industry (Chinese Taipei)	Hyundai Motor (Korea)		Wyeth (USA)	
		Sharp (Japan)	Robert Bosch (Germany)		Eli Lilly (USA)	
		Sanyo Electric (Japan)	Renault (France)			

		Sumitomo Electric Industries (Japan)	Volvo (Germany)			
		Electrolux (Sweden) Emerson Electric (USA) Schneider Electric Whirlpool	Denso (Japan) Johnson Controls (USA) Delphi Mazda Motor Bridgestone Suzuki Motor Magna International Goodyear Tire & Rubber Michelin Aisin Seiki Mitsubishi Motors MAN Group Koc Holding Continental Lear Visteon China First Automotive Works Shanghai Automotive Paccar Isuzu Motors			

Part Ⅱ:

Member Economy's Profile of

SME Innovation Policies in APEC

List of Member Economies

Chapter 1: Australia **1**

1. Economy and Industrial Structure and SME Position 1
2. SME Innovation Policies 3
3. Overall Assessment 14

Chapter 2: Canada **19**

1. Economy and Industrial Structure and SME Position 19
2. SME Innovation Policies 22
3. Overall Assessment 30

Chapter 3: China **35**

1. Economy and Industrial Structure and SME Position 35
2. SME Innovation Policies 38
3. Overall Assessment 43

Chapter 4: Japan **47**

1. Economy and Industrial Structure and SME Position 47
2. SME Innovation Policies 50
3. Overall Assessment 59

Chapter 5: Korea **63**

1. Economic and industrial Structure and the SME position 63
2. SME Innovation Policies 67
3. Overall assessment 78

Chapter 6: Malaysia **83**

1. Economic and Industrial Structure and SME Position 83
2. SME Innovation Policies 86
3. Overall Assessment 94

Chapter 7: Mexico **99**

1. Economy and Industrial Structure and SME Position 99
2. SME Innovation Policies 101
3. Overall Assessment 110

Chapter 8: Philippines 115

1. Economy and Industrial Structure and SME Position 115
2. SME Innovation Policies 118
3. Overall Assessment 129

Chapter 9: Chinese Taipei 133

1. Economic and Industrial Structure and SME Position 133
2. SME Innovation Policies 136
3. Overall assessment 146

Chapter 10: Thailand 151

1. Economic and Industrial Structure and SME Position 151
2. SME Innovation Policies 155
3. Overall Assessment 162

List of Tables

<Table 1.1> Types of Innovation Undertaken 2001-2003 2

<Table 1.2> R&D Expenditure 2003-04 3

<Table 2.1> Number of Business Establishment by Firm Size 20

<Table 2.2> Employment by the Size of Enterprises 20

<Table 2.3> Contribution of SMEs in Export Value 21

<Table 3.1> Classification of SMEs in China 37

<Table 4.1> Definition of an SME 48

<Table 4.2> Definition of a Small-Scaled Enterprise 48

<Table 4.3> Overall SMEs Economic Situation in Japanese Economy (As of 2004) 49

<Table 4.4> Labor Productivity Index of Japanese SMEs and Large Enterprises 49

<Table 4.5> Shares of Government Supported Loans in SME Finance 55

<Table 5.1> Korean Economy in World Ranking 63

<Table 5.2> Growth Rate Comparison between Manufacturing and Service Sectors 63

<Table 5.3> Economic Contribution of 2005 by Industry 64

<Table 5.4> Definition of SMEs in Korea 65

<Table 5.5> Status of SMEs by Year 66

<Table 5.6> Transition of SME Policies in Korea 66

<Table 6.1> Performance of the Malaysia Economy, 1996-2005 84

<Table 6.2> Share of GDP by Sector 85

<Table 6.3> Definition of SMEs by Sales Turnover and Full-time Employment 85

<Table 6.4> Status of SMEs Classified by Economic Activity (2003) 86

<Table 6.5> Changes in the Contribution of SMEs, 1996 and 2005 86

<Table 6.6> Grant Allocation for R&D during 8MP 90

<Table 7.1> SMEs' Share in Manufacturing 100

<Table 7.2> SMEs' Share in Commercial Sector 100

<Table 7.3> SMEs' Share in Service Sector 101

<Table 8.1> Role of SMEs in the Philippines Economy 116

<Table 8.2> Number of Establishments by Sector and Size 117

<Table 8.3> SBC Program by Categories 124

<Table 9.1> Economic Trends in Chinese Taipei 133

<Table 9.2> Definition of SME in Chinese Taipei 134

<Table 10.1> Distribution of Manufactured Export by Technological Categories 151

<Table 10.2> Economic Trends in Thailand 152

<Table 10.3> Definition of SME in Thailand 153

<Table 10.4> Loans to SMEs from Specialized Financial Institutes 158

<Table 10.5> Value of Investment in the three VCFs in 2004 159

LIST OF FIGURES

<Figure 1.1> AusIndustry's services for SMEs' technology development 7

<Figure 1.2> Graphical Depiction of the Program Hierarchy 10

<Figure 2.1> Debt Financing by the Kinds of Credit 26

<Figure 4.1> Entry and Closure Rate of Japanese SMEs 50

<Figure 5.1> SME Innovation Policy Direction 68

<Figure 5.2> Roadmap for SME Development Stages 69

<Figure 6.1> Total Investments in Malaysia (1998 – 2003) 84

<Figure 7.1> SME Grant Programs in the Four Categories of SMEs Policy 102

<Figure 8.1> Institutional Structure of SME Development 120

<Figure 9.1> Numbers of SMEs, 2001-2004 134

<Figure 9.2> Number of Employed Persons in Chinese Taipei, 2001-2004 135

<Figure 9.3> Business Enterprises' Total Sales, 2000-2004 135

<Figure 9.4> Export Sales, 2000-2004 136

<Figure 9.5> Business Financing Channel, 1993-2004 142

<Figure 9.6> Trends in the number of business incubators in Chinese Taipei 146

<Figure 10.1> Number of SMEs, 2002~2004 153

<Figure 10.2> GDP by enterprise size in 2000-2004 154

<Figure 10.3> Exports by Enterprise Size in 2000-2003 154

Chapter 1: Australia

1. Economy and Industrial Structure and SME Position

1.1 General Economic Characteristics

Australia has an industrial structure with comparative advantages in agricultural sector, resources and mining sector, and business services such as financial, consulting and software services. Moreover, concerning emerging high-technology, Australia had biotechnological capability with competitive edge in global market and significant take up of off-the-shelf technologies such as IT.

However, concerning technological capability and industrial strength, Australia's business R&D is substantially low compared to other industrialized economies such as US, UK, Germany, France and Japan. Moreover, there exist only few large domestic technology companies, which can lead industrial development and indigenous technology capability development. Skilled entrepreneurs are insufficient in human capital as well. Although commercialization performance is slowly but surely improving, it still lags behind other economies.

The Australian government pursues openness and competition economy like other Anglo-Saxon economies such as US and UK. Australia is an easy place to start a business – few barriers to market entry. The government creates a supportive environment for entrepreneurship. With regard to the innovativeness of Australian firms, the 34.8% of Australian companies are involved in innovation-related businesses during 2001-2003.

Australia has several relatively weak business sectors. Even though English-speaking Australia has a relative advantage in trading and is attracting FDI from English-speaking economies, Australia has a relative disadvantage because of its geographical isolation from other major economies. Australia suffers from the fact that it is hard to find experienced managers who can build successful SMEs. Supporting hardware and software infrastructure such as business consulting advice, technology intermediaries, and intellectual property protections and networks, have not been fully established yet (AusIndustry APEC presentation, 2006, "Australia's Innovation System and SME Innovation Issues").

1.2 SMEs in the Australia Economy

The definition of SMEs is provided by the Australian Bureau of Statistics. Small business can be defined as firms employing 1-19 persons while medium business can be defined as firms employing 20-199 persons. Large business can be defined as firms employing 200 or more persons. Another definition of SMEs is related to total turnovers and total assets: SMEs are defined to have less than 50 or 100 million turnovers or have less than 200 million in total assets. These alternative definitions are used by some government agencies in taking SMEs policy measures, for example, the Commercial Ready program, which is targeted to SMEs, applies a $50 million annual turnover as eligibility criterion.

The extent of innovation varied according to the employment size of the business, ranging from 30.4% for businesses with 5-19 persons (small businesses), up to 60.8% for businesses with 100 or more persons. The most common form of innovation for small businesses was the implementation of new or significantly improved operational processes. The innovation expenditure as a proportion of total business expenditure for small businesses was estimated at 1.9%. The majority of funds for innovation expenditure designed for small businesses came from an internal source.

<Table 1.1> Types of Innovation Undertaken 2001-2003

	Proportion of business innovation (%)	Any new or significantly improved goods or services (%)	Any new or significantly improved operational processes (%)	Any new or significantly improved organizational and managerial processes (%)
5-19 persons	30.4	14.3	19.8	17.7
20-99 persons	45.7	20.6	29.9	31.3
100 or more	60.8	38.4	44.8	39.5

Source: ABS 8158.0 (2003, pp 15)

The 40% of expenditure on R&D came from SMEs. The 49% of human resources devoted to R&D was attributed to SMEs. The 17% of small businesses were paid by Australian organizations to perform biotechnology-related R&D. The top two reasons for biotechnology-related outsourcing by small businesses were a lack of technical skills/expertise and cost effectiveness. The two main factors having a severe adverse effect on the advancement of biotechnology-related R&D in small firms lie in access to capital and grants. The two main causes that have an adverse impact on biotechnology product commercialization in small firms also remain in access to capital and grants.

<Table 1.2> R&D Expenditure 2003-04

	Small Business	Medium Business	Total (SMEs)	Large Business
Expenditure on R&D	$1,139,162 (16%)	$1,792,553 (24%)	$2,931,715 (40%)	$4,288,484 (59%)
Human Resources Devoted to R&D	6,948 (19%)	11,596 (30%)	18,544 (49%)	57,642 (51%)

Source: Developed from data in ABS Catalogue 8104.0 (2003-04), pp18-21.

2. SME Innovation Policies

2.1 Overall Strategy

The Australian government's basic principle of policy intervention is on the areas of market failures. In most of policy measures, the Australian government does not specify SMEs as policy targets, but promotes overall innovations regardless of the size of firm. The policy areas are mostly associated with market failures in which market economic system fails to properly operate. These areas include financial grants and equity investments for the early stages of high-tech start-ups and commercialization of public technology.

The Australian government does not have a separate governmental department or agency which focuses on SMEs. The SMEs sectors are run by small number of staffs only with the purpose of ensuring SMEs being treated with equal opportunities in every governmental policy measures such as public procurement, R&D grants or equity investments..

The Australian government launched a five-year $3 billion dollar *Backing Australia's Ability* (BAA) initiative in 2001. It was targeted at three key themes: 1) strengthening Australian ability to generate ideas and undertake research, 2) accelerating the commercial application of these ideas, and 3) developing and retaining Australian skills. In 2004, the government followed up with an additional package –*Building our Future through Science and Innovation*. It provides an additional $5.3 billion for science and innovation – a 75% increase on the BAA. Over the next ten years, the government will spend an additional $8.3 billion into science and innovation over and above ongoing expenditure.

With these initiatives, several elements of BAA are directly aimed at helping SMEs. The government's report on Mapping Australian Science and Innovation and program evaluations

suggests that SMEs have the most difficulty in funding R&D and commercialization. Yet, it is these firms which have the potential of innovation, growth and job creation.

The government aims to improve the flow of finance into business innovation and to stimulate growth of innovative firms by enhancing Australia's capacity to commercialize research and new technologies. The commercialization of technology is essential for an effective Australian innovation system. There are a lot of good researches that are not successfully commercialized. High-risk early-stage technology companies find it difficult to attract capital without a right mix of technical expertise with managerial, marketing and financial expertise. In addition, the companies face difficulties in accessing to management and business skills, and mentoring advice.

The *Department of Industry, Tourism and Resources* delivers a range of programs that have been developed to target particular problems in improving these industries. The 'AusIndustry' is established as the program delivery arm of the Department of Industry, Tourism and Resources.

2.2 Marketing Policy

Export Promotion

The Australian federal government provides 1) practical export information and advice, 2) identification of overseas opportunities, 3) on-the-ground exporting support overseas and in Australia, 4) a comprehensive trade exhibition program, 5) services to identify potential overseas business partners and to research and access high potential markets for Australian companies and 6) strategic export planning and network formation services. *Austrade,* the primary agency responsible for export promotion, has a network of staff in 177 locations in 58 States. Austrade consisted of three major export promotion programs: 1) *the Export Market Development Grants* (EDMG) assists SME exporters and would-be exporters with small grants reimbursing 50% of eligible export promotion expenses in less than AUD15,000, 2) *TradeStart* is designed to improve SMEs' access to Austrade's export promotion services and 3) the *New Exporter Development Program* (NEDP) provides advice and information on exporting business and marketing in foreign markets.

Besides Austrade, the *Export Finance and Insurance Corporation* (EFIC) provides guarantee service (which is provided by *Export Working Capital Guarantee Facility*) for working capital of SMEs exporter, and also medium and long-term finance and insurance services (which are

provided through *Documentary Credit Guarantees and Finance and Medium-Term Payment Insurance*) to help SMEs' export.

Government Procurement

The government procurement policy has two aspects. Firstly, Australian public agencies are required by the Australian law to purchase a minimum level of SME products and services. The Government has committed agencies (under the Financial Management Accountability (FMA) Act 1997) to source at least 10 per cent of their purchases by value from SMEs. For a specific industry such as ICT, the *Department of Communication, Information Technology and the Arts* is to ensure SME participation in major Australian Government ICT procurements. For contracts of $20 million and above, Australian government agencies subject to the FMA Act are to include a minimum target level for SME participation ranging between 10-20% of contract value depending on the proportion of hardware and services (10% for hardware, 20% for software/services). Secondly, in order to ensure that procurement processes are transparent and open, and not to discriminate against and not to deliberately exclude SMEs from participating in a procurement process, Agencies subject to the FMA Act are required to publish on *AusTender* contracts and standing offers with a value of $10,000 or more. From 1 January 2005, agencies subject to the *Finance Minister's (CAC Act Procurement) Directions* are also required to publish details of certain contracts and standing offers.

2.3 HRD Policy

Training

The Department of Education Science and Training (DEST) and more specifically *Industry Skills Councils* under DEST are responsible for meeting the training and education needs of the business sectors. Australia's national training system, which is composed of a range of public and private registered training organizations (RTOs), is closely cooperated with private industry sectors, and is a competency-based, nationally consistent system, in which 6 States and 2 Territories work together with the Australia's federal government.

Australian Apprenticeships Incentives Program (formerly the New Apprenticeships Incentives Program) provides a special commencement incentive of $1,100 for eligible employers who commence Australian Apprentices (formerly New Apprentices) in a qualification that relates to an area of innovation. The Special Innovation incentive is payable in addition to standard

incentives and was made available under the Program from 1 January 2003. An area of innovation is defined as an emerging industry or new area of an existing industry and the development of the industry is expected to lead to a competitive advantage for Australia by providing gains in manufacturing and/or export.

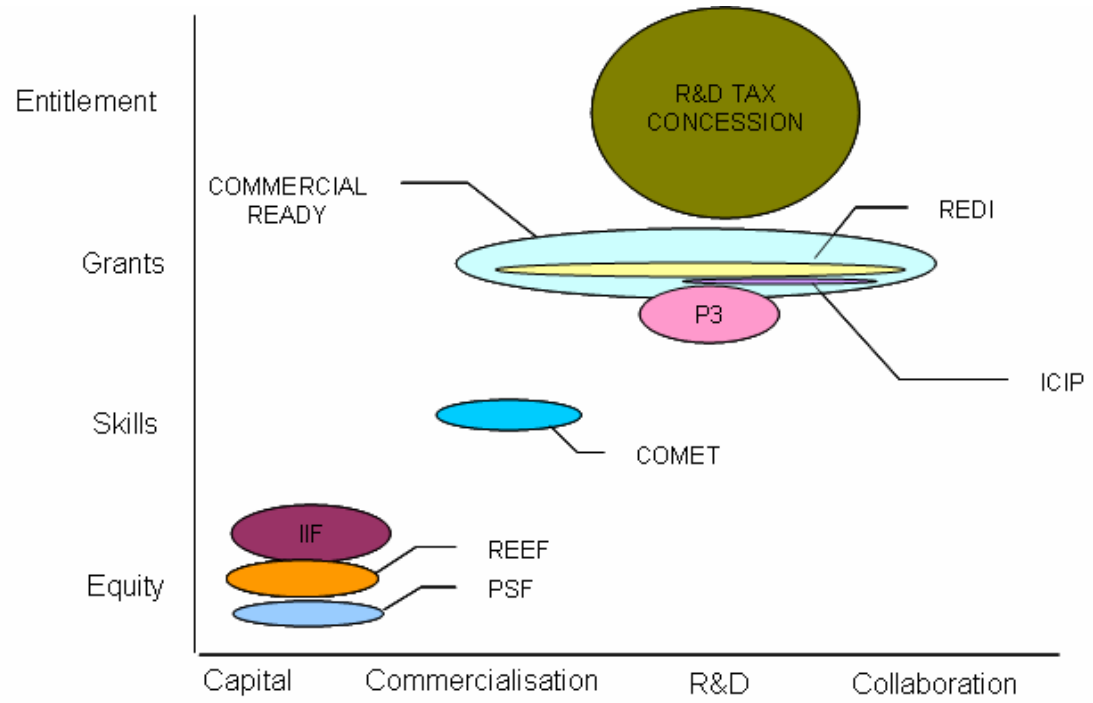
But all of these programs do not limit their applications to SMEs only. The training program specifically targeting SME innovation can be attributed to Small Business Entrepreneurship Program (training and mentoring). With this program, the Federal Government is funding companies that wish to run Training and Mentoring programs aimed at assisting small businesses to become more entrepreneurial. The element of the program furthers the work of the Small Business Enterprise Culture initiative and will focus on the provision of specific areas of business skills relating to business administration (e.g. business planning, new product development, commercialization skills, marketing, preparing for export, etc.). The element of the program supports those projects that have as their target the provision of business skills training and/or mentoring in individual areas of business administration to small business owners and/or managers. There is no specified funding limit for individual projects. However, grants for projects would typically be within the range of $50,000 to $300,000 (GST exclusive).

2.4 Technology Policy

Promotion of R&D in SMEs

Technology policies for SMEs' technological innovation are mainly delivered by AusIndustry, the R&D and Commercialization team under *the Department of Industry*, *Tourism and Resources*. AusIndustry's services for SMEs' technology development mostly consist of 1) R&D grants programs, 2) R&D tax assistants.

Concerning R&D grants programs, *Commercial Ready* is a competitive, merit-based program which supports innovation and its commercialization. *Commercial Ready* is the Australian Government's flagship innovation grants product, providing around $200 million a year to small and medium-sized enterprises between 2004 and 2011. *Commercial Ready* provides grants to projects from $50,000 up to a limit of $5 million for the duration of up to three years. Companies can apply for funding to meet up-to-half the costs of eligible expenditure incurred in developing a new product, process or service involving any one or more of research and development, proof-of-concept, and early-stage commercialization activities.



<Figure 1.1> AusIndustry's services for SMEs' technology development

Source: AusIndustry APEC presentation, 2006, "Australia's Innovation System and SME Innovation Issues"

The Commercializing Emerging Technologies (COMET) Program is a comprehensive commercialization promotion program that aims to enhance small new start-up company commercialization prospects. The program supports small new start-ups with the combined package of financial grants and management consultation such as business planning and management skills development. Business Advisers assist companies with commercialisation activities such as engagement of mentors, strategic & business planning, market research, and IP strategies. Assistance is available for up to two years to companies with turnover of less than $5m and less than 5 years old. At 31 December 2004, outcomes include more than $313 million raised in equity capital by COMET customers, over 600 strategic alliances, licenses and agreements, and around 265 manufacturing commencements and products / services launched.

The P3 program is aimed at increasing the amount of high quality pharmaceutical R&D activity in Australia throughout the entire value chain including biotechnology, originator, and generic medicines companies. Participating companies receive thirty cents for each additional dollar they spend on eligible R&D in Australia up to a maximum grant amount of $10 million.

Concerning the taxation related to innovation, the *R&D Tax Concession* is the principle government initiative to increase the amount of R&D undertaken in Australia. It is broad-based,

available to all industry sectors and each company controls the direction of their R&D. The concession enables Australian companies to deduct up to 125% of eligible expenditure incurred on R&D activities from assessable income when lodging their tax returns. An incremental tax concession (175% Premium) and R&D tax offset are also available in certain circumstances. The R&D Tax Concession is administered jointly by the Industry Research and Development (IR&D) Board (through *AusIndustry*) and the *Australian Taxation Office* (ATO).

Promotion of Technological Collaboration

Industry Cooperative Innovation Program (ICIP) is a merit-based grants program aimed at encouraging business-to-business cooperation on innovation projects that enhance productivity, growth and international competitiveness in Australian industries. The program has the particular focus of meeting strategic industry needs such as those identified through *Action Agendas* and it supports projects which deliver industry-wide benefits. ICIP projects are carried out by a consortium, in which a group of at least three entities who can work cooperatively to carry out the project and provide funds to match the ICIP grant assistance. ICIP will run until June 2011 and will provide $25 million of assistance.

2.5 Financing Policy

Government Equity Programs

Innovation Investment fund and Pre-Seed fund are available for SMEs in the early stage of development or for the purpose of commercializing innovative products.

The Innovation Investment Fund program is designed to promote the commercialization of Australian research and development, through the injection of venture capital into small, high-tech companies in their seed, start up or early expansion stage. The Australian Government is investing about $221 million, which will be matched by the private sector up to a maximum ratio of two to one. This means that total amounts of funds to support the commercialization of early-stage Australian R&D will total $358 million under both rounds of the *Innovation Investment Fund* program. Licensed private sector fund managers will administer this pool of investment capital. The fund managers make all investment decisions in relation to their *Innovation Investment Fund* money. However they are subject to the Commonwealth's license agreement and investor document requirements.

There are now nine *Innovation Investment* Funds with from $30 million to $50 million, and all states are now directly served by the *Innovation Investment Fund* -licensed funds. Two Innovation Investment funds, Allen & Buckeridge and Neo Technology Ventures, are specialized in information and communications technology (ICT). Two, GBS and Startup, are dedicated to a bioscience sector. One, *CM Capital*, has combined information technology and life science expertise. The remaining four, *AMWIN, Foundation, Momentum* and *Nanyang*, have a general investment focus.

The government is committing $200 million for a further round of the IIF program to be drawn down over the period 2007-08 to 2018-19. Each fund will be operated over a 10 year period.

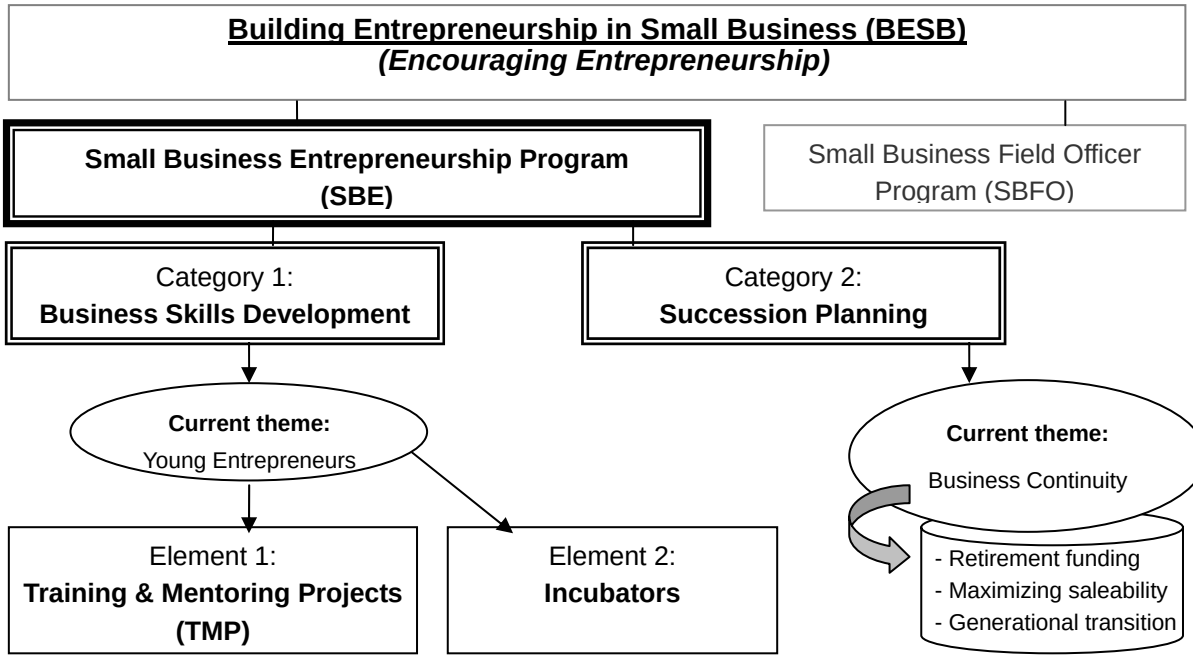
The Pooled Development Funds (PDF) program, which was started from 1992, provides predominantly new equity investment to eligible Australian SMEs. PDF program provides tax incentives, such as capital gains tax exemption and concessionary taxation treatment on dividends. The PDF program is designed to increase the supply of equity capital for promoting Australian SMEs. The PDFs are private sector investment companies established under the PDF Act which raises investors' capital and use it to invest in Australian companies. The government announced in the May 2006 Budget that the PDF program will close new registrations after 31 December 2006. It will be progressively replaced by the *Early Stage Venture Capital Limited Partnerships* (ESVCLP) program announced in the Budget, which is expected to become operational in 2006-07.

2.6 Management Innovation Policy

Consulting

The policy relating to support for SME business counseling in Australia is called as *Building Entrepreneurship in Small Business* (BESB). It comprises two initiatives: *the Small Business Entrepreneurship Program* (SBEP) and the *Small Business Field Officer Program*.

The SBEP, which was previously mentioned as the part of education and training policy, comprises two separate categories, the first of which has two elements. Category 1 is *Business Skills Development*, which is composed of 1) *Training and Mentoring Projects*, 2) *Incubators and Category* 2 is *Succession Planning*. The focus of the new *Small Business Entrepreneurship Program* is on building entrepreneurial skills to help the early growth and improvement of small business and small business expertise.



<Figure 1.2> Graphical Depiction of the Program Hierarchy

Secondly, the *Small Business Field Officers* program foster the growth of small businesses across Australia by improving their capacity to access information and advice on the Australian government, State and Territory programs, services and information, as well as local small business issues such as regulatory requirements. The *Small Business Field Officers* program provides practical and on-the-ground assistance to small businesses across Australia, particularly in areas of unmet need. The service was extended in the 2005 Budget until 30 June 2008. *Small Business Field Officers* deliver free general advisory services to small businesses, providing a vital resource for the many small businesses who want to know where and how to access relevant information and support. The availability of this one-stop service allows local businesses immediate and direct access to the full range of government assistance programs and information. The Field Officers work closely with local bodies in the community to complement and improve existing services, rather than duplicate successful initiatives that already exist.

The Australian government provided a funding of $60 million in the 2002 Budget for four years to 2005-06 to establish the *Small Business Assistance Program* (SBAP). This program provided skills development, incubation and advisory services to small business owners and managers. In the 2005 Budget, the government increased this commitment with a further $39 million to 2007-08 for Building *Entrepreneurship in Small Business*, which builds on the SBAP and

incorporates succession planning measures for small business, an initiative also introduced in the 2005 Budget.

Promotion of e-business and e-commerce

In order to promote e-business and e-commerce for SMEs, the Australian government mostly focused on developing general online commerce environment with government initiatives. Awareness campaign initiated by the government includes solving the problems of internet governance and online security and transactions, and encouraging SMEs' access to e-business.

The *Information Technology Online Program* (ITOL) was launched in 1996 offering competitive grants for implementing B2B solutions in order to promote e-commerce adaptation. ITOL is an Australian government funding program administered by the *Department of Communications, Information Technology and the Arts* (DCITA) designed to accelerate the national adoption of e-business solutions, especially by SMEs. The program supports the take-up of collaborative e-business across a wide range of industry sectors by offering competitive funding of up to $200,000. Previous ITOL recipients have supported projects across areas as diverse as agriculture, health and pharmaceutical, building and construction, automotive and welfare groups. These projects have been located in regional and metropolitan areas and in all Australian states and territories.

The Australian Electronic Business Network (AUSe.NET) is a national, not-for-profit organization that has been formed to encourage small business awareness and adoption of electronic commerce. AUSe.NET seeks to create awareness among SMEs of the benefits and relevance of doing business electronically via the Internet, and to assist small business to get on-line. AUSe.NET was established with funding from the *Department of Communications, Information Technology and the Arts* with support from State and Territory governments.

Promotion of Awareness of SME Innovation

The *National Innovation Awareness Strategy* (NIAS) was a five year, $35 million program announced under the *Australian Government's Backing Australia's Ability* initiative in 2001. NIAS concluded on 30 June 2006. The program was jointly administered by the Department of Industry, Tourism and Resources (Innovation and entrepreneurship components), and Department of Education, Science and Training (Science and Technology components). The innovation and entrepreneurship components were overseen by the National Innovation Council. The program aimed to raise awareness among young Australians, small to medium sized businesses (SMEs), and the broader community, of the economic benefits of innovation and

entrepreneurship, and aimed to encourage a wider interest and knowledge of science in the community, and to promote the achievements of Australian's scientists and science teachers. The program also aimed to encourage business decision making based on an informed understanding of innovation, and to motivate young people to pursue innovative and entrepreneurial careers.

2.7 Clustering and Networking Policy

Promotion of Incubators

The *Small Business Assistance Program* (SBAP) was established in 2002 in order to promote entrepreneurship cultures with skill development, which is run by the sub-program of the *Small Business Enterprise Culture Program* (SBECP) and to construct small business incubators, which is run by the sub-program of the *Small Business Incubator Program* (SBIP). SBECP provides grants, which is based on competition in order to help SMEs access to skills development, while SBIP provides funding for hardware infrastructures and for building-up of SMEs incubator facilities.

There are two kinds of incubator funding: Establishment Funding and Post-Establishment Growth Funding. Establishment funding involves the acquisition of an existing building (whether by purchase or lease) and fitting out that building, or the construction of a new building. However, support for an establishment funding project is conditional on the project plan demonstrating that the incubator will be operating, tenanted and fully functional within two years of the execution of the *Establishment Funding* agreement. The project plan submitted as part of the application must also indicates a period within which the incubator business will be financially self-sustaining. A maximum grant of $700,000 (exclusive of GST) is available to assist with the establishment of an incubator facility.

Post Establishment Growth Funding can support establishing clusters of incubator facilities, upgrading the capacity of existing facilities and extension and/or enhancements of mentoring and other skills development services that meet their tenants' needs - for example, through industry partnership and virtual tenants or projects that enhance the quality and capability of the incubator management structure. A maximum grant of $200,000 (exclusive of GST) is available to assist existing incubators to grow and develop on a once-only basis. Post Establishment Growth Funding will only be available to incubators that have commenced operation, can demonstrate their financial viability or capacity to achieve self-sustainability and, where applicable, have completed the incubator establishment project to the Commonwealth's

satisfaction.

For a specific industry development, ICT incubator program, being originally established in 1999 under the name of 'Building on Information Technology strengths (BITS) incubator program', are designed to promote ICT commercialization thorough establishing incubator for Australian ICT sector. The objective of the $36 million *ICT Incubators Program* (ICTIP) under the Department of Communications, Information Technology and the Arts is to support the better-performing incubators previously funded under the *BITS Incubator Program* to continue making a significant contribution to the national innovation system by: 1) identifying and supporting high potential ICT start-ups; 2) facilitating growth in employment, revenue and exports for the ICT start-ups; 3) assisting these ICT start-ups to secure financial and other support from third party sources (including venture capital firms, private investors, other technology firms, universities and government); 4) establishing mutually beneficial linkages with other elements of the Australian innovation system; and 5) adopting strategies to achieve ongoing financial self reliance without further Australian government support beyond the period of the program extension.

Network Brokering Policy

The Cooperative Research Centers (CRCs) program was established to bring together researchers and research users. The program emphasizes the importance of collaborative arrangements to maximize the benefits of research through an enhanced process of utilization, commercialization and technology transfer. It also has a strong education component with a focus on producing graduates with skills relevant to industry needs. There are CRCs operating in all industries – from aeronautics to food packaging through to the racing industry – which are producing new technologies and innovations to save money.

The Australian Research Councils (ARC) linkage grants are under the umbrella of the National Competitive Grants Program and are aimed at brokering research partnerships within the Australian innovation system to capture the economic, social and cultural benefits of research. Its objectives are: 1) to encourage excellent collaborative research within universities and across the innovation system, 2) to contribute to a strong knowledge economy, 3) to create opportunities for cooperation with related programs across Commonwealth portfolios, 4) to facilitate international linkages both within universities and industry and 5) to encourage industry-oriented research training.

3. Overall Assessment

Strength

Australian economic environments surrounding SMEs have several strengths in promoting SMEs innovation activities: 1) regulatory/governmental efficiency supporting SMEs innovation 2) market-oriented governmental intervention principles 3) focus on innovation and commercialization and 4) entrepreneurship cultures.

Australia is the advanced economy with GDP per capita exceeding 30,000 US$ as of 2005, and also experienced significant institutional changes during 1990s improving national competitiveness. Its overall economic and regulatory/governmental efficiency in labor market, financial market and final goods market are quite advanced compared to other developing member economies. The examples of these regulatory efficiencies can be easily found out in the procedural easiness with new start-ups and firms' bankruptcy rules. Unlike other member economies with bank-oriented financial system, in which impose substantial personal guarantees on firms' lending, Australian SMEs' CEOs have limited liabilities in their investments and can easily restart its business even after their companies' bankruptcies. Thus the entry and exits of firms to market are relatively easy to promote lively new start-ups activities in Australia. The regulatory environments for SMEs and new start-ups are especially suitable and friendly for high- tech industries development, which requires various and lively business experimentation.

Australian governments have strictness in keeping the principles of market-failure intervention in their SMEs innovation policies. This principle can be found out their financial supports and incubating policy for SMEs innovation. The Australian governments' financial supports for SMEs innovation are only restricted to equity investments without any kind of direct loans program or loan guarantee programs. And the operations of equity investment are entitled to private institutions, excluding governmental interventions. Moreover, Australian governments' supports for incubators are limited to those incubators, which can show financial self-sustainability within specific time periods. These incubators are required to obtain financial viability on their own business. Meanwhile, Australian government does not intervene in incubators' operations and investments. The incubators are private entities with their own boards, which evaluates the performances of the incubators periodically whether to continue to provide incubator services or not. These strict rules of market-oriented policies can significantly promote efficiency and quality of incubators' investment and service provisions, and thus results in SMEs innovation promotion.

Being related to this market-oriented approach in SMEs innovation policies, Australian government has policy focus on the new start-ups and the commercialization of scientific research results. Because of high risk embedded in high tech new start-ups, market failures can be occurred in creations of venture firms and commercialization activities. Thus, Australian government has a priority and focus on high technology new start-ups and commercialization. This priority and focus can vitalize SMEs innovation especially in high-tech industries such as BT and IT and also eliminates governmental budget inefficiency.

Lastly, business peoples and government officials emphasized the role of Australian culture for entrepreneurship in the promotion of SMEs' innovation. Since Australia is an isolated member economy being separated with other advanced economies, Australian peoples are said to have pioneer spirits like the US and easy to start new venture firms with their own creativities. Besides Australian global financial companies and consulting firms have high potentials to provide managerial talents which can commercialize scientific researches and high technologies into business.

Weakness

Despite of these strengths, Australian economic environments have several weaknesses in promoting SMEs innovation: 1) Australian economy does not possess large-sized global players in high tech industries and thus 2) Australian economy has very low business R&D intensity compared to other advanced economies, and 3) Australian governments does not have strategic development plans for specific technologies or industries like Japanese or Korean cases.

These weaknesses are all related to each other. Since Australian government does not have strategic development policy for specific high tech industries, the size-economy effect is hard to be accumulated. Since the large-sized global players, which can compete with global business groups in high technology such as SONY, Toyota and MicroSoft, do not exist in Australia, the industry linkage effects and technological collaboration effects on SMEs innovation hardly exist and R&D intensity, which is mostly led by large-sized global firms, is inevitably quite low. This will certainly result in the lowness of technology innovations in overall private business sectors.

Appendix 1: Summarized Policies in Australia

Policy Category	Elements	Detailed Program	Contents Note	
Marketing	Export Promotion	Export Market Development Grants (EDMG)	Providing small grants reimbursing 50% of eligible export promotion expenses less than AUD 15,000 to SMEs	AusTrade
		Trade Start	Improving SMEs' access to AusTrade's export promotion services	AusTrade
		New Exporter Development Program (NEDP)	Providing advice and information on exporting business and marketing in foreign markets	AusTrade
	Procurement of Government	Financial Management Accountability Act 1997	Ensuring public agency to source at least 10 percent of their purchases from SMEs and ensuring transparent and open procurement procedures	
HRD	Training	Australian Apprenticeships Incentives Program	Providing a special commencement incentive of AUD1,100 for eligible employers who commence Australian Apprentices Programs	DEST
		Small Business Entrepreneurship Program	Providing funds for SMEs which run Training and Mentoring program, which aims at assisting SMEs to become more entrepreneurial	DEST
Technology	R&D promotion	Commercial Ready	Providing grants for technological innovations around AUD200 million a year to SMEs	AusIndustry
		COMET	support of small new start-ups with the combined package of financial grants and management consultation	AusIndustry
		P3	Promoting pharmaceutical R&D activities through grants reimbursing 30% of eligible R&D expenditures up to AUD10million	AusIndustry
		Tax Concessions	Tax deduction for up to 125% of eligible R&D expenditure	AusIndustry
	Technological collaboration promotion	Industry Cooperative Innovation Program (ICIP)	Grant programs encouraging business to business cooperation on innovation projects	
Financing	Equity Financing	Innovation Investment Fund	Promotion of commercialization of Australian R&D results through venture capital investment to small but high tech new start-ups	
		Pooled Development Funds (PDF)	Providing equity investment to eligible Australian SMEs. This program will be replaced by the Early Stage Venture Capital Limited Partnerships (ESVCLP) in 2007	

Management Innovation	Consulting	Building Entrepreneurship in Small Business (BESB)	Small Business Field Officer Program: providing practical and on-the-ground advisory and information assistance to SMEs	
		Small Business Assistance Program (SBAP)	Providing consulting services for skill development, incubation and advisory services to SMEs managers	
	Promotion of e-business	Information Technology Online Program (ITOL)	Providing competitive grants for implementing B2B solutions in order to promote e-commerce	
		Australian Electronic Business Network (AUSe.NET)	National, not-for-profit organization encouraging SMEs awareness and adoption of e-commerce	
	Promotion of Awareness of SME Innovation	National Innovation Awareness Strategy	Aiming to raise awareness of young Australians and SMEs about the economic benefits of innovation and entrepreneurship	BAA
Clustering and Networking	Promotion of Incubators	Small Business Incubator Program (SBIP)	Providing funding for hardware infrastructures and for building-up of SMEs incubator facilities	
		Building on Information Technology Strengths (BITS) incubator program	Promoting ICT Commercialization through establishing incubator for Australian ICT sector	DCIT
	Networking	Cooperative Research Centers (CRCs)	Collaborative arrangements to maximize the benefits of research through utilization, commercialization and technology transfer	
		Australian Research Councils (ARC)	Linkage grants are under the umbrella of the National Competitive Grants Program and are aimed at brokering research partnerships within the Australian innovation system	

Chapter 2: Canada

1. Economy and Industrial Structure and SME Position

1.1 General Economic Characteristics

Canada has a population of 33 million, which is small considering its vast territory. GDP is 1.035 trillion US dollars, and Canada is one of major economic powers in the world. Canada enjoys the status of a high income member economy. GDP per capita reached over US $ 30,000. Canada is an OECD member as well as a member of APEC and the North American Free Trade Agreement (NAFTA). Before the NAFTA, Canada had sealed a US-Canada FTA in 1989. Their major trading partner is the US, as 84% of export and 57% of import are with the US. Being located in the vicinity of the US and having English as one of its official languages, US business activities can influence the Canadian economy to a great extent. Large US multinationals have close linkages with Canadian SMEs. The top export items are motor vehicles and parts and industrial machinery, which demonstrates the importance of both SMEs and foreign (mainly US) automakers. However, Canada has unique characteristics that differentiate it from the US system. With a high level of social security and medical service, Canada can be considered as an intermediate system between US and Europe. The unemployment rate is 6.8% which is neither low nor high. The real growth of GDP is 2.9%. These figures are typical among advance economies (the values range between the US and major EU economies).

Canada benefits from their abundant natural resources, and industries based on these resources are strong. Canada also has high-technology, multi-national corporations such as Nortel and Bombardier, but the R&D intensity in private sector is just over 1% which is lower than the US and other major EU economies. The share of business expenditure on R&D is only 47.1% of gross expenditure (Main Science and Technology Indicators, OECD 2006). This implies that the share of public expenditure on government research institutes and university research is high.

1.2 SMEs in Canadian Economy

The definition of SME is in line with the US as medium firms refer to businesses with fewer than 500 employees (less than C $50 million in gross revenues)[1] and small firms are defined as having fewer than 100 employees for manufacturing sector. As for the service sector, the

[1] According to Orser and Carrington, http://www.sme-fdi.gc.ca/epic/internet/insme_fdi-prf_pme.nsf/en/h_02015e.html

criterion is 50.

In Canada, the portion of SMEs in business establishment is relatively high compared with US. 99.9% of manufacturing firms and 98.9% of service firms are SMEs.

<Table 2.1> Number of Business Establishment by Firm Size

Number of Employees	Cumulative Percent of Employer Businesses	No. of Business Establishments		
		Total Goods-Producing Sector		Service-Producing Sector
Indeterminate	-	1,199,875	326,855	873,020
Employer Business Total	100.0	1,048,286	242,451	805,835
1–4	56.5	592,694	147,546	445,148
5–9	73.7	179,533	35,511	144,022
10–19	85.8	126,739	24,556	102,183
20–49	94.5	91,749	19,508	72,241
50–99	97.6	32,100	8,195	23,905
100–199	99.0	15,143	4,323	10,820
200–499	99.7	7,412	2,201	5,211
500+	100.0	2,916	611	2,305
GRAND TOTAL		**2,248,161**	**569,306**	**1,678,855**

Source: Statistics Canada, Business Register, June 2005

According to Dr. Cooper of NRC, it is estimated that about 100,000 R&D performers are present in Canada. The share of SMEs' R&D investment is about 41 % of total private R&D, and this accounts for C $5.407 billion. Considering large firms have an advantage to perform formal R&D (that is captured in a balance sheet) and majority of SMEs do not perform formal R&D, the share (41%) is surprisingly high. In terms of the achievement level of innovation, a survey of its clients by Industrial Research Assistant Program (IRAP) shows that 37% of SMEs claim a World first product. This symbolizes the strong technological capabilities of Canadian SMEs.

<Table 2.2> Employment by the Size of Enterprises

	Size of enterprises (number of employees)						
Industrial Sectors	0~4	5~19	20~49	50~99	100~299	300~499	500~
Goods producing sector	188,688	404,392	363,159	294,552	442,941	170,404	1,119,313
Service sector	745,753	1,531,505	1,115,515	832,870	1,050,671	404,603	4,869,017
Total	934,441	1,935,897	1,478,674	1,127,422	1,493,612	575,007	5,988,330
	6.9%	14.3%	10.9%	8.3%	11.0%	4.2%	44.2%

Source: Statistics Canada 2006

In terms of employment, Canadian SMEs account for 55.8% of total employment, of which medium sized firms have a share of 15.2% and small sized firms have 40.6%.

Canada's manufacturing industries shape the roles of SME to a certain degree.[2] High technology sectors like telecommunication and aerospace are important in fostering high-technology SMEs. The five largest goods producing industries are 1) Transportation equipment, 2) Oil and gas extraction 3) Primary and fabricated metal products, 4) Chemical, and 5) Wood product manufacturing.

SMEs generate 65% of total payroll in the economy (OECD 2005), but the SME share in GDP is less than half. In terms of the SME role in export, SMEs play a slightly less significant role. Approximately 35% of exports can be ascribed to SMEs. The amount of SME exports in sales reaches over $44 billion in 2004. However, only 8 percent of SMEs exported goods or services, and the remainder are concentrated in the domestic market.

<Table 2.3> Contribution of SMEs in Export Value

	Contribution (%) to V alue of Exp orts by Firm Size (number of employees)			
2002 (enterprise data)	**Small (1–99)**	**Medium (100–499)**	**Large (500+) All**	**Firms**
Agriculture, Forestry, Fishing and Hunting	66	14	20	100
Mining, Oil and Gas Extraction, and Utilities	10	13	77	100
Construction	81	17	2	100
Manufacturing	9	16	75	100
Wholesale Trade	68	21	11	100
Retail Trade	70	11	20	100
Transportation and Warehousing	86	4	10	100
Information and Cultural Industries and Finance and Insurance (ICFI)	88	6	6	100
Business Services	47	15	38	100
Other	21	6	73	100
All Industries	20	15	64	100

Source: Industry Canada, Small Business Exporters: A Canadian Profile

[2] Canada is a country with a large service industry and many SMEs are also active in the sector, but the current study mainly focuses on goods-producing sector.

2. SME Innovation Policies

2.1 Overview of SME Innovation Policies

The importance of SMEs in Canada's economy is well-recognized by policy makers and several programs and policies are in place that recognize the special circumstances and needs of small businesses. However, the Canadian government relies mainly on market mechanisms to support SMEs, preferring instead to intervene only when there are clearly defined market failures. Regarding service delivery to SMEs, there is a general reliance on local intermediaries (business associations, local economic development group, etc.) to provide services that are well-adapted to local needs and realities.

Canada has well-woven policy mix between federal and regional governments. Accordingly, three regional development agencies, namely, Atlantic Canada Opportunities Agency, Canada Economic Development for Quebec Regions, and Western Economic Diversification Canada develop their own programs for local SMEs.

The Industry Canada website lists the strategic issues of SME policy. They are, 1) strengthening the national policy framework supporting small business and 2) building knowledge through communication, consultation and information exchange. The Agenda has a major focus on certain segments, such as micro-enterprises and fast growing, knowledge-based firms.

2.2 Marketing Policy

Procurement

Canada once implemented a procurement policy in the 1970s through the Department Supply and Services Funds with 50% subsidy, but this program was dropped a few years later. It is still being debated whether to assign special benefit to SMEs in the procurement program. The only current exception are special procurement rights for Aboriginal firms – the majority of whom are SMEs - for any contract under $25,000. Since the site visit, the Minister responsible for government procurement has committed to at least 25% of contracts going to SMEs – the time for implementing this has yet been determined

Export promotion

Export Awards of Canada are provided to key exporters per year. Of the 8 awards, 3 went to high tech SMEs in 2005. Several provinces have similar awards. In addition to this general measure for firms of any size, the role of promoting the importance of exporting to SMEs was played by DFAIT (Foreign Affairs and International Trade Canada). Interestingly, as Canada is a member of NAFTA, Canadian SMEs with US trades are eligible to receive benefits from the US Enhanced Relationship Initiative. The size of the program amounts to US $125 million per year. More measures to promote marketing can be found in Industry Canada http://strategis.ic.gc.ca/epic/internet/insbrp-rppe.nsf/en/rd00560e.html.

2.3 HRD Policy

The government policy is delivered through Human Resources Investment Fund, which is administered by Human Resource Development Canada (now HRSDC: Human Resources and Social Development Canada). The Human Resources Investment Fund is used for helping unemployed people to find and keep jobs. HRSDC operates various programs, such as Training Center Infrastructure Funding Program and Sector Council Program. In addition, Natural Sciences and Engineering Research Council's Industrial Research Fellowship Program supplies C $30,000 to help new Ph.D. graduates to work in the industrial field. This functions as an industrial post doctoral program.

In terms of subsidizing recruitment activities of SMEs, funding does exist. However, the size of the subsidy is limited, reportedly C $ 5 million per year. The government body responsible for the field is HRSDC, which distributes the funding through IRAP.

The Small Business Working Committee has approached the federal government to take more cooperative policy measures with provincial governments and to focus on young people to be trained for industry. Following this approach, the use of Unemployment Insurance Program Fund is extended to train those recipients of unemployment benefit.

The Undergraduate Student Research Award is awarded for work in an industrial research environment. Provincial level training programs also exist. For example, Westlink has an industry internship program to build technology commercialization expertise capacity in Western Canada. However, these measures are not specific to SMEs.

The private sector is also known to offer their employees training programs to continually improve their skills. Research show that approximately 46% of Canadian private sector companies offer training opportunities to their employees. In fact, many private training institutes operate in Canada, and are eligible to receive government funding.[3]

2.4 Technology Policy

R&D tax credit

Canada is one of the leading economies in the world when it comes to providing tax credits for R&D. Traditionally, strong incentives have been given to those firms with formal R&D. The Scientific Research and Experimental Development program run by the Canada Revenue Agency is one of the most generous in the world (C $2.3 billion in 2001). Most provinces also provide a variety of Scientific Research and Experimental Development programs, which amount to about C$700 million per year.[4] SMEs in particular benefit from the R&D tax credit as Canadian Controlled Private Corporations only pay 12% instead of 21% corporate tax. They also enjoy special rates for R&D investment tax credits (35% on first C $ 2 million). According to Dr. Cooper of NRC, the total amount of R&D investment tax credit for SMEs accounts for an estimated C $ 500 million.

R&D grant

R&D grant programs are active and NRC-IRAP has a leading role in R&D grants for SMEs. IRAP funds 2,400 projects in 2,200 firms for about C $80 million in contribution grants. An estimated 158 firms receiving funding from IRAP spent C $ 15 million in 2004/5 to expand their innovation capacity.

Technology Partnerships Canada (TPC) is a conditionally repayable contribution program that provides funding for pre-commercialization research and development, amounting to C$ 300 million annum. They focus on aerospace and defence projects mainly, with some enabling technologies and environmental projects as minors. To increase the participation by SMEs, the government provides IRAP with C $15 million per year to be matched by C $15 million from TPC. It is delivered by NRC-IRAP. SMEs get up to 50% of the project cost as conditionally

[3] For example, the Oil and Gas Industry Training Centre of Excellence at the Northern Lights College in Fort St. John received $800,000 under the Western Economic Partnership Agreement in Feb. 2006
[4] IRAP - Dr. Coopers estimation

repayable contributions from IRAP-TPC. In general, the contribution will not exceed 33% of the project cost. In late 2005, the TPC program was put on hold for receipt of new proposals.

Technological collaboration

Canada manages cooperative programs between large and small firms. In general, the program is implemented by the fourth pillar organizations[5] 'not-for-profit corporation', such as Canadian Microelectronics Centre, CANARIE, and Precarn. They cover a range of consortia projects led by large and small companies.

2.5 Financing Policy

Canada is considered one of the leading economies in equity financing. The government acts as an investor to venture capital companies and supports the venture capital market directly through the Business Development Bank of Canada. In addition, the government provides tax incentives to those investing in venture capital and provides SMEs with specialized debt financing programs.

Debt financing

The major program designated for SME is the *Canada Small Business Financing* (CSBF) Program. The purpose of the Canada Small Business Financing (CSBF) Program is to help an important part of the economy — small and medium-sized businesses — get access to adequate financing. The CSBF Program helps fill a gap in the range of financing instruments available to these businesses, which might otherwise have difficulty qualifying for financing or finding financing that meets their needs.

The CSBF Program works because the Government of Canada shares the burden of risk with private sector lenders. As a result, lenders are able to increase the amount of financing they extend to small business.

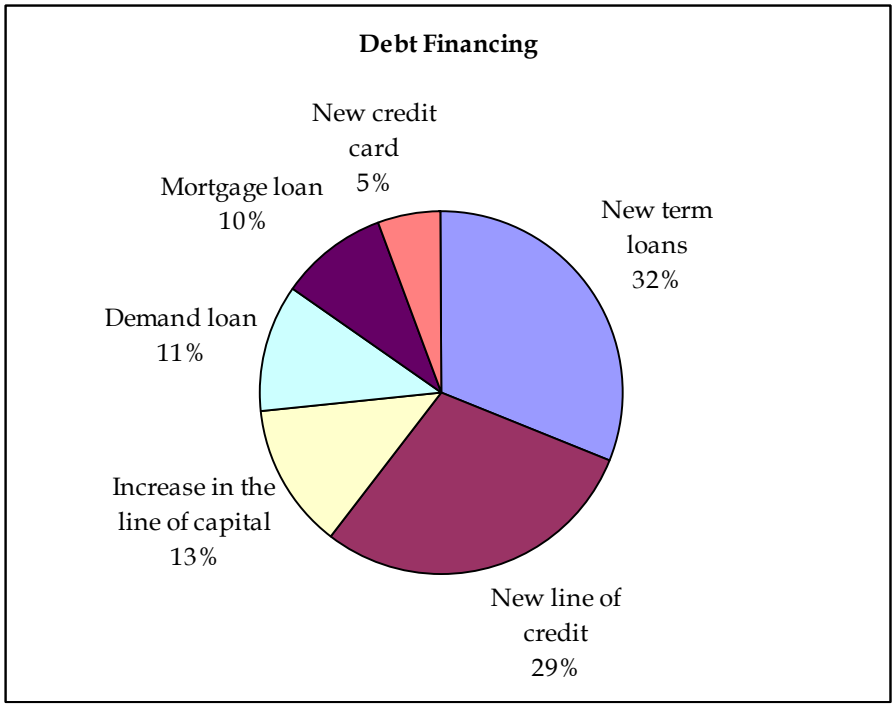
Lenders include some 1,380 chartered banks, credit unions, loan and insurance companies, and caisses populaires. They operate from more than 15,000 locations, providing service to Canadians in all provinces and territories. The Government of Canada shares the cost of losses with lenders and leasing companies by paying 85 percent of eligible losses on defaulted loans

[5] Please see http://www.precarn.ca/about/fourthpillar/index.html

and leases.

The CSBF Program supports asset-based debt financing. The maximum loan or lease is C $250,000, and terms of loans and leases are 10 years or less. The program is limited to small and medium-sized businesses with revenues of up to C $5 million per year and is not targeted to any group or region. During the period 2004–05 the total value of loans that private sector lenders made under the CSBF Program surpassed C $1 billion.

It should also be noted that there are a variety of other debt financing programs offered at the federal and provincial levels that compliment the offerings of the CSBF Program.



<Figure 2.1> Debt Financing by the Kinds of Credit

Equity financing

Canada has a long history of venture capital. The first venture capital (VC) case is reported in 1945. The tradition of strong equity financing still prevails even though some downturn occurred after the collapse of the dot-com bubble. Between 2000 and 2003, Canada was ranked third among OECD economies for venture capital investment as a percentage GDP (OECD Science, Technology and Industry Scoreboard, 2005). In 2005, there was roughly C $56 billion in private equity capital under management in Canada, 37 percent (C $21 billion) of

which was VC activity.

The government's role in encouraging VC is critical. The total VC funding placed in 2005 was C $1.8 billion, which was similar to that in 2004. The basic structure of equity financing initiated by the government is indirect. Government provides tax benefit to those investing in venture capital. Thanks to this benefit, labour sponsored venture capital corporations (LSVCC) have grown rapidly. In turn, the policy caused a high level of VC dependence on individual investors.

Besides LSVCC, the government supports VC through the Business Development Bank of Canada (BDC). The government also provides VC assistance through local non-for-profit organisations. For example, the Ottawa Centre for Research and Innovation (OCRI) receives funding from the government, the private sector, and universities. OCRI provides support to new and existing entrepreneurs and also promotes a venture capital network. In addition, a number of public pension funds invest some portion in VC, and they operate some VC funds directly.

Direct investment through government funds is also increasing the share in venture capital market. In terms of investment amount, this direct investment accounts for 10% of total VC in 2005[6]. Government funds include BDC, FCC Ventures and EDC VC funds, as well as provincial government funds (e.g. SGF, Innovatech). These government funds play an important role in the early stages, as can be seen by BDC whom focuses on technology start-up SMEs. The Financing Policy Division of Industry Canada is working on ensuring that the role the federal government plays in the Canadian risk capital market is appropriate to the industry's state of development.

2.6 Management Innovation Policy

Industry Canada is very active in building an integrated portal site to increase efficiency in accessing relevant information. The Canada Business website (http://canadabusiness.gc.ca) reduces the complexity and burden of dealing with various levels of government by serving as a single point of access for all government services, programs and regulatory requirements for business.

[6] Thomson Financial, Canada

Industrial Research Assistant Program (IRAP) hires about 260 Industrial Technology Advisors (ITA) for consulting SMEs on the matter of management, business and technological issues. They are located in 110 communities around Canada. The title 'Technology Advisor' does not reflect the exact content of support, the consulting aims for an integrated approach including partnering, network, and financing matters as well as technical issues.

HRSDC has also undertaken a number of initiatives to improve management skills of SMEs. In addition, regional development agencies work on these issues. For example, the Atlantic Council for Organizational Excellence held quality management seminars in 1990s and similar activities continue.

In addition, the Small Business Policy Branch has commissioned workshops on management skills and helps to develop and use the management skills diagnostic tools, a sort of self-assessment scoreboard.

2.7 Networking and Clustering Policy

There are an estimated 130 incubators in Canada. NRC plays an important role in incubating. In fact, incubating programs are frequently associated with clustering policy or cluster situation. A national clustering policy is not uniformly determined because of local variation in terms of promotion. Provincial governments may play an important role in this matter. Provincial governments have set up special public organizations to build public-private partnership. The funding for such entities amounted to nearly C $39.9 million in 2005 – mostly from federal or provincial governments. Federal government is the largest provider of the fund, accounting for C $ 10 million.

NRC is active in stimulating clusters where there are institutes located throughout Canada. The NRC webpage[7] explains the importance of building research network in Canadian environment.

> 'Canada, given its vast geography, relatively small and dispersed population, and the predominance of Small and Medium-sized Enterprises (SMEs), has taken a collaborative approach in building community innovation over the past decade.'

As a concrete plan for utilizing NRC institutes, C $ 500 million has been allocated over ten years to build 14 technology-based clusters of which six clusters have been built already. However, the activities are not confined to government research institutes. The focal

[7] http://www.nrc-cnrc.gc.ca/clusters/index_e.html

organization can be a large corporation, university, or public research institute, which can differ depending on the national system of innovation, regional environment and industrial sectors.

The collaborative networking between public research and private sector can be highlighted in the Federal Partners in Technology Transfer (FPTT) program. The members of federal laboratories meet regularly to share best practices for technology protection and transfer to firms. About 45 members participate in bimonthly meetings. The major player is the NRC, as the FPTT program particularly promotes technology transfer from federal laboratories.

Besides the Federal Partners in Technology Transfer program, a number of federal departments operate their own funding programs for technology transfer and collaboration, such as Agriculture and Agrifood Canada's Matching Investment Initiative, Defence Canada's Technology Demonstration and Industry Research Program, and National Science and Engineering Council's Collaborative Research and Development Program. However, these programs are not specific to SMEs.

SME specific networking was, for 9 years, accomplished through the Canadian Technology Network, which was created in 1995 and assimilated into Industrial Research Assistant Program (IRAP) in 2004. The network had provided the business and other technical related services in support of SMEs. It was closely allied to IRAP and had 1,000 members across Canada. While NRC-IRAP no longer maintains the network, it continues to collaborate with many of these organizations.

Many clusters are naturally constructed. As an example, there are 125 research organizations in Metro Montréal. The medical cluster around Montréal owes much to the research centers in universities and research institutes (e.g. McGill University has 14 research centers and houses the NRC biotechnology institute). 'Fonds de la recherche en santé du Québec' is a not-for-profit public research fund that promotes network of health research. The province of Quebec has been investing strongly for almost 20 years.[8] The overlapping efforts by both federal and provincial governments are critical. Regional clusters that attract special interests are such as Atlantic Canada (ACISN), Quebec (RQSI), Ontario (ONRIS and PROMIS), and western Canada (Innocom) etc. Each cluster has different core hub organizations and different sectors. Ontario attracts ICT firms as large multinational corporations like Nortel reside in the region.

[8] Dr. Renaud remark at University of Toronto in 2001

3. Overall Assessment

Strength

Many Canadian SMEs have performed R&D (11,000 per year claim R&D tax credits) and diverse SME specific grant programs are available. Technology policy to encourage entrepreneurs has been in place, and corresponding financial incentives, such as R&D credits, are provided. The balanced technology policy exists in providing both tax benefits and research grants.

With the elimination of the deficit in 1997-98 and consistent budget surpluses thereafter, the federal government acquired greater flexibility to adjust policy levers to encourage economic growth. This has resulted in greater spending in innovation related areas, including increased funding for emerging technologies and greater resources for clustering activities.

Canada has a strong tradition in equity capital, venture capital and angel investors, which contribute to the growth of SMEs. The lack of financial resources just after establishment was the weakest point for start-ups, but government venture programs specifically aim to fill this need.

Canada has diverse organizations to support SMEs. Provincial governments, such as Québec, play an important role in forming favourable SME policies. In Ottawa, not-for-profit organization, such as OCRI, play a critical role in encouraging entrepreneurship and facilitating networks.

Weakness

The rising value of natural resources pumped up the value of the Canadian dollar, but this strength produced little in SME export. The dependence on the trade with the US, which currently accounts for an estimated 85% of exports, can cause problems if the exchange rate further elevates.

In examination of six sectoral policies, it is found that the marketing policy measures do not contain procurement benefit to SMEs. The effort to establish a tax free zone to invite foreign investment is not visible at the federal government level. Canada has to attract high-value added facilities of foreign MNCs, but it is not certain whether these firms seriously consider the move.

Canada government might consider building e-business as private activities. Considering the

strong internet-base of Canada, it is possible to promote e-business by offering SMEs in this area added support and incentives.

Canada's HR policies represent a concerted effort in both recruiting and training. However, Canada's concern on quality job creation implies that more investment in business incubating is required to absorb scientist and engineers or hosting R&D facilities of MNCs, especially in the area of manufacturing-service fused sector (e.g. personal medical equipment and integrated service). Canada still has not solved how to utilize the influx of highly talented graduates from other economies.

Recommendation

To support a superior social system, the relatively high tax rate is understandable. However, this has to be retained to the level that does not impose burden on SMEs. For the SMEs that create quality jobs, the total tax burden should be reduced.

Reference

Cooper, D. and McKenzie, B., 2006, A Research on the Innovation Promoting Policy for SMEs in APEC: Survey and Case Studies - Canada.

OECD, 2004, Science, Technology and Industry Outlook.

OECD, 2005, OECD SME and Entrepreneurship Outlook.

Appendix 2: Summarized Policies in Canada

Policy Category	Elements Detailed	Program	Contents	Note
Marketing	Procurement of Government	N.A.	SME preferential program had existed before but not currently. Under consideration in 2006+	
	Building up Capacity of Overseas Marketing	Export Awards of Canada	General promotion for both small and large firms, Canadian Commercial Corporation also working for export promotion in general base	
		Export-source	Team Canada operate on-line database	
HRD	Recruiting	IRAP-HRDC program	SME specific program with funding of C $ 5 million per year	
		Industrial Research Fellowship Program	General subsidy to recruit Ph.D.s	NSERC
	Training	Undergraduate Student Research Award	Working in industrial research environment	
		N.A.	Various private training exist	
Technology	R&D tax credit	Scientific Research and Experimental Development program Investment tax credit program	SMEs- Canadian Controlled Private Corporations - have special rates for R&D investment tax credits (35%)	Canada Revenue Agency
	R&D grant	NRC-IRAP Programs	2,400 projects in 2,200 firms for about C$80 million in contribution grants	
		Technology Partnerships Canada (TPC)-IRAP	Increasing participation of SMEs in pre-commercialization project	
	Tech. Collaboration	Fourth pillar organizations	'not-for-profit corporation' manage the program that promote technological collaboration between small and large firms	
Financing	Equity Financing	Labor Sponsored Venture Capital Corporation (LSVCC)	Government provides tax benefit for individuals to invest in the venture capital	
	Debt Financing	Canada Small Business Financing (CSBF) Program	Canada pays 85 % of losses on defaulted loans and leases	
		Business Development Bank of Canada	Public bank to provide both loans and investment program	

Management Innovation	Support for Counseling	IRAP-ITA	IRAP employs 260 Industrial Technology Advisors for consulting SMEs	
		Small Business Policy Branch	Organize workshop on management skills	
		Canadian Business Services Centre	business related information and service	Federal / Provincial
		Canadian Technology Network	Providing advice	Dropped in 2004
	Support for e-business	N.A.	Various web-based information exist	
Clustering and Networking	Networking	State programs	Fonds de la recherche en santé du Québec is an example of these activities	
		Federal Partners in Technology Transfer (FPTT) program	FPTT aims to transfer the result of government funded research.	
		NRC programs	C$500 million has been allocated over ten years to build 14 technology-based clusters	
		NRC-IRAP	IRAP continues the SME specific networking previously organized under Canadian Technology Network	
	Capabilities Development	NRC Industrial Partnership Facilities	11 Industrial Partnership Facilities currently operate. – form of incubator program	
		Canadian Association for Business Incubators	130 centers	

Chapter 3: China

1. Economy and Industrial Structure and SME Position

1.1 General Economic Characteristics

Chinese National Innovation System (NIS) in centrally-planned economic growth period is often characterized as lacking in incentive structure for innovation and commercialization of science and technology outputs. Yang, *et al*.(2006) pointed out three basic problems concerning with Chinese NIS: 1) concentration of S&T resources and personnel to military research institutes, which were separated from private enterprises, 2) industrial Public Research Institutes (PRIs) are also entrapped within the authority of respective ministries and bureaus, which has no horizontal communications with private and other ministries' PRIs, and 3) even within the same ministries, each PRI only has vertical communication channels lacking in direct horizontal networks with other PRIs and private sectors.

However, technological and industrial policy has shifted with Chinese economic reforms, toward 1) importing and transferring foreign high-technology, and 2) promoting commercialization of domestic PRIs' high technology developments. Now it is evaluated that Chinese technological innovations, diffusions and implementations showed drastic improvements. Most of new high-technology start-ups, which are mostly technology intensive industries such as IT, BT and new materials, emerged from spin-offs by universities and PRIs. These drastic improvements on technological innovations and commercialization can be partly attributed to 1) central government' tremendous budget cuts to these universities and PRIs, and 2) legal and regulatory reforms to allow venture firm affiliations and equity investments by these universities and PRIs (Yang, *et al*., 2006).

The Chinese government has the explicit strategy to develop large business groups like Korean and Japanese ones. In the recent 11th five-year national plan for economic development, the Chinese government expresses outspoken strategy and needs to develop large global companies with indigenous technological capabilities and global brand names (Lim, *et al*., 2005). Instead of duplicating the Korean policy instruments to channel financial resources into successful entrepreneurs, the Chinese government agglomerates state-owned large enterprises into gigantic business groups in order to achieve economy of scale and scope (Lee and Kim, 2005). Moreover, tremendous domestic market size has contributed to the growth of these state-owned enterprises (SOEs) and also global-sized private domestic firms in IT industries, which were mostly started

as spin-off ventures from public government-owned research institutes (Lazonick, 2004).

Chinese universities and PRIs are quite strong in basic scientific researches, which were developed during the cold war through high military expenditures, but lacked in commercial technology development and collaboration with market-based private firms. China is frequently cited as one of high potential in scientific researches in terms of large number of PRIs and researchers and its basic research capabilities (Liu and Yang, 2003). The Chinese government pursued the strategy to channel this high scientific potential to commercialization of private market goods collaborating with private firms (Li and Handberg, 2002). The Chinese government promoted spin-offs and venture firms from universities and PRIs through privatizing ownerships, science parks and Multinationals' R&D FDIs (Lazonick, 2004).

China's strategy and focus toward MNCs and inward FDI have experienced subtle changes in recent years. The Chinese government originally had enthusiasm in encouraging inward FDIs in order to become a world manufacturing production center expecting local employment creations and general technology and management spillover effects. However, recently complaining that foreign MNCs and inward FDIs' effects on high technology transfers are not satisfactory, the Chinese government switched the focus of MNCs and inward FDIs promotion to technology transfers and technological capability development of domestic firms (Eun, 2006). However, in the situation where foreign MNCs can have easy access to tremendous Chinese domestic markets without needs for collaboration with Chinese firms, the effectiveness of the technology transfer policies is questionable. These are quite different from the Korean and Japanese regulating inward FDI policies. Because of Korea and Japanese FDI regulations, the only possible route to access to these economies' domestic markets was exports of capital goods and license contracts. Even though the huge domestic market size of China indispensably demands foreign capitals for rapid economic development, domestic ownership of strategic industries and fostering its own nationality firms with global technological capability are crucial.

1.2 SMEs in the China Economy

The definition of SMEs in China was released by the State Economic and Trade Commission, State Development Planning Commission, Ministry of Finance and National Bureau of Statistics of PRC in 2003. According to this revised definition, SMEs mean the enterprises, which have employees less than 2,000 or annual sales less than 300 million yuans or total assets less than 400 million yuans. Among these SMEs, medium enterprises mean the companies which have employees more than and equal to 300 or annual sales more than 30 million yuans, or total assets more than 40 million yuans. Small enterprises are the ones less than medium enterprises.

However, the definitions of SMEs varied with the industrial sectors.

<Table 3.1> Classification of SMEs in China

Sector	Variables	Unit	Medium	Small
Manufacturing	Payroll Annual Revenue Total Assets	Population Million yuans Million yuans	300-2,000 30-300 40-400	Under 300 Under 30 Under 40
Construction	Payroll Annual Revenue Total Assets	Population Million yuans Million yuans	600-3,000 30-300 40-400	Under 600 Under 30 Under 40
Wholesale	Payroll Annual Revenue Total Assets	Population Million yuans Million yuans	100-200 30-300 1-5	Under 100 Under 30 Under 1
Retail	Payroll Annual Revenue	Population Million yuans	3,000-30,000 10-150	Under 3,000 Under 10
Transportation	Payroll Annual Revenue	Population Million yuans	500-3,000 30-300	Under 500 Under 30
Post	Payroll Annual Revenue	Population Million yuans	400-1,000 30-300	Under 400 Under 30
Hotel and restaurant	Payroll Annual Revenue	Population Million yuans	400-800 30-150	Under 400 Under 30

Sources: The New Tentative Classification Standards on the SMEs, National Bureau of Statistics of PRC(2003)

As of 2005, the approximate number of SMEs in the Chinese economy numbered 43 millions, which comprised of 99.6% of total number of all enterprises in the Chinese economy. The SMEs in the Chinese economy account for 58.5% of Gross Domestic Product, 59% of total domestic sales and 48.2% of total tax revenues. Most of export goods especially in the sectors of labor-intensive light industries such as textiles, clothes, toys, parts and components, and also in the sectors of high-tech industries such as electronics and IT come from SMEs production. The employment provided by SMEs accounts for 75% of total urban employment.

From the perspective of innovativeness, the SMEs in the Chinese economy account for the 75% of technological innovation, the 80% of new products and the 65% of total patents since the early 1980s. During the development of high-tech fields such as IT, industry design, BT, modern logistics, and community service, SMEs play an active role to improve the industrial technology level and to speed up the modernization of traditional industries.

2. SME Innovation Policies

2.1 Overview of SME Innovation Policies

The National Development and Reform Commission, the department of SME is responsible for the formulation and enforcement of SME innovation policies in China. The department's major activities are 1) encouraging fair competition and private company development, 2) researching policy measures to foster SME development, 3) facilitating joint ventures with foreign companies and 4) building up the service system for SMEs.

During the period of the 11th Five-Year Plan, the National Development and Reform Committee will actively implement SMEs' growth program. The general idea of this SMEs' growth program is to carry out the spirit of "the fifth session of the 16th National People's Congress", which is to preserve scientific conception of development, and to fulfill the National Promotion Laws for SMEs. The main goals of the SMEs' growth program are to perfect the innovation supporting system for SMEs based on a plan to carry out and complete the innovation policies. The goals are also designed to establish an innovation environment, establish a common technologies service platform for 100 SMEs, foster a batch of SMEs with their own intellectual properties, know-how and strong competitiveness, and establish 1,000 pilot SMEs with the information network. The emphasis of this task has been place in the following four aspects: 1) boost the innovation idea and establish the promotion mechanism for SMEs independent innovation, 2) establish and perfect innovation supporting service system and improve the capabilities of SMEs independent innovation, 3) perfect the innovation policy and optimize the innovation environment for SMEs, and 4) carry out the Information Technology Project and promote the development of SMEs' innovation.

The National Promotion Laws for SMEs has been acted from January 1, 2003 and is the first law giving the foundations of promoting SME development in a systematic way. The Promotion Laws specifically define the roles of government in SMEs promotion, which are 1) providing financial support for SMEs, 2) promotion of SMEs start-ups and new business ventures, 3) promoting technological innovation of SMEs, 4) supporting the efforts of export and domestic marketing, and 5) providing various infrastructure service for the purpose of establishing the SMEs' innovation-friendly business environment.

The 11th Five-Year Development Plans specifically mentioned the plans of fostering SMEs development. The promotion plan for SMEs development suggests the 9 sub-programs to promote the innovative capabilities of SMEs: 1) constructing the laws and regulations for

promoting SMEs' innovation and development, 2) establishing the public service infrastructure for SMEs, 3) promoting the innovative capabilities of SMEs, 4) restructuring the industrial and market structure of SMEs, 5) deepening the corporate restructuring to level up the management skills of SMEs, 6) strengthening the education and training system to upgrading SMEs' personnel's technological and management skills, 7) solving the problems of SMEs' financial shortages, 8) promoting the exit and entry of SMEs in the market system, and 9) evaluating and monitoring the performance of SMEs.

SMEs' innovation policies should be said to be a part of the National Plans for Science and Technology Development, 2006-2020. The National Plans emphasize the development of China into innovation-based growth phase. Most of the policies relating to SMEs' technological innovation are included in this National Plan for S&T Development, which are 1) increase of R&D investment, 2) tax exemption support for R&D and technological innovation, 3) financial support for innovation activity, 4) public procurement for innovation, 5) IP promotion and protection, 6) human resources development for S&T, 7) education and diffusion of science culture, 8) establishment of S&T innovation platform. Related governmental divisions are preparing for following specific policy development, which will be announced in 2006. As parts of this national plans, the SMEs' technological innovation policies are also being formulated and have the basic goal of constructing "technological innovation system centering around private firms acting as major players in the market system with the collaboration with industry, academia and research institutions.

2.2 Marketing Policy

Export Promotions

The funds for promoting SMEs' export were established from year 2000 with the annual budget of around 10 billion yuans. The funds are provided for SMEs' export promotion activities such as 1) holding or participating international fairs for SMEs, 2) supports for various kinds of international certifications relating to export product qualifications, environmental regulations, 3) new export market development, 4) education and training for export management, and 5) assisting foreign public procurement. The funds are under the control of the National Department of Commerce.

2.3 Technology Policy

Promotion of R&D in SMEs

The innovation Fund for Small Technology-Based Firms, which was established in 1999, is to promote SME development and to facilitate SME technological innovation. It is specifically 1) to support technological innovation at technology-intensive SMEs, 2) to help technology-intensive SMEs develop technology, 3) to facilitate commercialization of developed technology, 4) to develop technology-intensive SMEs with Chinese characteristics, and 5) to accelerate development of advanced technology. With this innovation fund, government provides loans at the low-interest rate or no-interest rate or capital investment. The innovative SMEs, which can apply for this fund, should be 1) R&D expenditure more than 3% of total sales, 2) R&D personnel more than 10% of total employees, and 3) total employee less than 500 persons.

The Funds for SME development were established in 2004, with the annual budget of 1 billion yuans in 2004, 2 billion yuans in 2005, 3 billion yuans in 2006. The Funds provide loans without interest rates or with interest rates reduction to SMEs for the purpose of SMEs' technological innovation, product development, and new-technology and diffusion of new-process.

Concerning tax concession being related to SMEs, there exists 1) 150% tax exemption for the costs of R&D, 2) increase depreciation rate for R&D equipment. And, in a bid to increase R&D expenditure, the government encourages high-tech SMEs to spend 3% of total sales to R&D expenditure, large companies to 3%, and generally to 1.5%.

2.4 Financing Policy

Government Equity, Loan and Loan Guarantee Programs

The Chinese central government does not provide explicit direct loans, loan guarantee programs or direct/hybrid equity investment to SMEs. However, in an indirect way, the Chinese government promotes bank lending to SMEs. In order to facilitate SMEs loans by Chinese domestic banks, the Bank of China, Chinese central bank, has distributed several guidelines to Chinese banks since 1998. These guidelines includes 1) promotions of SMEs financial service provisions (1998), 2) widening of interest rates bands applicable to SMEs (1998), 3) increase of loans to SMEs, which have market potentials and credits (2002). Thus through the guidelines of

central banks, the Chinese government promotes and increases the loans to SMEs innovation and growth. Besides these general SMEs loan guidelines, Chinese banks' regulation authority issued a guideline about Chinese banks' SMEs loans programs and operations in 2005. The guidelines require Chinese banks to establish SMEs loan departments, to develop differentiations of loan services programs to SMEs, and 3) to improve the procedures and regulations concerning SMEs lending. Concerning loan guarantee intermediaries, the Chinese government provided the guidelines to promote the establishments of SMEs credit guarantee intermediaries with exemptions of three years' operational tax.

Concerning direct financial markets and equity investments for SMEs, the Chinese governments executed a series of deregulations being related with the establishments of high-tech new venture firms through 'the Temporary Promotion Programs for New Venture Firms,' which were enacted by National Development Commission from March 2006. In order to facilitate direct financial funding from equity markets, the Chinese government established a Stock Exchange only for SMEs like NASDAQ in June 2004.

Certification of Innovative SME

High tech SMEs in the National Cluster for High-Tech Industry Development, which is certified by the Chinese government, can receive a two-year exemption of income tax, and afterwards only 15% corporate tax is required.

2.5 Clustering and Networking Policy

Promotion of Incubators

The Chinese government supports SMEs' innovation and growth mainly through the development of industry clusters and incubators. The Chinese government recognizes the inborn deficiencies of SMEs, which are small scale, few financing channels, shortage of managerial and technological talents, and lack of information (Xue, 2006). Since SMEs lack the economy of scale, SMEs face difficulties to obtain access to training, market intelligence, logistics and technology. Moreover, SMEs in the Chinese economy, which is catching-up and late-industrializing economy, have a tendency to have limitations of technology gaps (Yang, *et al*., 2006).

Recognizing the deficiencies of SMEs, the Chinese government has pursued a strategy to

remedy the problems through development of industry clusters and incubators which can provide economy of scale, strong market influence, sufficient talents, technologies and information provisions (Xue, 2006). Considering the limits of Chinese government's resources and the huge numbers of SMEs in the Chinese economy, the centralized government intervention in SMEs' growth and innovation should be perplexing to be implemented. Thus, through the decentralized industrial clusters, such as Science Parks and Incubators, the Chinese government is trying to achieve SMEs' innovation and economic growth. This strategic change from resourced-based industrialization to network-based cluster development approach is pointed out to be right transitions suited for SMEs innovation developments in the Chinese economy (Yang, *et al*., 2006).

There existed a series of governmental programs to promote Chinese technology innovation and creations of industrial clusters. The Torch Program, which was initiated since 1988, had the general purpose to develop high technology industries in the Chinese economy. This program promoted the establishment of Science Parks and Technology Business Incubators and innovation funds for high technology SMEs. The Decision on the Reform of the Science and Technology Management System in 1985 has provided significant support for the development of business incubators. The reform had the general purpose of promoting commercialization activities of universities by allowing universities' venture investments, transfers of universities' technologies and dual employment of professors and researchers in private sectors. These reforms generally supported the development of university-based technology incubators and universities' affiliated venture firms. In 1998, the State Science and Technology Commission renamed to the Ministry of Science and Technology and its functions are shifted to encouraging innovation activities in private sectors especially through development of science parks and incubators (Yang, *et al*., 2006).

As of 2002-3, the Chinese clusters, which were developed by central governments, local governments and universities, were estimated to be around 12,300 clusters (Hong, *et al*., 2003) However, as clusters' establishments were overrun by local governments, central governments restructured over 6,700 clusters and eliminated over 4,700 clusters among these as of 2004 (Hong, 2004). National clusters, which were developed by Chinese central governments, can be categorized according to its size as 1) Special Economic Zones as the largest size, 2) Economic and Technology Development Zones and 3) High and New Technology Industrial Development Zones as middle size, and 4) University Science Parks as small-size. Especially specific industrial clusters, such as IT, BT, SW, NT, ST, etc, are often positioned within national-sized clusters or High and New Technology Industrial Development Zones. For example, Zhongguancun Science Park in Beijing possesses Life Science Park, Aerospace City, Software

Park, Shangdi Information Industrial Base, Bio-City Peking University and Beixin Materials Park within the district (Hong, *et al*., 2003).

In Addition to physical cluster formation with lands and facility construction, diverse policy measures to promote incubating high-technology start-ups companies are provided by each clusters and science parks. Policy instruments, which can be most utilized by Science Parks, are the provisions of hardware facilities such as pilot-scale plants, independent labs, open labs with high-valued experimental facilities, as well as software services, such as business services (consultation services, evaluation system, professional intermediary services), financing network services, logistics services and HR-related recruitment services. Especially, the generous incentive program for overseas student returnees are implemented to attract overseas Chinese students to return and serve the Chinese economy as initiating new high tech venture firms. These incentive programs are quite extensive and generous, for example, that returnees are entitled to the preferential policies of Beijing Municipal Government on rights in residence, real estate property purchase, and the children of legal representative of the residing returnee-run enterprises may enroll primary and middle schools affiliated to Tsinghua University even without mentioning generous exemptions of corporate income tax, sales tax, income tax and property tax for specific time periods.

3. Overall Assessment

Strength

Chinese economy has high potentials of SMEs innovation growths. Economically Chinese SMEs have favorable environments such as 1) huge-sized domestic markets, i.e. high consumer purchasing powers, 2) basic research capabilities of PRIs and universities in high technology areas, and 3) large number of high quality human resources. These favorable economic environments are all conducive to SMEs innovation. Since huge-sized domestic markets means high potential of business success, it can induce exuberant entrepreneurship and new start-ups. Besides, high technology capabilities and qualified human resources can create the environments beneficial for spin-offs and venture firms in high technology sectors.

Based on these favorable economic environments, the Chinese government has chosen cluster-based SMEs innovation policies. These policy measures have several strengths in promoting SMEs innovation. Chinese government has the priority on promoting spin-offs and high-technology start-ups with substantial incentive measures such as tax-incentives and R&D

subsidies. The Chinese government officially promotes the spin-offs and the technology investments by Chinese PRIs and public universities. National clusters and incubators, which were established by national government and local governments, provide diverse supports for SMEs innovation. Since these clusters and incubators are closely located with PRIs and universities with high technology capabilities, new start-ups and SMEs can have technological supports. Incubators provide consulting and financial network services for SMEs innovation. Clusters can also provide natural networks with other competitive firms, information flows and financial networks.

The Chinese government's supports for SMEs innovation is strictly based on SMEs performance evaluations. Incubators assess the performances of SMEs periodically to differentiate governmental support levels. Chinese government officially does not provide, or provide only in small limited portion, financial supports for PRIs and public universities. Public universities such as Beijing University have invested or owned hundreds of new venture firms, which yields substantial profits for university budgets. The Chinese government allowed the professors of public universities to possess other jobs beside professors in order to participate in venture firms and profitable projects. PRIs are in the same situations. Governmental financial supports for PRIs are almost entirely non-existent so that PRIs have to maintain their budget viability through their own commercial activities. These strict market-oriented reforms for SMEs innovation through spin-offs and commercialization of public universities and PRIs should be commended as one of the strength points for Chinese SMEs innovation.

Weakness

Chinese economy possesses high potential for SMEs innovation, especially high-tech venture firms and spin-offs as like the case of Lenovo business group. However, overall Chinese SMEs innovation activities such as R&D investments or patent registration are extremely poor, when compared to other advanced economies. This phenomenon explains the weaknesses of Chinese economy in SMEs innovation promotions. Even though Chinese economy possesses high potential of basic researches and high technology, these capabilities are only confined to small portion of total Chinese SMEs, which are located in several important high tech clusters. Most of Chinese SMEs are still in low-skilled, labor-intensive industries based on cost-competitiveness. The upgrading of overall competitiveness of Chinese SMEs is challenging tasks for the Chinese government.

Chinese policy measures for SMEs innovation are still in infancy, which were only started in the late 1990s. Most of SME innovation policies are coming in the near future and in relatively

small amount of budget. Thus compared to other advanced economies with long history of SMEs supports, Chinese SME innovation policy measures are small in size and in extents. Direct loans program, equity investment program, loan guarantee programs, technology and management consulting services for general SMEs should be implemented in near future.

Reference

Eun, Jonghak, 2006, The changes of Chinese technology catch-up strategy, KIEP World Economy Update 2006-07.

Hong, Sung-Bum, 2004, Reforms of Chinese Innovative Clusters and Policy Directions, a mimeo, Science and Technology Policy (STEPI).

Hong, Sung-Bum, Deok-Soon Yim, and Ki-Kook Kim, 2003, Characteristics and Types of Chinese Innovation Clusters in Comparison with Korean Cases, STEPI Policy Paper 2003-22.

Lazonick, William, 2004, Indigenous Innovation and Economic Development: Lessons from China's Leap into the Information Age, *Industry and Innovation*, Vol. 11, No. 4, pp 273-297.

Lee, Woosung and Kim Wanjung, 2005, Chinese and Indian Business Groups and Corporate Governance systems, SK research institutes internal report.

Li, Zhen and Roger Handberg, 2002, The Central Dilemma of China's S&T policy, Bulletin of Science, Technology and Society, Vol.22, Np.6, pp 484-495.

Lim, Duksoon, Myungjin Lee, Chunguen Lee, Kigook Kim, Sungbum Hong and eunjung Choi, 2005, Science and Technology Systems and Policies of BRICs Countries and Korea's Response, STEPI Policy Report 2005-05.

Liu, Chang-yung and Jie Yang, 2003, A Comparative Analysis on Technology Innovation and Diffusion System and Industrial Innovation Between Taiwan and Mainland China, *International Journal of Innovation Management*, Vol. 7, No. 4, pp 443-473

Xue, Huang, 2006, The Initiatives and Incentives for SMEs' Technology Innovation in China, a presentation to APEC SME Policy Expert Seminar in Seoul, 2006.

Yang, Tracy, Jamus Jerome Lim and Toshiki Kanamori, 2006, The People's Republic of China's

Small and Medium Enterprise Development Strategies in the Context of a National Innovation System, ADB Institute Discussion Paper No. 55.

Appendix 3: Summarized Policies in China

Policy Category	Elements	Detailed Program	Contents Note	
Marketing	Export Promotion		Providing funds to SMEs for participating international fairs, for acquiring international certifications, for new export market development etc.	NDC
Technology	R&D promotion	Innovation funds for high tech firms	Promotion of high-tech SMEs'technological innovation and commercialization by providing funds in the forms of equity investment or loans at low interest rates	
		Funds for SME development	Providing loans to SMEs at low or no interest rates for technological innovation and diffusion of innovation	
		Tax concessions	150% tax exemption for R&D expenditure and increase of depreciation rate for R&D equipment	
Financing	Certification of Innovative SMEs	High Tech SMEs	Certified high-tech SMEs are provided by tax incentives	
Clustering and Networking	Promotion of Incubators	Torch Program	Promoting establishment of Science Parks and technology business incubators and providing innovation funds for high tech SMEs	
		Reform of the Science and Technology Management System	Promoting commercialization activities of universities by deregulating public universities' venture investments and technology transfers	

Chapter 4: Japan

1. Economy and Industrial Structure and SME Position

1.1 General Economic Characteristics

Japan has the foremost large number of global manufacturing firms with a diversity of industries. In terms of revenues and market shares, Japanese global companies cannot be compared to any other APEC member economies. Japanese global companies have long history of its strength and competitiveness especially in the industries of iron and steel, shipbuilding, automobiles and electronics. The growth of Japanese global companies can be attributed to the specific characteristics and historical precedents of Japanese National Innovation System (NIS). Unlike other APEC member economies, Japan already has the capacity of absorbing foreign high technology before the World War I and developed substantial capabilities to develop indigenous technologies with extensive military expenditures during wartime periods. In this process, Zaibatus, the family-owned Japanese corporate groups, has accumulated substantial capital and market share with the cooperation of military governments. After the dissemination of Zaibatus by the US military government in Japan, Keiretsu is voluntarily formulated among the member companies of Zaibatus. With internal capital formation and resources pool within Keiretsu, Japanese Keiretsu companies could have grown up to become global leaders in several industries (Lee, 2005). Among this growth process of Japanese global companies, the roles of the Japanese government were mostly limited to the protection of domestic industries with strict formal and informal restrictions on Foreign Direct Investment, which resulted in the ownership of Japanese firms in the hands of Japanese peoples (Odagiri and Goto, 1993).

The role of Japanese SMEs in the Japanese NIS is quite exemplary to the other APEC member economies. Not only being value-enhancing partners with large global Japanese firms, but also being globally competitive enterprises entering into Global Production Networks (GPN), especially in electronics and machinery industries, Japanese SMEs notably contributed to Japanese economic success and development of the Japanese NIS. It is well known that Japanese specific governance system (SMEs' Keiretsu relationship with large global Japanese firms often owning cross-shares, and lifetime employment practice and seniority-based wage structure) contributed to a stable long-term relationship among diverse stakeholders and thus resulted in efficient tacit-knowledge acquisition, which is essential in mature industry's technological development (Goto, 2002).

Japanese universities and PRIs have substantial capabilities to develop indigenous technology innovation through research and development, and to cooperate and share efficiently knowledge spillovers with private firms, but still lack in basic research and scientific breakthroughs as in the US universities. Most of scientific researches in Japanese universities are still mostly related with technology development and not on wide-ranged basic researches, which are pointed out as the reason behind the unsuccessful IT and BT venture industries in Japan compared to the US. The political background in which Japan could not develop military superpower with limited spending on defense expenditures and R&D can be partly attributed to the weak capability of basic research (Coriat, 2002; Goto, 2002).

1.2 SMEs in the Japanese Economy

The definition of SMEs is provided for each industrial sector by the SME Basic Law, which was amended in 1999. The large enterprises numbered 12 thousands, medium enterprises 549 thousands, and small enterprises 3,777 thousands as of 2004. Small enterprises are comprised of 87.1% of all enterprises numbers, medium enterprise 12.6% and large enterprises only 0.3%.

<Table 4.1> Definition of an SME

	Manufacturing and Others	**Wholesales Retail**		**Services**
Capital	300 million yen or less	100 million yen or less	50 million yen or less	50 million yen or less
Number of Employees	300 or less	100 or less	50 or less	100 or less

<Table 4.2> Definition of a Small-Scaled Enterprise

	Manufacturing and Others	**Commerce and Services**
Number of Employees	20 employees or less	5 employees or less

The SMEs in Japanese economy are accountable for 71.0% of total employment, 50.7% of manufacturing production, 37.1% of manufacturing equipment investment and 56.6% of value added in manufacturing industry.

<Table 4.3> Overall SMEs Economic Situation in Japanese Economy (As of 2004)

SMEs		Large Enterprises	Total
Enterprises number[1]	4.326 million (99.7%)	0.012 million (0.3%)	4.338 million (100.0%)
Employees[1]	28.09 million (71.0%)	11.47 million (29.0%)	39.55 million (100.0%)
Value of Shipments[2]	144,056 billion Yen (50.7%)	140,115 billion Yen (49.3%)	284,171 billion Yen (100.0%)
Equipment Investment[2]	3,834 billion Yen (37.1%)	6,503 billion Yen (62.9%)	10,337 billion Yen (100.0%)
Value-Added[2]	57,513 billion Yen (56.6%)	44,163 billion Yen (43.4%)	101,677 billion Yen (100.0%)

1) Except agriculture, forestry and fisheries industry

2) Manufacturing industry

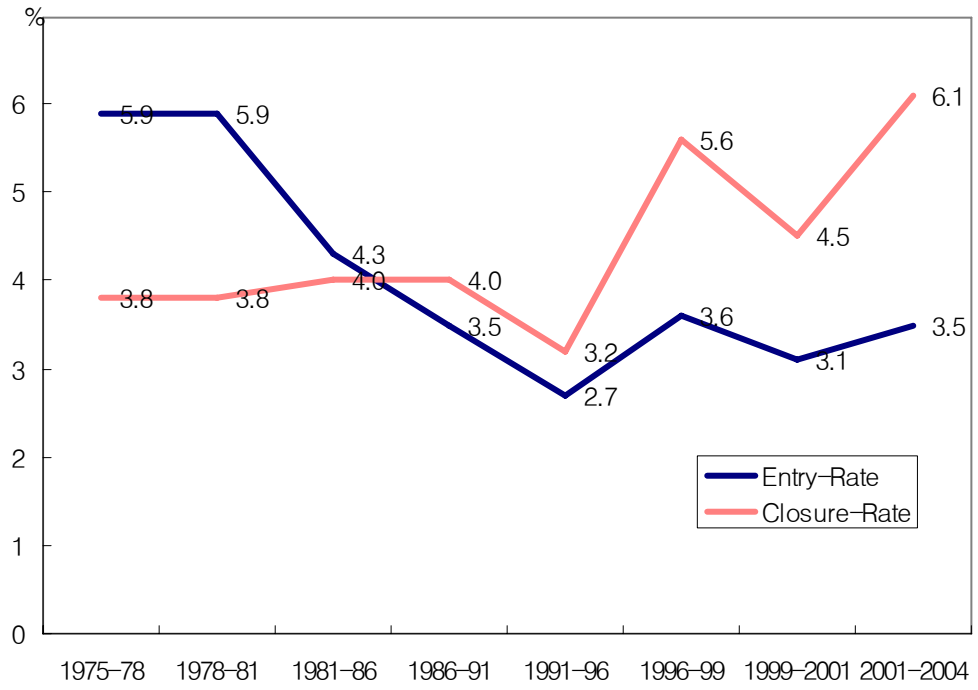
The aggregate labor productivity of Japanese SMEs is almost half of that of Japanese large enterprises. However, during the period of 1996-2003, the labor productivity of Japanese SMEs did not show a significant increase in manufacturing industry, while the labor productivity in the whole industry actually fell during the same period.

<Table 4.4> Labor Productivity Index of Japanese SMEs and Large Enterprises

		1996	1997	1998	1999	2000	2001	2002	2003
Whole Industry	SMEs	4,840 (47.0)[1]	4,894 (47.7)	4,837 (49.9)	4,602 (46.8)	4,573 (43.9)	4,483 (44.3)	4,558 (44.6)	4,389 (42.3)
	Large	10,287	10,265	9,696	9,831	10,425	10,109	10,228	10,386
Manufacturing Industry	SMEs	9,069 (48.2)	9,335 (49.0)	9,010 (49.8)	9,081 (50.9)	9,366 (49.3)	9,321 (52.7)	9,249 (51.0)	9,378 (49.4)
	Large	18,826	19,063	18,093	17,842	19,009	17,684	18,153	18,986

Note: The number in the parenthesis ( ) means the percentage ratio of the labor productivity of SMEs compared to that of large enterprises.

The worrisome concerns of Japanese governments lie on the fact that Japanese entry, start-up rates of SMEs has significantly decreased since the mid of 1980s, while the closure rate of SMEs showed the reverse trend of rising during the same period. During the rapid economic growth period of the 1970s, the entry rate of SMEs recorded almost 6%, while the closure rate remained below 4%. However, during the economic downturn period of the 1990s, the entry rate of SMEs declined to around 3.5% while the closure rate continued to rise up to more than 6% since 2000.



<Figure 4.1> Entry and Closure Rate of Japanese SMEs

2. SME Innovation Policies

2.1 Overview of SME Innovation Policies

The Small and Medium Enterprise Agency of the Ministry of International Trade and Industry (MITI) takes overall responsibility for SME policies and implementations.

The major restructuring of Japanese SME policies are on the amendment of the Small and Medium Enterprise Basic Law in 1999, which states the basic policy philosophy, "developing and growing a wide range of independent SMEs for greater economic vitality."

The Japanese government developed its SME policies within the framework of the former SME Basic Law, which was enacted in 1963. At the times of enactment, SMEs were viewed as being small and weak and thus requiring special social policies. With such perception, conventional SME policies had been basically aimed at rectifying the gap between SMEs and large enterprises. The core points of the policies were to remedy disadvantages which SMEs faced in general business activities. In the past, the focus of SMEs policies' methodology had been placed on pursuing the scale merit of SMEs while developing uniform modernization policies

for each industry. Thus overall policy system of the previous SME Basic Law was 1) upgrading the structure of SMEs with the aim of improving productivity, which included facilities modernization, technology improvement, business management rationalization and arrangement of business joint operation, and 2) rectification of disadvantages in order to improve trading conditions of SMEs, which encompassed excessive competition prevention, subcontracting transaction rationalization, securing SME business opportunities and SME export promotion.

However, the environment surrounding SMEs has undergone severe changes including economic growth and maturation, consumer needs diversification, IT revolution, and spread of globalization. Moreover, mass-production of standardized products has shifted to small-sized production of various products and it requires mobility and flexibility, in which SMEs have intrinsic advantages. With these environmental changes, the Japanese government has recognized the importance of venture business, small enterprises and the merits of SMEs. To this end, the Japanese government fundamentally revised and restructured conventional SME policies and the SME Basic Law in 1999. The new SME Basic Law is based on a new philosophy of promoting diverse and vigorous growth and the development of independent SMEs, rather than rectifying the gap between large enterprises and SMEs. The revised Law has three key factors: 1) promoting business innovation and new business start-ups (or self-sustaining enterprises), which consists of business innovation promotion, start-ups and technology-based venture promotion, 2) strengthening the management base of SMEs, which consists of ensuring managerial resources, facilitating collaboration and joint operation, and ensuring public procurement opportunities and 3) facilitating adoption to economic and social change, which provides necessary social safety nets and bankruptcy legal system.

2.2 Marketing Policy

Export Promotions

The SME agency provides advice and information service for SME exporters often by the means of corporate match-making (which is run by the *Business Matching and Advice Programs*) and international strategic partnerships. SMRJ(*Organization for Small and Medium Enterprises and Regional Innovation*, Japan) offers trade and investment experts' advice and information. Advisors or experts are those who are retired from trade companies, manufacturing and banking sectors, *etc.*, and they have experiences in international-related works. Additionally, SMRJ holds seminars for internationalization of SMEs while JETRO holds SMEs' foreign fairs.

2.3 HRD Policy

Training

The Institute for Small Business Management and Technology (ISBMT), which are under the direction of SMRJ, is dedicated to provide training services to SMEs management and personnel. They have training programs for SME executives, management, technicians and even support personnel. The training programs have a focus on management training in order to promote managerial innovations and also provide human resources development programs for the personnel of SME support agencies. For human resource development at the SME Universities, they provided 1) training for the personnel responsible for SME support, 2) training for the collaborators for SME support, 3) training for the managers of SMEs, and 4) training for the future entrepreneurs. The ISBMT, which is located at 9 sites throughout Japan, holds 5-day training seminars on topics such as methods of business plan formulation and the necessary administrative knowledge for actual start-ups and for those who have clearly decided to start up business and have a specific business plan.

Besides this formal institute for training programs, there are several lectures and training programs provided by private sectors. *The Start-Up Venture National Forum*, which involves those with experiences in creating a company and other kinds of experts, gives lectures and organizes public discussions with the purpose of building up an atmosphere that gives a birth to many new businesses. The aim of this forum is to improve the understanding of the public towards start-ups and venture businesses. *The Central Federation of Societies of Commerce and Industry* and *Japan Chamber of Commerce and Industry*, in collaboration with their affiliated *Commerce and Industry Associations*, provide supports how to compile business plans and how to enhance the practical skills needed for start-ups by holding intensive seminars which are called as '*start-up cram schools.*'

2.4 Technology Policy

Promotion of R&D in SME

The Small and Medium Enterprises Agency (SMEA) in the Japanese government provides two kinds of support for technological development of SMEs in the aspect of R&D: 1) Support for

commercialization by SMEs, and 2) *Small Business Innovation Research* (Japanese SBIR) program.

The support program for commercialization provides subsidies part of R&D costs of SMEs. Firstly, the program subsidizes part of the costs of R&D for practical application, start-up activities (such as technology evaluation, getting patents, building system, *etc.*) and consults on business plan development and implementation. In order to 1) promote technical research and development by SMEs, 2) create value-added SME products, 3) facilitate SMEs' entry into new markets, and 4) upgrade fundamental technologies for the development of new products and technologies by SMEs, a part of the cost of raw materials, machinery and equipment, technical guidance for R&D are subsidized (1/2 of total costs).

The SBIR system has been established to activate SMEs with technology development and support their creative business activities. Under the SBIR system, the Japanese government designates subsidies for technological development for SMEs as 'specific subsidies' and endeavors to increase governmental spending of R&D budget on SMEs. Besides, the government offers diverse aids for SMEs in an effort to provide a support for commercialization of R & D results by using governmental specific subsidies. The subsidies include 1) reduction of patent fees. 2) As an exception to 'Small Business Credit Insurance Law,' expansion of debt guarantee lines or establishment of special cases without collateral, the third party's guarantee is provided. 3) As an exception to the object of investment by Small and Medium Business Investment and Consultation Companies, in the establishment of a company whose capital exceeds 300 million yens, and in procurement of funds for implementing business activities by a company with capital of more than 300 million yens may become an object of investment. 4) As an exception to 'the Law on Subsidy for Facility Introduction Funds for Small-Scale Enterprises,' the ratio of lending institutions under the small business facility funds system is expanded from 1/2 to 2/3. 5) The Japan Finance Corporation for Small Business lends funds for facilities or long-term operations to business with technology.

Promotion of Technological Collaboration

The government (mainly public industrial technology research institutes) aims to improve the technological development capabilities of local SMEs and to promote dissemination and advancement of the results of technical development through the method of promoting technological collaboration among academia, industry and government.

'*New Tie-Ups*' is the program that is intended to promote the development of high valued

products, services or new business areas through tying up several SMEs, which play in different business areas. This program aims to produce a synergy effect by combining technology/know-how stocked by each SME. The SMEs being selected for the *New Tie-Ups* program provide diverse assistance measures.

This program provides a subsidy for building up of tie-ups body and a subsidy for commercialization of the *New Tie-Ups* results. Supporting for building a Tie-Ups body made of SMEs, the government grants a subsidy for the costs of preparing governmental approvals for Tie-Ups or using consultants. The commercialization of a new area development by tie-ups, the government grants a subsidy for costs of examination related with new products development, trial-products, etc.

For *New Tie-Ups* companies, the limit of credit guarantee is expanded and low-interest-rate loans can be provided based on the evaluation of their capacity to repay. Besides these benefits, tax exemption on 7% of purchase price or 30% special depreciation in first year is allowed. SMRJ offers a loan for producing new products or building a facility for R&D. Patent fees are reduced and the equity investment by *Small and Medium Business Investment* and *Consultation Companies* can be extended to more than a limit of 300 million yen.

2.5 Financing Policy

Government Equity Programs

Small and Medium Business Investment and Consultation Companies, which were established since 1963, are private companies mostly owned by local governments or financial institutions. The companies provide equity investments to SMEs at the early stages by purchasing new stock issues, convertible bond issues, and warrant bond issues with the capital of not more than 300 million yens in general.

Promoting investment to venture business, SMRJ invests into limited partnership for venture capital investment. For the purpose of investing in domestic small and medium-sized venture businesses that are creating new business fields such as the development of new products and technologies, or in an early stage of growth, a *Limited Partnership for Venture Capital Investment* can be established with a private VC as an executive partner and SMRJ as a member of the Limited Partnership.

With the aim of coordinating support in aspects of funding for new business of SMEs having an outstanding idea or skill, SMRJ and companies collectively build the 'Keep it up! SME Fund' with comprehensive support.

Government Loan Programs

Concerning public support for SMEs loans, there are three agencies involved. First, the *Japan Finance Corporation for Small Business* (JASME) established in 1953 provides long-term capital with long-term fixed and low interest rate. Second, founded in 1949, *the National Life finance Corporation* (NLFC) provides small and unsecured loans for very small firms. Third, the *Shoko Chukin Bank* established in 1936 is a private financial service bank. The JASME provides a high amount of finance for medium enterprises to purchase factories and collateral or guarantee is required. The NLFC provides small loans to small businesses such as stores, which do not require collateral or guarantee. The NLFC cooperates with *Japan Chamber of Commerce and Industry* (JCC) and the JCC provides teachings for small business managers on making accounting books as well as recommendation for finance for small businesses taught by JCC to NLFC. The finance for small businesses provided by NLFC has the maximum loan amount of 10 million yens with the interest rate of 1.8% per year. Shoko Chukin Bank provides finance for member companies only. The governmental banks, which provide about 10% of total SME finance amounts, complement private banking system.

<Table 4.5> Shares of Government Supported Loans in SME Finance

(As of December 2003, Unit: trillion yen)

Business Category	**Financial Institution Name**	**Total Outstanding Loans to SMEs**	**% of Grand Total**
Private Financial Institution	City Banks	79.2	39.4%
	Main Regional Banks	66.8	25.78%
	Secondary Regional Banks	23.7	9.1%
	Trust Banks and Long-Term Credit Banks	12.6	4.8%
	Shinkin Banks	41.8	16.1%
	Credit Cooperatives	9.2	3.5%
	Sub-total	233.3	89.7%
Governmental Financial Institution	JASME	7.6	2.9%
	NLFC	9.2	3.5%
	Shoko Chukin Bank	10.0	3.8%
	Sub-total	26.8	10.3%
Grand Total		**260.1**	**100.0%**

Besides the governmental banks' loan programs, SMRJ and prefecture governments invest support fund, which is called as *Business Upgrading Loan*, for local government and local industries partnership projects for local SMEs such as building Industry Park, Wholesale Park or Shopping Centers and improving Shopping Mall. The loan interest rate is limited to 0.8% or no interest (for projects approved under special laws or disaster restorations). The loan limit shall not be over 80% of applicable project costs and the repayment period shall not exceed 20 years (period of deferment is not more than 3 years).

Government Loan Guarantee Programs

Supplementing credit capability of SMEs with the credit insurance system and credit guarantee system, the credit guarantee facilities, such as the Credit Guarantee Association and the *Japan Small and Medium Enterprise Corporation*, assist SMEs without sufficient credit and collateral. The systems aim to contribute to facilitate funding for SMEs through guarantee by the Credit Guarantee Corporations for their loans from financial institutions. Moreover, JASME supplements the risk in *Credit Guarantee Corporations* throughout Japan through reinsurance.

Credit Guarantee Corporations, a total of 52 independent offices throughout Japan, have been established as certified corporations under the *Credit Guarantee Association Law* (1953) for the purpose of facilitating access to finance for SMEs by guaranteeing their borrowings from financial institutions. The outstanding guarantee of liability is estimated as 329,739.7 billion yens as of the end of March 2005. Under the *Small Business Credit Insurance Law*, JASME provides reinsurance of the debt guarantee by Credit Guarantee Corporations and lending them the funds necessary for operations. The contracted amount for underwritten insurance from April 2003 to end of March 2004 is estimated at 14,278.6 billion yens.

2.6 Management Innovation Policy

Consulting

The Japanese government has three types of a business support system for SMEs: 1) SME and Venture Business Support Centers, 2) Prefectural SME Support Centers, and 3) Regional SME Support Centers. These centers, in collaboration with the private SME support institutions such as *Commerce and Industry Associations* and *Chambers of Commerce and Industry*, work as one-stop service counters which provide information concerning SME support strategies and implement support projects. SME Support Centers are established to provide one-stop services

for SMEs, which include over-the-counter (OTC) consultation, dispatches of experts and incubator managers, on-site professional assistance, business feasibility assessments, information service and training programs. The focuses of the centers are on business creation and new start-ups and business innovation. The centers not only provide management strategy, marketing and consulting services to SMEs and entrepreneurs, but also they provide support for specific management issues of each SME.

SME/Venture Business Support Centers have 8 locations in the main large city level, while *Prefectural SME Support Centers* have 57 locations in prefecture level and *Regional SME Support Centers* have 261 locations in local city level.

Promotion of E-business and E-commerce

The Japanese government started the 2nd round plan for introducing IT infrastructure to SMEs in March 2004, which implements IT utilization for business innovation. In *Prefectural SME Support Centers*, SMRJ and the *Chamber of Commerce and Industry*, IT training programs and seminars are held in the use of e-commerce and home-page construction. The *Prefectural SME Support Centers* and SMRJ dispatch IT experts to SMEs that are considering the introduction of IT. The government also provides low-interest rate loans to SMEs in order to promote IT investment. Promoting strategic IT systems such as a POS system into SMEs, lease companies appointed by the government lend strategic IT equipments to SMEs at the low interest rate. As SMEs purchase specified IT equipments, they can receive special depreciation or tax credits.

Besides these direct supports for IT introduction to SMEs, the government has build up development base for the diffusion of IT into SMEs. SMRJ manages a portal site for SME general information (which is called as J-Net 21), which will enhance function as one stop service, to promptly provide necessary information to SMEs. For trade outplacement efficiency and e-marketplace build-up, the *National Association for Subcontracting Enterprises Promotion* and its prefectural branches implemented networks, homepages and trade Matching System. In order to promote business innovation for SMEs which could become model cases for using IT in each region, the government subsidizes a half of the cost of advance research toward building SME business models or development.

Promotion of Awareness of SME Innovation

In an effort to foster a number of start-ups and to develop SME network, SMRJ hosts various events ranging from occasions for SMEs to meet with investors and business partners to events that provide information to inspire the creation of new business areas. *Venture Fair Japan* is

held periodically and introduces and exhibits fine experimental projects, as well as the results of joint research undertaken by venture firms. In *Venture Plaza*, business plans are presented by venture firms at 9 locations nationwide. *New Market Start-Ups Support Fair* focuses on themes to promote new markets such as 1) contents industry (computer games, cartoon character, merchandise goods etc.), 2) medical and welfare services, 3) robotics. In SME Expo, 'Sougoten,' SMEs with prominent products, unique technology, and business models, are given the opportunity to present their management innovation through exhibitions and presentations at the SMEs synthesis exhibitions. There are lots of visitors to make good use of this opportunity to exploit new markets, meet dealers and business partners and, and get in touch with new business affiliates.

2.7 Clustering and Networking Policy

Promotion of Incubators

Based on the law to facilitate the *Creation of New Businesses* and other laws and regulations, comprehensive policies are established in order to promote new business creation and entrepreneurship, which include financing, personnel, information, technology, and supporting services for business creation. Emphasis is made on the following areas: enhancing capital supply by private investors, developing human resources support with training, assisting technology development with funding for prototype development models and providing expertise and consultations through SME support centers.

More specifically, in order to provide comprehensive assistance to the start-up phase of a business, SMRJ provides incubators, which are essentially a ready-to-go office space and support infrastructure for start-up companies. There exist three types of business incubators operated by SMRJ: 1) establishment of business facilities to foster business in local economies (which has 11 facilities), 2) establishment of university-affiliated business incubation facilities (12 facilities), and 3) capital invested with local governments to the joint venture companies which establish business incubation facilities (5 facilities).

3. Overall Assessment

Strength

Japanese economy has highly favorable environments for SMEs with several strengths in promoting SMEs innovations: 1) the Japanese government has foremost comprehensive and extensive supports for SMEs innovation and competitiveness acquirements, 2) due to the large number of global players in high tech industries, industrial linkages and competition pressures are strong enough to induce high performance of SMEs innovation, and 3) Japanese employees loyalties and abundant skilled labors are highly favorable to SMEs innovation.

Japanese policy measures for SMEs innovation are highly commendable for its size and its comprehensiveness. The financial supports, especially through direct loan programs and guarantee programs for SMEs innovation, are quite enormous in a way that governmental direct loans to SMEs consist of more than 10% of total outstanding lending to SMEs in Japan. Financial guarantees for SMEs liabilities are more than 10 times of direct loans. There even reinsurance schemes for SMEs loan guarantee programs. These financial supports for SMEs have long history more than 40 years. Management consulting services, on which the Japanese government recently puts a policy priority, even dispatch fulltime-hired-specialists and consultants to SMEs in a specific time period. In order to produce highly competitive SMEs entrepreneurs, the Japanese government operates several SME universities specified only for SMEs CEOs and managers. Concerning the SMEs technological innovation promotion, the Japanese government introduced US-styled SBIR programs to enhance governmental efficiency in technology supports.

Beside these substantial governmental supports for SMEs innovation, the existence of large number of global players in high tech industries such as in the areas of electronics, automotives, engineering and information technology is certainly favorable to SMEs innovation. With technological collaboration and, sometimes, fierce competitions with global business groups, Japanese SMEs are inevitable to innovate and upgrade competitiveness for survivals. Japanese SMEs have acquired strong competitiveness in electronics parts, automotive parts and mechanics. The high capabilities of Japanese human resources are also a good environment for SMEs innovation. Moreover, the Japanese culture of strong loyalty to companies and lifetime employment are also applicable to SMEs and are highly favorable to SMEs innovation. According to the interviews with employees in SMEs, Japanese employees in SMEs do not easily move to other companies for the reasons of wage or incentives. Notwithstanding a prolonged recession period, the culture of loyalty and lifetime employment is substantial. Since

engineering and mechanics require embedded-technology and experienced skilled labors, the high stability of employment in Japanese SMEs certainly increases the innovativeness of Japanese SMEs

Weakness

Despite of these substantial strengths favorable for SMEs innovation, two weaknesses can be pointed out in Japanese SMEs innovation. Firstly, even though the SME policy principles has changed with the Basic Law amendments after the early 2000s, the governmental supports for SMEs still have the tendency of supporting weak SMEs to sustain its financial viabilities. Unlike Australia, which has strong market-oriented principles concerning survivals of SMEs, the Japanese government still has a tendency to support incompetent SMEs to prolong their existence. The governmental intervention beyond market-failures can result in lagging industrial restructuring and overall economic inefficiencies and also to SMEs innovation.

Secondly, even though the Japanese culture of loyalty and lifetime employment is favorable for existing SMEs, especially for engineering and mechanical industries, the culture may be harmful for the creation of new venture firms and high tech start-ups. Since new start-ups and venture firms require high entrepreneurships and pioneering spirits with venture capital markets who can share these high risks investments, the stabilized Japanese culture can produce quite adverse effects on the creations of Japanese high tech venture firms.

Reference

Coriat, Benjamin, 2003, The strengths and weaknesses of Japanese technological innovation system: recent status, STEPI internal seminar.

Goto, Akira, 2000, Japan's National Innovation System: Current Status and Problems, Oxford University of Economic Policy, Vol. 16, No. 2, pp 103-113.

Lee, Woosung, 2005, "International Comparisons of Corporate Governance systems and Institutional Contexts," FKI seminar

Odagiri, Hiroyuki and Akira Goto, 1993, "The Japanese System of Innovation: Past, Present, and the Future," in Richard R. Nelson (ed.) "National Innovation Systems: A Comparative Analysis," Oxford University Press

Appendix 4: Summarized Policies in Japan

Policy Category	Elements	Detailed Program	Contents Note	
Marketing	Export Promotion		Providing advice and information services for SME exporters by corporate match-making and international strategic partnerships	SMRJ
HRD	Training	Institute for Small Business Management and Technology (ISBMT)	Providing training services for SME executives, management, technicians and support personnel	SMRJ
Technology	R&D promotion	Commercialization support	Providing subsidies for part of SMEs' R&D costs and consulting services for business plan development and implementation	SMEA
		Japanese SBIR	Promoting SMEs technology development through subsidies, favorable treatments in receiving financial investment, loans and public procurement etc.	
	Technological collaboration promotion	New Tie-Ups	Promoting high-valued products/services and new business developments through tying up several SMEs with financial incentives and subsidies	
Financing	Equity Financing	Small and Medium Business Investment and Consultation Companies	Providing equity investments to SMEs at the early stages with the capital of not more than 300 million yens in general	
		Limited partnership investment in SMEs	Providing equity investment to new products and technology developments or in an early stage of growth in limited partnership with private VCs	SMRJ
	Debt Financing	Japan Finance Corporation for Small Business (JASME)	Providing long-term capital with long-term fixed and low interest rate to medium-sized enterprises for purchasing factories	
		National Life Finance Corporation (NLFC)	Providing small unsecured loans for very small business such as stores	
		Business Upgrading Loan	SMRJ and prefecture government invest into a support fund for local government and local industries' partnership projects for local SMEs such as building Industry Park and Wholesale Park	

		Loan guarantee programs	Credit guarantee corporations provide credit insurance for SMEs without sufficient credit and collateral	
Management Innovation	Consulting	SME and Venture Business Support Centers	Working as one-stop service counters which provides information and consulting for SMEs to develop business strategy and implementation	
	Promotion of e-business	Promotion of IT infrastructure establishment	Providing training, IT expert dispatch and low-interest-rates loans in implementing e-commerce infrastructures to SMEs	
		J-Net 21	Providing general information to SMEs	
	Promotion of Awareness of SME Innovation	Venture Fair Japan	Exhibitions of fine experimental projects and the results of joint research undertaken by venture firms.	
		Venture Plaza	Presentations of business plans by venture firms	
		New Market Start-Ups Support Fair	Promotion of new strategic industries such as contents, medical and welfare services and robotics	
Clustering and Networking	Promotion of Incubators	SME support centers	Enhancing capital supply by private investors, developing human resources by training and providing funds for technological development	
		Business incubators	Providing a ready-to-go office spaces and infrastructures for start-ups companies.	SMRJ

Chapter 5: Korea

1. Economic and industrial Structure and the SME position

1.1. General Economic Characteristics

Korea has gone through the process of condensed economic growth for the past four decades, achieving 10th highest GDP in the world.

<Table 5.1> Korean Economy in World Ranking (unit: USD 100 billion)

Rank	**1 2 3**			**4**	**5 8**		**10**
	USA (124.8)	Japan (45.7)	Germany (27.9)	China (22.2)	United Kingdom (22.0)	Canada (11.3)	Korea (7.9)

Source: IMF(2006), 2005 baseline

The manufacturing sector has seen an average annual economic growth of 8.0 % over the past decade and been played a pivotal role in placing the Korean economy the 10th largest in the world.

<Table 5.2> Growth Rate Comparison between Manufacturing and Service Sectors

	GDP Manufacturing		**Service**
Average annual gr owth rates(%) of decade (from 1995 to 2004)	5.0	8.0	7.3

Source: Korea National Statistical Office (Korean Statistic Information System, KOSIS)

Manufacturing accounts for 33.8 % share of the GDP and 18.5 % of the economically active population is engaged in the manufacturing sector. Thus, as manufacturing takes up more than 70% of total exports, it is a *Cash Cow* that helps Korea achieve dramatic economic development through exports.

<Table 5.3> Economic Contribution of 2005 by Industry

Classification	Agricultural and fisheries	Mining	Manufacturing	Service
GDP ratio	3.0	0.3	33.8	56.5
Employment ratio	7.9	0.1	18.5	65.5

Source: Korea National Statistical Office, KOSIS data

The IT industry in Korea has emerged as a major industry as the 1990s witnessed rapid growth in domestic companies and informatization. GDP ratio increased from 5.6% in 1995 to 14.2 % in 2004. As IT-related manufacturing industries such as semiconductor and computer are rapidly improved with a firm foundation of electrics and electronics industries, IT manufacturing has become the growth engine of the entire IT industry. The growth rate of the IT industry recorded 25.2% annually from 1998 to 2000 and the IT industry played a pivotal role in overcoming the Asian financial crisis. Starting from 1990, Korea's informatization infrastructure was dramatically developed and reached to that of the advanced economies. In the area of National Informatization Index, Korea made an impressive move from 22d in ranking in 1990 and to 12th in 2003 and to 3rd in 2005. Korea also reached the top among participants in 2005 in terms of the Digital Opportunity Index(DOI) of International Telecommunication Union(ITU) that measures the overall development level of information and telecommunication[9].

1.2. SMEs in the Korea Economy

1.2.1 SME Definition in Korea

SMEs in Korea were defined when the 'Small and Medium Enterprises Act' was enacted and promulgated in 1966. Following the enactment, the scope of SMEs was changed through 10 revisions. According to the SME Act, SMEs in the area of manufacturing are considered as companies which have less than 300 employees or its capital worth under KRW 8 billion.

[9] Source: Ministry of Commerce, Industry and Energy, '2006 Beginning of the Year Plan for Prosperous Korea: Going into Semi-Final of Global Industry and Quarter Final of Global Trade(2006),' Ministry of Information and Communication 'Leaping towards Global IT Power Korea (2006)

<Table 5.4> Definition of SMEs in Korea

Sector	Scope	
	Number of employees	**Capital or sales (KR W Won)**
Manufacturing	less than 300	capital worth KRW 8 billion or less
Mining, Construction, Transportation	less than 300	capital worth KRW 3 billion or less
Large general retail stores Hotel	less than 300	sales worth KRW 30 billion or less
Seed and seeding production Fishing Electrical & Gas and waterworks Tour agency & Warehouses Transportation-related service, medical	less than 200	sales worth KRW 20 billion or less
Wholesales and product intermediation	less than 100	sales worth KRW 10 billion or less

As of late 2004 baseline, SMEs represent 99.8% of the entire enterprises(2,998,000 SMEs) and 86.5% of total employment(10,415million employees). The SMEs in Korea account for 48.6% of total production, 49.4% of value-added and 35.6% of exports. In terms of company size, small enterprises(less than 50 employees) take 97% and medium enterprises (more than 50 but less than 300 employees) take 2.85%. Thus, the SMEs in Korea account for 99.8 % of total enterprises. In considering the number of employees, 86.5% of total enterprises are SMEs, of which small enterprises and medium enterprises are 63.2% and 23.4% respectively.

The status of SME shows that the number of large enterprises was reduced by 10,000 and that of SMEs increased by 160,000 right after the Asian Financial Crisis in 1998. Meanwhile, the number of large enterprises has increased by 4,000 and that of SMEs was up by 400,000. In the process of overcoming the financial crisis from late 1998 to 2004, the number of people working for large enterprises decreased by 900,000 due to business restructuring, while SMEs created new jobs of approximately 275,000. This shows that SMEs have a growing role to play in terms of job creation.

<Table 5.5> Status of SMEs by Year

Classification		1998	2000	2002	2003	2004
Number of businesses	Total	2,629,868	2,864,134	2,953,124	3,004,105	3,003,180
	SMEs	2,607,710	2,854,081	2,948,171	2,999,297	2,999,293
	Ratio	99.2	99.7	99.8	99.8	99.8
Number of employees	Total	10,177,797	11,530,908	11,975,672	12,041,387	12,036,330
	SMEs	7,659,010	9,677,648	10,385,020	10,474,630	10,415,383
	Ratio	75.3	83.9	86.7	87.0	86.5

Source: Korea National Statistical Office, Annual Report on the Business Statistics

1.2.2 Korean SME Policy Evaluation and Tasks Ahead

SME policy framework in Korea began with government's passive effort to protect SMEs from dominance of large enterprises. Today, however, SME policy paradigm has been shifted to produce a way to enhance growth potential for a national economy.

<Table 5.6> Transition of SME Policies in Korea

1960s: Created SME Policies
· Established a legal framework for assisting and fostering SMEs · Small and Medium Enterprise Cooperative Act('61), Set-aside Program ('65), framework Act on Small and Medium Enterprises ('66)

1970s - 1980s : Protected and fostering SMEs
· Fostered them as a player of supplying and producing parts with heavy chemical industry-driven policy in place · SME-exclusive industry system('75), Stable supply to large company system('80) · Created Credit Guarantee Fund('76), Small Business Corporation('79), Technology Credit Guarantee fund('89)

1990's: Pursued structural improvement of SMEs
· Shifted policy focus to autonomy, opening and competition with the inauguration of WTO (Jan.'95.) · Announced removal of SME-exclusive industry ('94), Reduced a set-aside for small business ('95) Enacted the Act on Supporting Structural improvement and managerial Stabilization of Small and Medium Business('95), Created Small and Medium Business Administration(SMBA)('96)

Financial Crisis - 2002: Fostered venture business, promoted start-up
· Established measure to complement weak areas such as Small and Women's business with focus on venture policy
· Opened KOSDAQ('96), Related the requirements of listing on KOSDAQ and provided tax benefits('98)
· Special Act on Venture Business('97), Small Business Act('97), Women's Business Act('99)

2003 -: Strengthen self-sustaining and innovation capacities through policy innovation
· Implement the strategy to secure competitiveness suitable for the innovation-driven economy through nine SME plans
· Comprehensive plan to enhance SME competitiveness('04.7), Plan to vitalize venture businesses('04.12), 12 tasks for policy innovation('5.1), Comprehensive plan for self-employers('05.5), Revision of policy finance('05.6)

Source: SME Innovation Forum(Feb.24, 06)

2. SME Innovation Policies

2.1 Overall Strategy

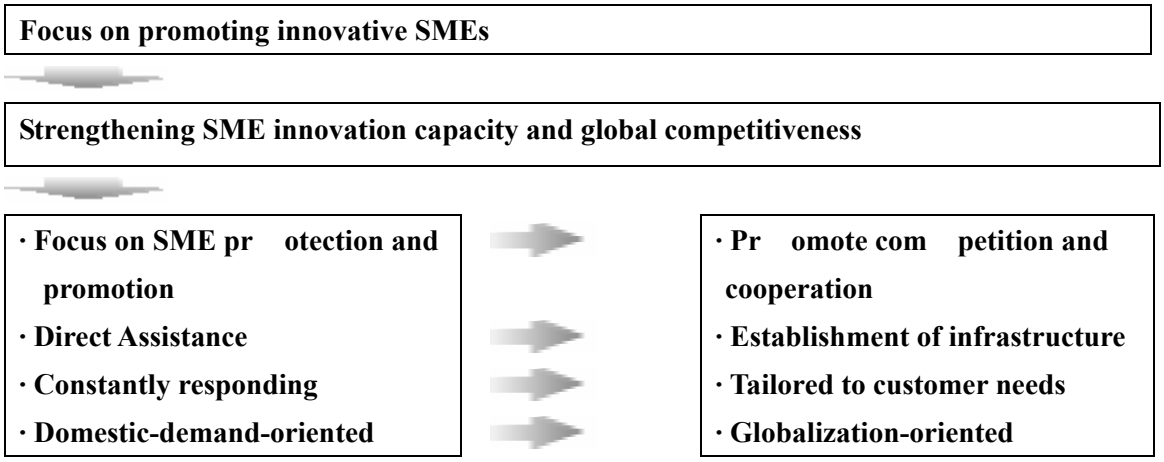
It is a current trend that productivity increase which uses technological innovation rather than investing labor and capital has become a new economic growth engine. Management environment is being shifted to *innovation-led economic structure*. As such, it is prevalent that a new strategy needs to be established and implemented to ensure that the SME sector should enhance its competitiveness[10].

Against this backdrop, there is an increasing demand to shift the focus of SME policies from protectionist policy of fostering SMEs to the policy of increasing SME competitiveness by promoting competition and enhancing technological and management innovation capacity.

In an effort to meet the expectations, the Korean government changed the SME policy trend to strengthen competitive edge, an effort to foster SMEs as economic growth base. The government was therefore able to establish a strategy that is more conducive to 2006 innovation-led economic structure.

[10] Source: Maeil Business Newspaper (2006), 'SMEs in Korea'

2.1.1. Innovative Policy Direction in Korea

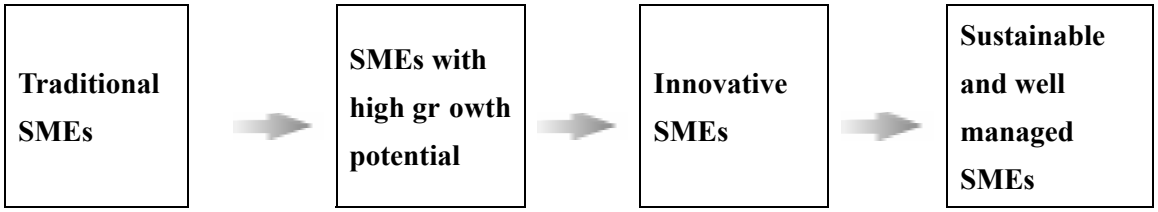


<Figure 5.1> SME Innovation Policy Direction

Source: Innovative SME Advisory Committee (2006)

The Korean government is trying to depart from its past policy framework formed in the era of factor costs and rather focus on enhancing vitality of small and venture business by strengthening innovation capacity and international competitiveness of SMEs. The shift of policy paradigm was made to promote voluntary competition and cooperation from the protectionist policy of fostering SMEs.

The government's SME developmental roadmap is designed to create an environment where all businesses including small firms and micro-enterprises are able to grow into innovative SMEs and the government seeks to make a shift in policy paradigm from the protectionist policy of fostering SMEs to the policy of promoting voluntary competition and cooperation. Thus, it continues to provide customized policy of setting differentiated policy objectives according to the demands and characteristics of SMEs. Focusing on indirect SME assistance such as establishing infrastructure and offering service and information rather than providing direct SME assistance, the government aims to lay the foundation for an innovative-friendly environment where SMEs can grow into innovative SMEs.



<Figure 5.2> Roadmap for SME Development Stages

Source: SMBA(2006), Visiting survey on Korean SMBA data.

As shown in <Table 5.6>, the Korean government provides specialized policies depending on growth stages and types of SMEs in a bid to create an environment where traditional SMEs can be developed into innovative SMEs.

2.2 Marketing Policy

Procurement of Government

Korean Small and Medium Business Administration (SMBA) requires public institutions to purchase SMEs' technological products that have been approved for performance by the government thereby promoting technology development of SMEs and public purchasing of SME products. Regarding the progress of the public purchasing system, in July 2005, the government introduced the system of recognizing the performance of technological products developed by SMEs and the performance insurance system. It also established the basis for exemption from liability for the purchasers of technological products. In Jan. 2006, the government also adopted the technological product purchase target system.

With regards to purchase target, the proportion of technological products that each public institution is required to buy out of SME products stood at 5% in 2006, but will be increased to 10% in 2010. To secure the effectiveness of this system, the level of accomplishment of a purchase target is reflected in evaluating the public institution concerned. In order to prevent technological products developed by SMEs from not being used through combined orders for construction projects issued by a public institution, the government increased the number of construction projects that are divided into lots in Jan. 2006.

Export Promotion

The Korean government has accomplished projects of trade missions, supporting overseas

private service centers and large and small firms' joint entry into overseas to promote export of SMEs.

In the project of supporting overseas private service center, 153 private consulting companies in major economies were designated as overseas service centers to help the SMEs advance into foreign markets. They are responsible for conducting market surveys on export and foreign investment, identifying partners, and providing consulting for projects such as establishment of a local legal entity. During 2001- 2005, the number of companies that received support recorded 752, achieving export worth $12.78 million.

The trade missions are dispatched to overseas niche markets in order to find product markets for SMEs and promote their export. Since 1998, trade and investment missions have been sent for associations for each industrial sector. SMBA has helped individual companies to participate in exhibitions since 2004 when the association does not take part.

Large and small firms' joint entry into overseas market program, which began in 2006, aims to enhance export competitiveness of SMEs. The purpose of program is to help small companies advance into overseas markets by using the experience and human network of large firms with high brand recognition at home and abroad. With respect to the contents of assistance, the government provides indirect costs for individual companies, while large firms cover the overhead costs incurred. Direct costs are borne by individual companies, such as airfare costs and the costs of stay.

2.3 HRD policy

Recruiting

In an effort to revitalize technological innovation activities, foster skilled technological personnel and create jobs, the promotion of SME R&D manpower recruiting project has been implemented. Through the promotion of SME R&D manpower recruiting project, SMBA assists with the establishment of university-industry cooperation offices and research institutes attached to business by enabling SMEs to utilize ample workforce and physical R&D resources of a university. In 2005, 164 university-industry cooperation offices were installed and 44 *university-industry collaborated research institutes attached to SMEs* were installed.

With respect to the achievements, for each university-industry cooperation office, an average of

4 students participated as researchers, putting the total number of students in R&D for the entire university-industry cooperation offices at 671. Out of 255 four-year students, 43% or 109 students found jobs at SMEs.

After a program was launched for *university-industry collaborated research institutes attached to SMEs* in 2005, the number of innovative SMEs has increased from 17 to 30. Moreover, 104 high skilled researchers were hired at SMEs as of April 2006.

Peculiar to Korea, the *Industrial Technician Selection* program was designed to relieve SME labor shortage problems. The program selects some of those who have obligation to do military service and instead sends them as industrial technicians to SMEs for production or manufacturing. Every year, the Korean SMBA supports SMEs to utilized 4,500 men.

Training

The SME Manpower Structure Upgrading Program aims to enhance productivity of SMEs and resolve their manpower shortages by training employees at SME associations in each sector and region through educational courses. Since 2005, this program involves the Federation of Small and Medium Business, which is in charge of general supervision, and its associations, which conduct this program after reflecting the needs of its member SMEs. 30% - 40% of the program costs are supported. With respect to achievements, during the 2005 business year, 20 associations have participated in 205 educational courses with the presence of 6,908 workers from 3,338 SMEs.

2.4 Technology policy

SME Technology Innovation Development Program

SMBA has accomplished the *SME Technology Innovation Development* Program to promote technological innovation of SMEs which have inherited R&D, to accumulate R&D capacity and enhance technological competitiveness by supporting some costs for developing new products.

SMBA undertakes the tasks in a year or three-year project. Within 100 to 300 million won, the central government supports 50% of the cost of technological development and local governments provide 25% of the cost. After conducting the SME technology innovation program, SMBA receives back 30% of its contribution as technology fees in installments for

five years.

Regarding the progress of this program, SMEs have bombarded SMBA with the requests for technological development due to their lack of finance and workforce in a rapidly changing technological environment. In response, SMBA secured a budget of 30 billion won for the first time in 1997, financing 666 SMEs. Until 2005, it has provided fund worth 735.5 billion won for 11,425 companies.

Industry-University - Research Institute Consortium

The government helps regional SMEs that have lack of innovation capacity to enhance their technology innovation and resolve technical problems by encouraging them to use excellent equipment and manpower in a research facility of university or research center. In case of the *Industry-University-Research institute consortium*, the central government provides 50% of the costs and local governments provide 25% of the costs for technology development for up to one year. The 2006 budget of the industry-university-research consortium program that started in 1993 is 42.6 billion won. This program resulted in 5,026 patent applications, 13,600 cases of trial product manufacturing, and 10,446 cases of process improvement during 1993-2004.

Exchange Assistance Program for SMEs between Different Industries

SMBA conducts the Exchange Assistance Program for SMEs between different industries. This program allows SMEs between different industries to exchange management and technology information, resolve technological problems, and increase SME competitiveness by undertaking new technological development and joint programs. To do this, SMBA provides various SME assistance programs: it helps SMEs in different businesses establish exchange programs; it dispatches experts on the exchange program to offer counseling and lecture services; it holds various seminars, symposiums and Exchange Plaza; and it provides support for international SME exchange programs among Korea, Japan and Chinese Taipei. Joint Technological Development Program for technology fusion is also sponsored by SMBA.

Korean Small Business Innovation Research (KOSBIR)

In an effort to offer government-wide support for SME technology innovation activities, the Korean government established the *Korea Small Business Innovation Research* (KOSBIR) Program and has conducted the program since 1998. In the KOSBIR, 16 agencies including 10 government agencies with massive R&D budgets and 6 government investment agencies provide more than 5 % of R&D budget to SMEs. Approximately 8,275 billion won were given

to assist SME technology innovation activities in 2005 and 1.13 trillion won of R&D budgets are scheduled to be given to SMEs in 2006.

2.5 Financing Policy

The Fund of Funds

The Korean government created the Fund of Funds to promote the establishment of investment funds for SMEs and venture businesses, thereby expanding the supply of investment in 2005. In 2005 Korea Venture Investment Corp was designated as the institution for operating the fund of funds and was beginning its business. Until 2009, the investment resources worth 1 trillion won will be created. So far, 385 billion won has been created, including 170 billion won in 2005 and 215 billion won in 2006.

With respect to its achievements, first, the fund of funds, as the seed money for investment funds in the private sector, has contributed to the promotion of venture capital market. Second, this fund seeks to accomplish public objectives and profitability, as professional fund managers operate it to reduce the risk of investment and the fund system gives priority for the associations that invest in the sectors where the possibility of market failure is high.

Debt Equity Financing

Debt equity financing is provided for SMEs in order to enhance their access to finance by resolving market failures and to foster innovative SMEs. After the financial crisis of late 1998, the government focused on promoting the start-up of venture businesses and enhancing their competitiveness by debt equity financing to vulnerable sectors such micro enterprises.

In July 2004, the government set up a comprehensive measure to strengthen competitiveness of SMEs to expand the provision of start-up fund, long-term facilities fund, and the fund for putting developed technologies to market that are difficult to be handled with in the private sector and to expand their credit loans. In 2005, measures to revamp debt equity financing for SMEs were mapped out that contained putting focus on innovative SMEs, seeking customer convenience through the simplification of procedures, producing more results and strengthening the post mortem.

The debt equity fund amounted to 3 trillion won in 2004, 3.16 trillion won in 2005, and 2.75

trillion won in 2006. A one-stop service of the debt equity financing, which does not require visiting loan guarantee institutions, has made the loan process quicker than before.

SME Loan Guarantee Program

Loan guarantees are provided to SMEs which have difficulty in financing by easing capital shortage and supporting business stability. The purpose of the loan guarantee service is as follows: first, the service evaluates the level of technology, its commercialization and marketability; second, it offers financial assistance; and third, it intends to foster and develop SMEs with excellent technology and promote technical financing. By combining technical evaluation with guarantee function, SMBA finances start-up or venture businesses that have excellent technologies but suffer from the lack of collateral and self-reliance.

The loan guarantee fund is managed by the *SME Credit Guarantee Fund* and the *Technology Guarantee Fund* created in 1976 and 1989, respectively. Meanwhile, the *Regional Credit Guarantee Foundation* was established in 1999 and is being operated in 16 cities and provinces nationwide.

Innovative SME Certification

Innovative SMEs made its debut in the early 1980s and was rapidly growing in the 1990s. There are three types of innovative SMEs. First, it is so-called adventurous and challenging *venture businesses*. The venture businesses are expected to bring high profit and high risk as venture capital investments increase. Second type of SMEs is *Innovation businesses* (Inno-biz), which offer high growth potential and are able to secure technology competitiveness through technology innovation. Third type of SMEs is management innovation-driven SMEs, which currently carry out management innovation-related activities or have made innovative achievement after implementing management innovation activities within the past three years[11].

Once a business is certified as innovative SMEs(either a venture business or inno-biz business), the standard of issued capital is reduced to over 5 million won from over 50 million won. In case of venture businesses, the number of employees of incorporated companies can increase up

[11] OECD only stipulated technology innovation in the first edition of Oslo Manual ('92) but it added management innovation after recognizing interrelationship between the importance of non-technological innovation and technological innovation. Technological innovation emphasizes on production and process innovation, while management innovation stresses marketing and organization innovation.

to 300 from 50, which actively promotes start-ups and venture management. There is exception to commercial law when people invest in commercial property in venture businesses. In such a case, an agency specialized technology evaluation is able to evaluate a company's technology value. The government also provides benefits to SMEs, in which venture businesses have priority to apply for a patent, and additional scores are added to them. When listed on the KOSDAQ, special benefits are given to the listed companies in the screening process for listing.

In addition, for venture employees who receive the stock option can have tax benefits. The government allows professors or researchers to begin venture businesses or to take leave of absence for a certain period to work for start-ups[12]. Thus, current venture-friendly business environment enables them to have dual jobs as being CEOs or employees of venture businesses.

In particular, technology innovative SMEs(inno-biz companies) can have benefits based on venture business standard and they are able to take part in various technology development support projects on preferential basis. The government also provides self- strengthening innovation program, which consists of the *technology innovation small group assistance* and the *SMEs counseling designating one professor for one company*. The *Product priority purchasing system for new technology development* is being used to secure market of inno-biz products.

2.6 Management Innovation policy

SME Consulting Program

The SME consulting service started in 1999. In 2005, SMBA has developed a consulting service to the *Coupon-based SME Consulting Service* program, a radical change from the previous ones by introducing the voucher system, digitalizing the application processes in the website, and operating the evaluation committee. This Coupon-based Consulting Service program through management consulting of SMEs is the outsourcing strategy to counsel SMEs to resolve bottleneck inherited in the company with major management innovation activities.

The Coupon-based Consulting Service program has a special feature in not only transforming the conventional consulting program but also contributing to fostering the consulting industry. Moreover, SMBA has implemented establishing a code of ethics for prohibition of moral

[12] Note: Staff of national universities in Korea is considered as public servants. Although the government prohibits a civil servant from being an employee of a company at the same time, there is an exception that employees of innovative SMEs are allowed to hold dual jobs.

hazards and consulting quality for SMEs, the consultants training program for quality and capacity of consultants, and evaluation of consulting. In addition, SMBA has conducted a survey on the actual condition of consulting companies and a survey on the satisfaction of SMEs as consumers of policy.

Customized Policy Information System

Korea has a customized policy information system or SPi-1357 system that combines online portal site and a call center for troubleshooting. The portal site (www.spi.go.kr) is the gateway to provide policy information in real time in 9 areas, such as finance, manpower and technology by integrating 7,200 kinds of information held by 232 SME support agencies. An offline comprehensive counseling system for SMEs through toll-free number of 1357, the specialists in each areas of SMBA answer the questions and queries of SME and counsel the bottleneck of business for SMEs. Through the commercial complex analysis system integrated with the public purchasing information network, the SPi system is not only a guider for new SME starters and potential SME founders but also reduce an unnecessary excessive competition within each sectors and areas in ex ante.

Since Jan. 2006, SMBA began the trial operation until June and in July, it began to provide the full-fledged services. With respect to the amount spent to operate the system, the customized policy information system cost 1.89 billion won in its establishment and operation for 2006, and the call center cost 500 million won. In 2007, 3.5 billion won will be allocated to upgrade the system.

e-Business

The SMBA also helps SMEs enhance their productivity through digitalization, Digitalization measures include the assessment of the SME digitalization level, provision of comprehensive consulting for innovative digitalization and the digitalization of production facilities of SMEs. In the projects to help SMEs to encourage the digitalization, there are *the SME Production Digitalization Project*, *Total Information Management Providers (TIMPs)*, and *Cluster for Digitalization Innovation project*. *The Cluster for Digitalization Innovation Project*, supported by SMBA, is designed to establish a broadband Internet infrastructure and internal network in an effect to lay the foundation for digitalization in the cluster. The main propose of the project is to accelerate the digitalization of SMEs in economically poor areas.

2.7 Clustering and Networking Policy

Business Incubator

The Korean government has implemented the establishment of Business Incubators (BIs) to raise the start-up success rate. The beneficiary of this program would be entrepreneurs of start-up companies and new or potential SME starters. This program has provided for SMEs with business spaces for 2 to 3 years in the Business Incubators, management, technology, or marketing counseling services, and bridging financing.

The SMBA assists with the establishment of business incubators (BI), the driving engine for starting a new technology company in a region and creating jobs, in order to develop the local economy and achieve a balanced growth by enhancing the success rate of start-up.

In 1992, Small Business Corporation extended loans to BI centers. In 1998, the program began to be funded by the government, which bore some costs for establishing BI centers at university, national and public research institutions. In 1999, the government increased the number of BI centers to create jobs and resolve unemployment. As of June 2006, there are 268 BI centers, which accommodate 4,287 companies, and 4,255 companies graduated from BI centers.

The SMBA provided government grants in terms of their operational costs, and the expansion of their facilities to support self-reliant BIs financially. The operational costs are spent to strengthen services for consulting, patent application, and technology and design development. According to evaluation grade, which ranges from S to C, from operating system, success rate of commercialization for incubating start-ups, BI centers are provided differentiated amount of government grants to cover their operational costs. In terms of facility expansion costs, BIs are chosen by an evaluation committee, taking into consideration the size of correspondent investment by the BIs or more than 50% of cost by the benefit principle. Regarding the achievements of the BI program, if BI centers obtain the poor achievement, the centers would be excluded in the list of beneficiary for the next financial season based on the evaluation.

3. Overall assessment

Strength

SMBA, as a strong policy executor, is responsible for both establishing and implementing SME support policy. The Korean government has also introduced certification systems of innovative SMEs and it provides benefits to certified SMEs when they participate in government support programs. Generally, the government takes the lead in creating an environment for promoting SMEs and implement SME support policies. *Venture business certification*, introduced in an effort to overcome the 1997 financial crisis, *technology innovation certification in 2001* and *management innovation certification* in 2006 are government-issued certification systems that are being implemented. In particular, a master plan for developing SMEs into innovative SMEs has been introduced and it has been implemented since 2006.

The Korean government has focused on the institutional establishment of a SME-friendly environment to enhance SME competitiveness. For instance, Korea has established and operating the SPi-1357 system, aiming at delivering integrated information about government support policies to SMEs which have less capability of collecting information.

With the development of Korean e-business, the government has established the online system from the application to ex-post monitoring and provided information about support programs. It has also introduced the ex-post monitoring system, which conducts systematic analysis for performance evaluation after program implementation and is then reflected in the next year program.

Weakness

Starting 2000, the Korean SME policy focus has been shifted to strengthen competitiveness and build innovative capacity from protectionist policy. But the government is still pushing for a strong SME protectionist policy compared with other advanced economies such as Australia and Canada. Such SME protectionist policy may have a negative impact on Free Trade Agreement and bilateral agreements in the future and pose a problem for SMEs to enhance self-sustaining capacity. Given that Korean local governments have a relatively short history and SME policies are less developed in comparison with other advanced economies, it is strongly recommended that both the local governments and the regional offices of SMBA play their roles to strengthen the SME innovation.

In 2005, in particular, a master plan for developing SMEs into innovative SMEs was introduced, and it has been carried out since 2006. To effectively implement the plan, the government has to build an effective evaluation system that conducts systematic analysis for performance evaluation and is reflected in policy implementation. Overall, government focus should be on a qualitative goal and creating an environment or system for SMEs so that they can achieve a policy goal, rather than focusing on a quantitative goal or timetable for SME support system.

Recently, the government has conducted a pilot test when implementing policies. Through the pilot test, a systematic approach is required to bring major improvements and conduct the pilot test nationwide. For a way to implement the pilot test, the government needs to introduce it in small town areas and to gradually expand it so that the Korean government makes the best use of it nationwide when undertaking SME support programs.

Aside from Australia, it is rare to see SMEs can make a comeback from bankruptcy. It is because business starters or CEOs are forced to guarantee loans with personal assets upon loan requests by SMEs, a company bankruptcy directly leads to CEO's personal assets in bankruptcy. Such cultural and environmental factors are the main reasons that have prevented SMEs from restarting new businesses. Therefore, it is highly recommended that the government come up with a supplementary approach to solve the institutional problem to SMEs.

Reference

Maeil Business Newspaper, 2006, SMEs in Korea.

Ministry of Information and Communication, 2006, Leaping towards Global IT Power Korea.

Ministry of Information and Communication, 2006, Beginning of the Year Report: Advance into Global IT Power Korea.

Ministry of Commerce, Industry and Energy & Federation of Korean Industries (FKI), 2006, 2015 Industry Development Vision and Strategy.

Ministry of Commerce, Industry and Energy, 2006, 2005 Industry and Energy White Paper.

Ministry of Commerce, Industry and Energy, 2006, 2006 Beginning of the Year Plan for Prosperous Korea: Going into Semi-Final of Global Industry and Quarter Final of Global Trade.

Ministry of Commerce, Industry and Energy, 2001, 2010 Vision and Strategy: to Reach Semi-Final of Global Industry.

SMBA and TIPA, 2006, Economic Impacts of Innovative SMEs and Effective Promotion Strategies.

Innovative SME Advisory Committee, 2006, Policy and Strategy to Promote 30,000 Innovative SMEs.

SMBA, 2005, 2006 First Annual Report on SMEs.

Korea National Statistical Office, Statistics Information System, GDP, Economically Active Population, Source: http;//kosis.nso.go.kr.

SMBA, 2006, Questionnaire of survey, A Research on the Innovation Promoting Policy for SMEs in APEC: Survey and Case studies.

Appendix 5: Summarized Policies in Korea

Policy Categories	Element	Detailed Program	Contents	Note
Marketing	Public purchasing	Public purchasing program of SME technology products	Purchase target of SME technology development products 5%(2006)→ 10%(2010)	SMBA
	Export	Trade missions program	Trade mission groups are dispatched to overseas in order to promote SME export	SMBA
		Private Overseas Support Center	153 private overseas support centers to conduct market research, find partners and provide consulting services for overseas company establishment	SMBA
		Joint global market program for SMEs & large companies	The government and larger companies support SMEs to advance into the global market	
HRD	Recruiting	Industrial Technician Selection Program	Select men for SMEs instead of serving their military service(4500 people a year)	SMBA
		Policy of supplementing SME R&D workforce	Utilize workforce and physical R&D resources in universities and recruit SME R&D manpower	SMBA
	Training	SME workforce improvement program	Associations providing an integrated package service for SME workforce improvement	SMBA

Technology	R&D Grant	SME Technology Innovation Development	Providing government grants for SMEs' new technology development (75%)	SMBA
		KOSBIR program	Allot SMEs more than 5% of R&D budgets of 16 public agencies	
	R&D Tax Treatment	Corporate tax reduction	10% tax reduction of R&D costs for SMEs	SME focused
	Technological Cooperation	Promote cooperation between industry-university –research and SMEs	Promote joint cooperation program for industry-university –research and SMEs	SMBA
		Programs for promoting SME exchange and cooperation in different fields	Promote exchange and cooperation between SMEs in different fields	SMBA
Financing	Equity Financing	Financing and managing fund-of-funds	Created fund-of-funds to promote the establishment of investment funds for SMEs and venture businesses, thereby expanding the supply of investment (170 billion won in 2005)	Korea Venture Investment(Corp.)
	Loan	Government direct loan for SME innovation	policy loans to SMEs	SMBA Small and Business Corporation
	Guarantee	Loan guarantee program	Loan guarantees to SMEs having difficulty in financing and building technology capacity	Credit Guarantee Fund, Technology Guarantee Fund, Local Credit Guarantee Foundation
	Certification	Innovative SME Certification	Government-issued certifications for innovative SMEs (Certification for venture business, Inno-biz and management innovative companies)	SMBA
Management Innovation	Awareness	SPi 1357	Comprehensive policy information about SME support policy, which provides an online policy information portal and a call center for consulting	SMBA
	Consulting	SME Coupon Consulting Service program	e-coupon service for consulting fees for SMEs	SMBA
	e-business	Promote the cluster for Digitalization Innovation	Support the establishment of internet infrastructure and internal network so that SMEs in economically poor areas can build the innovation cluster	SMBA
Clustering and Networking	Incubator center	Incubator centers	Operate 268 incubator centers	SMBA

Chapter 6: Malaysia

1. Economic and Industrial Structure and SME Position

1.1 General Economic Characteristics

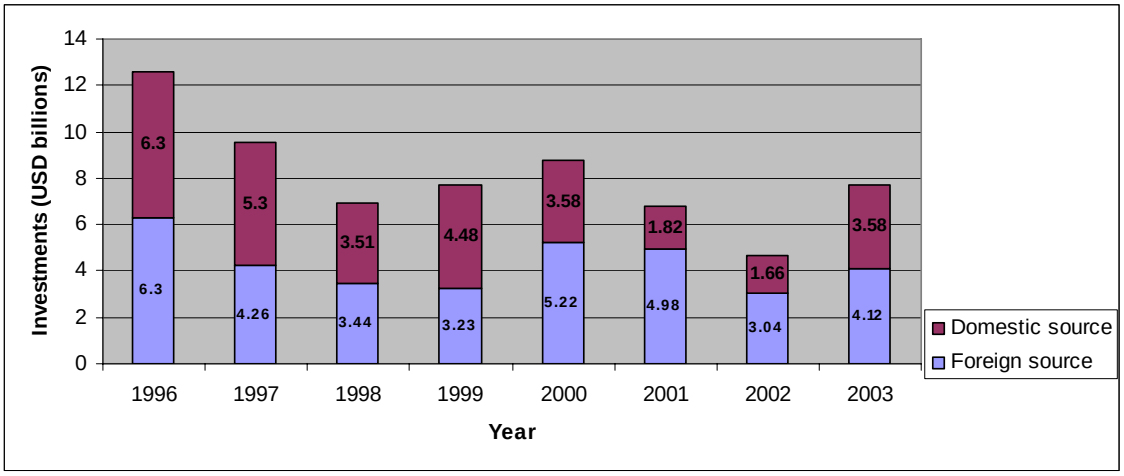
Malaysia was a resource-based economy after independence in 1957, depending on natural resources and exploitation of the land. However, the government pursued two distinct strategies for the transition into the industrialized economy; first, the import substitution industrialization during the 1960s and second, the export-oriented strategy during the 1970s and 80s. The growth and structural transformation of the economy over the last three decades has occurred within the framework of a liberal trade and investment regime as well as the extensive use of so-called functional and selective industrial policies. The overall approach to industrial development is anticipated to continue, but a shift towards more market-based policies is apparent in the industrial policy adjustments introduced since the late 1980s.

The recession of the mid-1980s, in particular, awakened the urgent need to re-evaluate and redefine existing development strategies and policies. The effect was a broad shift from a relatively diffused policy approach to a more comprehensive and integrated strategy to foster industrial dynamism. The state decided not to be directly engaged in production and the private sector was instead assigned to undertake the critical role in industrial development. Therefore, this phase of industrial restructuring witnessed the introduction of several new policy initiatives to redress fundamental weaknesses within the industrial sector, foster structural dynamism, and promote new sources of growth through a more focused and integrated approach to policy interventions.

What is more, Malaysia's economy has always been open and highly internationalized. For more than four decades its economic growth has been sustained through an open global trading environment[13]. In particular, Malaysia strives to sustain itself as an attractive investment location for FDI, adopting a liberal investment regime. As Malaysia further liberalizes its investment regime, in keeping up with market changes and investors needs, it continues to receive a sizeable inflow of FDI into selected sectors. As a result, inward FDI was US$ 4.12 billion and domestic investment was US$ 3.58 billion in 2003 (see Figure 6.1).

[13] Malaysia recorded a total trade of USD213.67 billion in 2004, exporting USD 126.32 billion, more than double the size of its GDP, to pose the rank of the 19th largest exporter and 18th largest importer in the world (10th largest single exporter to the US).

During the last decade (1996-2005), in terms of GDP, overall real GDP growth averaged 5.2 % while that of manufacturing was 4.9 % although the target set for the second Industrial master Plan (IMP2) was 9.5 %. However, the growth in the Malaysian economy continued to be driven by the manufacturing sector until 2005, when it was overtaken by growth in the services sector of 6.5 %. The share contribution of the manufacturing sector to the Malaysian economy targeted at 38.4 % by 2005 in the IMP2 ended at 31.4 % instead. The service sector expanded from a targeted share of 48.4 % in 2005 to realized share of 58.1 %.



<Figure 6.1> Total Investments in Malaysia (1998 – 2003)

Source: Malaysian Industrial Development Authority

<Table 6.1> Performance of the Malaysia Economy, 1996-2005

Sectors	IMP2 Target	Actual Growth Rate (%)			
	Average Annual Growth (%)	1996	2000	2005	Average Annual Growth (%)
Manufacturing	9.5	18.2	18.8	4.9	4.9
Services	8.8	8.9	6.7	6.5	5.6
Agriculture	2.6	4.5	6.1	2.1	2.1
Mining	1.9	2.9	0.8	0.8	2.5
Construction	8.5	16.2	0.6	-1.6	-2.1
Real GDP	**7.9 10**	**.0**	**8.9**	**5.3**	**5.2**

Source: SMIDEC 2006: 10

<Table 6.2> Share of GDP by Sector

Sectors	IMP2 Target (%)	Actual		
		1996 2000		2005
Manufacturing	38.4	29.1	31.9	31.4
Services	48.4	51.2	53.8	58.1
Agriculture	8.2	10.8	8.9	8.2
Mining	4.2	8.2	7.3	6.7
Construction	4.7	4.4	3.3	2.7

Source: SMIDEC 2006: 10

1.2 SMEs in the Malaysian Economy

A Census on Establishment undertaken by the Department of Statistics in 2005 was intended to provide an enumeration of the total number of enterprises in the key economic sectors. SMEs in the key sectors have been defined according to annual sales turnover or number of full-time employee. The definition of SMEs in Malaysia falls into two broad categories.

<Table 6.3> Definition of SMEs by Sales Turnover and Full-time Employment

	Manufacturing and Manufacturing-related Services	Services Sector including ICT and Primary Agriculture
Micro	Less than RM 250,000/ less than 5 employee	Less than RM 200,000/ Less than 5 employee
Small	Between RM 250,000 and RM 10 million/ Between 5 and 50 employee	Between RM 200,000 and RM 1 million/ Between 5 and 19 employee
Medium	Between RM 10 million and RM 25 million/ Between 51 and 150 employee	Between RM 1 million and RM 5 million/ Between 20 and 50 employee

Source: SMIDEC 2006

SMEs in Malaysia are a major driver for economic development since the 1997 economic crisis. Most of registered firms are composed of SMEs, accounting for 98.8 % or 516,855 of all enterprises enumerated. In terms of number of SMEs by sector, the share of the number of the manufacturing sector is very low, accounting only for 7.5%, while the service sector accounts for 86.3% in 2003. Nonetheless, the contribution of manufacturing SMEs to the Malaysian economy is significant. For example, the share of manufacturing SMEs in total output was 29.6% in 2005. Moreover, the contribution of manufacturing SMEs to economic development increased significantly during last decade. Manufacturing SMEs accounted for 22.1% in total output, 19.5% in value-added and 29.6% in employment in 1996. By 2005, these shares have increased to 29.6%, 25.9% and 31.1%, respectively. This implies an annual average growth of 5.3% in output, 5.7% in value-added and 2% in employment between 1996 and 2005.

<Table 6.4> Status of SMEs Classified by Economic Activity (2003)

	Establishment (No.)	SMEs (No.)	% of SMEs	% of Structure
Manufacturing	39,219	37,866	96.6	7.5
Services	451,516	449,004	99.4	86.3
Agriculture	32,397	29,985	92.6	6.2
Total	**523,132 51**	**6,855**	**98.8**	**100**

Source: SMIDEC 2006

<Table 6.5> Changes in the Contribution of SMEs, 1996 and 2005

Indicators		***1996***	***2005***
Total output	Value (RM billion)	51.5	82.0
	% of manufacturing sector	22.1	29.6
	Average growth rage (1996-2005)		5.3
Added value	Value (RM billion)	10.1	16.6
	% of manufacturing sector	19.5	25.9
	Average growth rage (1996-2005)		5.6
Employment	Number	329,848	394,670
	% of manufacturing sector	29.6	31.1
	Average growth rage (1996-2005)		2.0

Source: SMIDEC 2006

2. SME Innovation Policies

2.1 Overview of SME innovation policies

Along with the 1997/98 financial crisis, the government put greater efforts into strengthening the performance of SMEs by initiating many programs and incentives during the second Industrial Master Plan (IMP2) and the Eighth Malaysia Plan 2001-2005 (8MP). The modernization and strengthening of the SMEs sector were seen as a means to encourage domestic investment and also to provide the critical linkage in the development of broad-based globally competitive industrial sector. The government envisioned the transformation of SMEs from being labor- intensive enterprises to those based on capital, knowledge and technology. In the process, the capabilities of these enterprises are strengthened to enable them to scale up the value-chain form OEM to own-design and ultimately own-brand manufacturing (OBM).

The IMP2 including the 7 and 8MP addressed several issues such as; access to markets; increasing technology capabilities; enhancing the adoption of ICT; and increasing access to finance among other programs (MITI 1996). During the 7MP (1996-2000) period, several programs were implemented covering a wide spectrum of SME needs. The plan accorded a

critical role to SMEs in supporting the national industrialization effort through foreign linkages across the manufacturing sector. During the 8MP, the majority of SMEs did not have the technological capability to improve production efficiency and product quality. The government, therefore, undertook strong supports in the development of resilient SMEs during the period of this plan, especially in sectors with high growth and export potential (Saleh and Ndubisi, 2006).

Toward this end, the government established the National SME Development Council (NSDC) in 2002. Reflecting the highest commitment given to the development of SMEs, the NSDC is chaired by the Prime Minister. SME development programs are currently administered through 12 ministries and 38 agencies. As the highest policy making institution on the development of SMEs, the NSDC aims to strengthen inter-ministry and inter-agency cooperation, coordination and implementation of policies and programs. In particular, SMIDEC (Small and Medium Industries Development Corporation) has played a critical role in coordinating and implementing SME policies. SMIDEC embarked on an aggressive campaign to promote the development of the SMEs sector by intensifying outreach effort to advisory services, infrastructure facilities, market access, and many other supporting programs.

The year 2005 marked the end of the IMP2, 8MP and the SMEs Development Plan (2001-2005) period. The last decade was a significant time for the development SMEs as their contribution to economic activities, especially manufacturing sector was increasingly recognized. Since 2006 the 9MP(2006-2010) and the IMP3 (2006-2020) has been initiated. During these periods, SMEs in the service sector related to manufacturing will be targeted as the major contributor to economic growth.

2.2 Marketing Policy

Export promotion

The government is committed to facilitate the entry of enterprises into the export markets. In this regard, the MATRADE (Malaysian External Trade Development Corporation) stimulates the participation of SMEs in trade fairs by financing their participation cost. SMEs are granted by participating in trade events. The *Market Development Grant* (MDG) managed by MATRADE assists SMEs by defraying expenses incurred in developing market overseas (such as travel costs, fees for booths and costs of printing brochures) and expenses incurred in setting up sales promotion office overseas. Over the years, it has become popular in attracting a large number of participants.

Integration of SMEs into the global supply chain of MNC

The 8th Malaysia Plan emphasized the marketing of SMEs by integrating SMEs into the global supply chain of MNCs. It has been implemented by introducing the *Global Supplier Program* (GSP) and the *Industrial Linkage Program* (ILP) as good practices.

The GSP, which involved a strategic partnership among the SMEs, MNCs and training institutions, was aimed at strengthening the capability of SMEs as global suppliers. It focuses on a skills development/ training program to enhance knowledge and capabilities of SMEs into world-class suppliers of services and products (Economic Report, 2003). In short, the program targets that SMEs will develop the capacity to supply parts for MNCs in the world market as well as in the domestic market. Nonetheless, this does not mean the guarantee of a business contract between MNCs and SMEs, since it should depend on the actual performance of SMEs. The main difference of GSP training program from the other training program is placed on that training program under GSP is all organized by MNCs participating in GSP. In other words, it enables SMEs to integrate into the supply chains of MNCs by upgrading workforce capabilities to meet the requirement of MNCs (Junichi Mori, 2005). It also provides core competencies to ensure quality and productivity to meet MNCs entry requirements.

In addition, the 8MP clearly mentioned that the GSP was inside the ILP. The main purpose of the ILP initiated by SMIDEC in 1997 is to develop the capabilities of SMEs to meet the requirement of MNCs and LEs. Through this linkage, Malaysian SMEs become an integral part of the MNCs supply chain, thereby increasing the domestic content of foreign investment. The concept of ILP is synchronized with the GSP and they are complementary. While the GSP provides opportunities of training and business linkage with MNCs for local SMEs, the ILP allows tax incentives for both MNCs and SMEs at the national level. In the ILP, qualified SMEs will be eligible for a pioneer status with 100 percent tax exemption on statutory income for five years. MNCs that participate in the ILP will be allowed to deduct the expenditure incurred in i) the training of employees, ii) product development, and iii) testing and factory auditing to ensure the quality of vendors' products from the computation of income tax.

SMIDEC Annual Showcase (SMIDEX)

Another useful means of improving market access includes the *SMIDEC Annual Showcase* or SMIDEX. This event is aimed at providing opportunities for SMEs to exhibit their goods or demonstrate their capabilities to potential customers. Activities include an exhibition, business matching sessions and a technical seminar. Thus SMEs are able to forge closer linkages with

MNCs and LEs.

2.3 Human Resource Development Policy

Training program

The Human Resources Development Act was passed in Parliament in 1992 and enforced in January 1993. The Act led to the establishment of the *Human Resource Development Fund* (HRDF*)* administered by the Human Resources Development Council (HRDC). In line with the corporatization, the HRDC is now known as Pembangunan Sumber Manusia Berhad (PSMB). Continuous retraining and skills upgrading of workforce are implemented through a grant system.

PSMB had given special emphasis on retraining and upgrading the skills of their workforce. Towards this end, PSMB had established the *SME Unit* in 2000. The activities undertaken by the unit among others include:

- Advisory Services / Consultative Visits: PSMB sent letters of advice to SME employers to encourage the utilization of levy contributions. Visits were also carried out to advise the employers on the training assistance.

- HRD Talk Series and Seminars for SME Employers: PSMB had organized a series of HRD Talks to enlighten SMEs' employers on the importance of training and retraining.

- HRDF Workshops for SMEs: This workshops aim to create awareness among SMEs on the procedures for the application of training grants and submission of claims.

In addition, the *SBL-Khas training scheme* was implemented by PSMB in 2001 to assist employers including SMEs who were active in their training activities but facing cash flow difficulties and thus, unable to pay training costs upfront. Under the scheme, employers do not have to pay training fees upfront to training providers or may only need to pay a small percentage of the training fees, depending on the type of skills. Training fees incurred will be paid directly by PSMB to the training providers. The training programs that are eligible to be offered under this scheme are public programs and in-house programs conducted by training providers who are registered with PSMB.

2.4 Technology Policy

Technology policies for SMEs' technology innovation are mainly developed for grant and technological advisory programs under the framework of the 2nd National Science and Technology Policy. The policy aims to increase the national capability and capacity for R&D and technology development and acquisition. It also encourages partnerships between public-funded organizations and industry as well as between local and foreign enterprises for the co-development of technologies with a view to increasing indigenous technology capability (MOSTE 2003). In this regard, the government is committed to encourage Malaysian SMEs' technology innovation by undertaking R&D and product development activities.

The government has allowed *R&D grants* to encourage innovation through R&D via many channels. The government approved RM925.9 million under various specific purpose schemes. In particular, greater emphasis is placed on the *Intensified Research in Priority Area* (IRPA), accounting for 70.2% of total R&D grant, which supports applied, strategic and prioritized research SMEs that has great potential for commercialization with the realignment. However, the disbursed rate of most R&D grants is less than 100%. In particular, the disbursed rate of the IRPA accounts only for 65.5%. It is likely to be resulted from the R&D grant system based on the reimbursement of uncompleted or low quality research output. It has led to the relatively low application rate for R&D grants, but at the same time would lead SMEs to keep back from moral hazard.

<Table 6.6> Grant Allocation for R&D during 8MP

Name of Grants	Amount approved (RM million)	Amount disbursed (RM million)
Commercialization of R&D Fund (CRDF)	18.3	n.a.
Technology Acquisition Fund (TAF)	21.3	37.7
Intensified Research in Priority Area (IRPA)	650.4	426.9
Industry R&D Grant Scheme (IGS)	98.6	102.5
MSC R&D Grant Scheme (MGS)	57.2	43.5
Demonstrator Applications Grant Scheme (DAGS)	80.1	41.7
Total	925.9	n.a.

Source: compiled from SMIDEC, 2006

Apart from dedicated assistance for SMEs to upgrade their production processes, SMEs could apply for the *Technology Acquisition Fund* (TAF). It provides assistance for SMEs to acquire high-tech equipment and machinery, technology licensing as well as patent rights, prototypes

and designs that can facilitate technology transfer. The TAF is managed by the Malaysian Technology Development Corporation (MTDC) and provides a matching grant of up to 70 % or a maximum of RM2 million. So far, 47 SMEs have accessed the scheme worth a total value of RM37.7 million.

Another way in which the government supports SMEs' technology innovation is delivered by technical advisory service through the *SME Experts Advisory Panel* (SEAP). At 2006, 35 experts have registered under this program, whereby the experts provided advice on-site to improve efficiency and productivity of SMEs. The areas of expertise include technology improvement, international standards, productivity improvement, automation, maintenance, machinery equipment, materials technology, process improvement and ICT. The objective of this program is to enhance SMEs' technological capabilities by undertaking diagnostic audit SMEs and providing on-site assistance and transferring technology as well as technical know-how to SMEs.

2.5 Financing Policy

Soft Loan for SMEs

The *soft loan scheme* is one of the main ways which provide financing assistance for existing as well as new start-up enterprises. The general soft loan scheme approved a total of RM78.58 million to 127 SMEs in 2005 compared with RM23.65 million to 47 applicants in 2004. This marked more than threefold increase in the value of loans approved. In particular, it has played an important role in assisting the factory relocation of SMEs. SMEs operating at non-designed industrial sites are hampered from gaining access to institutional credits, government assistance programs as well as limited capacity to expand. The Soft Loan Scheme provides assistance for SMEs to relocate their premises to designated site. To this end, the *Soft Loan for Factory Relocation* is introduced. It will enable SMEs to acquire assets that will enhance their capabilities and obtain other financial assistance. More specifically, it is provided to fund the purchase of ready-factories, the purchase of factory lot and construction of factories including related infrastructure and costs to purchase related machinery and equipment due to relocation.

Venture Capital Fund

Unlike soft loan programs, only two venture capital funds were established in 2000. The objective of the venture capital funds is to encourage the development of new technology

industries as the engine of economic growth, and the targeted sectors of the funds include information and communications technology, advanced manufacturing and life sciences. Since its launch in June 2000 to end-March 2006, a total of 80 applications have been approved, amounting to RM267.5 million. 86% of the amount approved or RM230.1 million have been disbursed into 79 invested enterprises.

SMEs Bank

Reflecting the government's commitment to nurture and develop the SME sector, two development finance institutions, namely Bank Pembangunan Industri Malaysia Berhad (BPIMB) and Bank Industri & Teknologi Malaysia Berhad (BITMB) was merged in 2005 to form the *SMEs Bank.* The SMEs Bank is tasked with nurturing and developing SMEs through the provision of financial and non-financial services including the creation of an entrepreneurial community. The SMEs Bank will also provide guarantees to loans granted by banking institutions, facilitate securitization, and provide credit ratings and business analysis on SMEs.

Memoranda of Understanding (MoUs)

Given the large number of SMEs in the economy, grants alone will not be sufficient to meet their financing needs. Accordingly, SMIDEC has signed *Memoranda of Understanding* (MoUs) with commercial banks to ensure available funding for its assistance schemes. In 2005, MoUs were signed between Bank Islam Malaysia Berhad and Bank Muamalat Malaysia Berhad to provide financing to SMEs. Under these arrangements, SMIDEC's role is to provide referrals on existing SMEs under its various entrepreneur development programs.

2.6 Management Innovation Policy

Information Provision System

SMIDEC has focused the applications development to provide a platform for SMEs to easily access the information related to their development as well as submitting their application for SMIDEC's financial assistance schemes on-line. A comprehensive database system that is able to gather and capture information pertaining to SMEs has also been developed. The *MITI and Agencies and Trade and Industries Exchange* (MATRIIX) Project Phase I and II include SME Info Centre, on-line application module, virtual business matching module, small and medium

industries information system, electronic document management system, and geographical information system.

E-business

In the new business model, it has become critical for SMEs to access markets through undertaking e-commerce. SMIDEC's *Grant for RosettaNet Standard Implementation* was introduced in 2003 with an allocation of RM5 million to enable SMEs to participate in the supply chain of the MNCs or LEs. The scheme provides assistance to local SMEs to implement an internet-based common messaging standard for global supply chain management. It enables enterprises in the supply chain to communicate and conduct business electronically through common codes for sourcing of parts and components. Benefits accruing from the adoption of RosettaNet include the elimination of errors in data entry, reduction of cycle time and inventory costs thereby shortening the time to market and lowering transactions costs.

In addition, there is a scheme which provides assistance in the form of soft loans for SMEs to utilize ICT to improve the competitiveness, efficiency and productivity of SMEs. SMEs supplying parts and components in the production process of MNCs and LEs need to rapidly develop their ICT capabilities to participate in their supply chain. The government launched *Soft Loan Scheme for ICT Adoption* to assist SMEs in manufacturing activities to upgrade their engineering design capabilities and acquire Enterprise Resource Planning (ERP) software. SMEs providing services also have recourse to this loan facility to acquire relevant software. This facility is not to be used for refinancing of existing loans.

2.7 Clustering and Networking Policy

Business Incubation Program

The status of BIs in Malaysia is focused on selected high-tech sectors, which include ICT, advanced materials, aerospace, BT and other environmentally sound technologies (Lakshminarayanan, 2004). BIs have been mainly located in universities, R&D institutes and in technology parks. There are a number of business incubation models being undergone in Malaysia. Firstly, BIs established in *Technology Park Malaysia (TPM)*[14] are for individuals and start-ups expanding from prototype or preproduction. There are 3 BIs in the TPM. The second

[14] Technology Park Malaysia (TPM) was the first science park established in 1988 by MOSTE.

BI model could be found in the *technology development clusters (TDCs) program* promoted by Malaysian Technology Development Corporation (MTDC). TDC is an incubation center established within university to allow companies within specific industries such as BT and multimedia to operate in close collaboration with lecturers and scientists. It also strengthens linkage between universities and industry. Four BIs under TDCs program are located in four different universities[15]. The third model is a *Multimedia Super Corridor (MSC) incubator.* It is another initiative of the MTDC to support budding entrepreneurs, SMEs and start-ups to become successful IT and multimedia enterprises. It is located within the multimedia university campus. Finally, SIRIM Berhad has established the *One Stop Techno Business Incubator Center*. It serves as a hub incubator to all other incubator activities within and outside SIRIM. However, the performance data is yet to be built up since most BIs in Malaysia are at the infancy stage like Thailand.

3. Overall Assessment

Strength

Malaysian economic environments surrounding SMEs have several strengths in promoting SMEs innovation activities: 1) institutional restructuring, 2) industrial linkage for marketing, and 3) grants and funds for enhancing R&D and technology capabilities of SMEs.

First of all, the Malaysian government has pursued institutional restructuring to increase the effectiveness of policy for SME innovation. For example, the 8MP has paid much attention to enhance the technological capabilities of SMEs, while the 7MP accorded a critical role to SMEs in supporting the national industrialization effort through foreign linkages across the manufacturing sector. The government, therefore, undertook strong supports for the development of resilient SMEs during the period of this plan, especially in sectors with high growth and export potential

Secondly, the government has made great effort to strengthen industrial linkages between SMEs and MNCs/ LEs by enhancing the technological capability of SMEs. The strategy enables SME to become more competitive, innovative and reliable suppliers for global outsourcing network. This is to facilitate entry into new export markets. In this regard, existing programs initiated in

[15] Under TDCs program, four universities in which BIs are located are as follows: University Putra Malaysia (UPM) in 1996; University Malaya (UM) in 1999; University Kebangsaan Malaysia (UKM) in 1999; and University Technology Malaysia (UTM).

the 7MP have been intensified and new ones initiated to further develop advanced professional and managerial skills among SMEs. These measures would in turn add value to products and services, and generate new market opportunities for SMEs.

Finally, many programs designed to strengthen the performance of SMEs show concerns of most government ministries and agencies. For example, there are more than 10 ministries and around 40 government agencies dealing with SME innovation. It indicates that the government provides high opportunities for SMEs to be innovative and competitive in a number of sectors.

Weakness

Despite of these strengths, Malaysian SMEs still face many domestic and external challenges, which could hinder their resilience and competitiveness. They could be found in building technology capabilities of SMEs and grant system.

Technological collaboration between public and private sector as a way of building the technology capability of SMEs can be important, but the current technology transfer program in Malaysia is too small to link the competence of universities and public research institutes (PRIs) with SMEs effectively. Most policies are concentrated on grants and funds instead. It is likely to lead SMEs to totally rely on the government support without enhancing their own technology capabilities and so it will deteriorate competitiveness in the global economy.

Many grants for R&D are important as a way which strengthens SME innovation, but the performance of these programs has not been satisfactory in Malaysia. As mentioned earlier, most disbursed R&D grants are much lower than approved R&D grants. It is likely to result from the R&D grant system based on the reimbursement of uncompleted or low quality research output.

Therefore, the Malaysian government needs to make more efforts to enhance the technology capability of SMEs by promoting more practical technology transfer and collaboration between SMEs and universities/ PRIs. It is also required to make some more efforts to build social capital based on mutual trust between SMEs and the government. It would lead SMEs to participate in R&D grants and fund programs initiated by the government.

Reference

APEC, 2005, APEC Economic Outlook. (http://www.apec.org)

Department of statistics Malaysia. (http://www.statistics.gov.my)

First Quarter, 2006, Malaysia: Industry, Investment, Trade and Productivity Performance, Ministry of International Trade and Industry Malaysia. (http://www.miti.gov.my)

Kanapathy, V., 2000, Industrial Restructuring in Malaysia: Policy Shift and the Promotion of New Sources of Growth, Tokyo Club Foundation for Global Studies. (http://www.tcf.or.jp)

MITI, 1996, Second Industrial Mater Plan, 1996-2005, Executive Summary, MITI Malaysia, pp. 10-13.

MOSTE, 2003, The Second National Science and Technology Policy and Plan of Action, Ministry of Science, Technology and the Environment Malaysia.

Saleh, A. and Ndubisi, N., 2006, *SME development in Malaysia: Domestic and global challenge*, Economic Working Paper Series, University of Wollongong.

SMIDEC, 2006, *SME Performance Report 05*, SMEs Development Corporation.

UNPAN: United Nations Online Network in Public Administration and Finance (http://www.unpan.org/)

Yusof, Z. A., 2001, "Information Technology, Industrial Structure and Competitiveness in Malaysia: A Note," Tokyo Club Foundation for Global Studies. (http://www.tcf.or.jp)

World Bank (http://www.worldbank.org)

Appendix 6: Summarized Policies in Malaysia

Policy Category	Elements	Detailed Program	Contents Note	
Marketing	Building up Capacity of Overseas Marketing	The Market Development Grant (MDG)	Assisting SMEs by defraying expenses incurred in developing markets overseas and expenses incurred in setting up sales promotion office overseas.	MATRADE
		Global Supplier Program	It involves training and linkage to MNCs and large enterprises.	
		Industrial Linkage Program (ILP)	Programs for enhancing integration of SMEs into global supply chain	SMIDEC
HRD	Recruiting			PSMB
	Training	SME Human Resource Development	PSMB had given special emphasis to employers in this category, to be active in retraining and upgrading the skills of their workforce.	
		Human Resource Development Fund (HRDF)	Upgrading the knowledge and skills of workers and equipping workers with the latest and specific skills and facilitating the transfer of technology in industry operations.	PSMB
		SBL-Khas Scheme by PSMB	Employers do not have to pay training fees upfront to training providers or may only need to pay a small percentage of the training fees.	PSMB
		HRD Portal	HRD Portal is a training portal where the training community meets to perform various training activities online.	PSMB
Technology	R&D Promotion	Intensified Research in Priority Area (IRPA)	70.2% of total R&D grant	
		Technology Acquisition Fund (TAF)	Provides assistance to acquire high-tech equipment and machinery, technology licensing, as well as patent rights etc.	MTDC
		SME Expert Advisory Panel (SEAP)	SMEs are given on-site assistance by industry experts to transfer their technology know-how and industry experience	SMIDEC
	Collaboration	The second National Science and Technology Policy	Encourage partnerships between public funded organizations and industry as well as between local and foreign enterprises.	MOSTE
Financing	Equity Financing	Venture Capital Fund	To encourage the development of new technology industries as the engine of economic growth, and the targeted sectors of the funds	

	Debt Financing	The Small Debt Restructuring Scheme (SDRS)	Addressing problems faced by viable enterprises in securing financing as well as providing advisory services on SME financial requirements and applications	BNM
		Soft loan for SMEs	It is to assist existing and new start-ups in project, fixed assets and capital financing.	SMIDEC
		SME Bank	The SME Bank is tasked with nurturing and developing SMEs through the provision of financial and non-financial services, including the creation of an entrepreneurial community.	
	Certification of SMEs	Memoranda of Understanding (MoUs)	To ensure available funding for its assistance schemes	SMIDEC
Management Innovation	Overall Information	MITI and Agencies Trade and Industries Exchange (MATRIIX) Project Phase Ⅰ and Ⅱ	- SME Info Center - On-Line Application Module - Virtual Business Matching Module - Small and Medium Industries Information System (SMIKS) etc.	SMIDEC
	Support for e-business	Grant for RosettaNet Standard Implementation	Include the elimination of errors in data entry, reduction of cycle time and inventory costs thereby shortening the time to market and lowering transactions costs.	SMIDEC
Clustering and Networking	Local Assets Level-up Program	Technology Park Malaysia Incubation	BIs established in Technology Park Malaysia (TPM) are for individuals and start-ups expanding from prototype or preproduction.	
		Technology Development Cluster Program	TDC is an incubation center established within university to allow companies within specific industries such as BT and multimedia.	MTDC
		Multimedia Super Corridor Incubator	It is to support budding entrepreneurs, SMEs and start-ups to become successful IT and multimedia enterprises.	
		One Stop Techno Business Incubator Center	It serves as a hub incubator to all other incubator activities within and outside SIRIM.	SIRIM

Chapter 7: Mexico

1. Economy and Industrial Structure and SME Position

1.1 General Economic Characteristics

Mexico is a member economy with large territory and population. The population already passed $100 million mark, and significant numbers of ex-pats live in United States. Mexico boasts abundant labour resources and still Mexico enjoys low unemployment rate (3.6% in 2005). Mexico also implemented devolution of power and allocated more autonomy to states and municipal governments. The overall design to structure the way to innovate still depends on federal government, but the resources come from both federal and state governments.

GDP reached over $769 billion, and the real GDP growth rate is 3% in 2005. The previous Fox administration with inflation targeting monetary policy has achieved stable and favorable macroeconomic conditions to Mexico. The inflation rate has gone down from 15% of 1999 to 5.4% of 2004.[16] Fiscal management has been successful in recent years, and the lowered interest rate is one of the most prominent achievements in the recent reform along with low inflation rate. It reduced for 16.3% of 1999 to 8.6% of 2004. As the economic conditions get better, businessman can plan future, the new firm creation rate is high. IMD World Competitiveness yearbook highly estimated that Mexico has highly efficient financial policy.

Among the APEC member economies, Mexico does not stand out as heavy R&D investors but neither recognized as laggards. The economic size may allow Mexico to achieve the goal, but it is only recently that Mexico started to increase gross R&D investment. It is difficult to host high-technology firms and to keep talented young entrepreneurs partly due to their tendency to build the companies in other North American Free Trade Agreement (NAFTA) economies - the United States in particular.

The membership of NAFTA gave Mexico a uniquely different environment from other Latin America economies. Inward investment to Mexico is over $ 14 billion and over 60% comes from the US.[17] In addition to this preferential linkage with the US, Mexico built further free trade agreement with 41 economies (total 12 FTA, 43 economies).

[16] CIA World Fact Book
[17] UK Trade & Industry Report

The recent oil boom created room for government to produce a sound government balance sheet, and the newly created government funding resource aims to upgrade the economic profile of Mexico.

1.2 SMEs in the Mexico Economy

The definition of SMEs in Mexico was up to 250 employees in manufacturing sector and now it is up to 500 from 1999. Statistics of medium-large firms compatible with US standard, and statistics based on previous criteria is still available for the international comparison of SME performance. Therefore, the SME definition is categorized into micro (up to 30 employees or ~900,000 pesos), small (up to 100 or 9 million pesos), medium-small (up to 250 or 20 million pesos), and medium-large (up to 500). Firms over the size is defined large (501~). The share of each category in the case of manufacturing sector is presented in Table 7.1.

<Table 7.1> SMEs' Share in Manufacturing (%)

Firm Size	Share of Establishment	Share of employment	Share of Value-added
Micro	95.4	25.7	7.7
Small	2.7	11.9	9.2
Medium small	1.1	14.1	32.3
Medium large	0.5	13.7	
Large	0.4	34.5	50.8

Source: INEGI 1999

In the case of commercial service sector, the categories are different in terms of the number of employees. The category of commercial sector includes specific services such as wholesale, retails and durable consumer good sales.

<Table 7.2> SMEs' Share in Commercial Sector (%)

Firm size Category by employees	Share of Establishment	Share of employment	Share of Value-added
Micro (~ 5)	97.6	56.7	41.8
Small (6~ 20)	1.6	10.2	12.0
Medium (21~ 100)	0.5	6.7	8.8
Large (101~)	0.4	26.4	37.4

Source: INEGI 1999

In the case of general service sector such as restaurant and hotels, medical service, etc. the SMEs presence can be identified.

<Table 7.3> SMEs' Share in Service Sector (%)

Firm siz e Category by employees	Share of Establishment	Share of employment	Share of V alue-added
Micro (~ 5)	94.4	57.8	27.7
Small (6~ 20)	4.4	14.9	23.8
Medium (21~50)	1.1	14.0	24.6
Large (51~)	0.2	13.3	23.9

Source: INEGI 1999

SMEs play a critical role in Mexican economy, considering they contribute to 52% GDP (as of 2005). Mexican business consists of 99% of SMEs in numbers, which generate 72% of employment in Mexico.[18]

2. SME Innovation Policies[19]

2.1. Overview of SME Innovation Policies

The government intends to create a favourable environment for SMEs and the government acts at various levels. The support for SMEs has increased significantly under President Fox´s administration. The creation of the Under-ministry for Small and Medium Enterprise in 2001 has been identified as one of the major successes of the Fox Administration. The Fox administration allocates approximately 200 million dollars annually. The amount is almost ten folds as compared with the previous administration.

The major trend is to encourage founding of innovative firms and connecting them with resources and other organization so that they can achieve the competitive SMEs in both local and global market. For the purpose, the *Entrepreneurial Development Program* (EDP) within the *National Development Program* was delivered. The objective of EDP can be summarized as providing favorable environment for entrepreneur. This includes financing, consulting, training, and promoting management and technological innovation, strategic development of regions and industrial sectors, and restructuring value chains. After the EDP, the integrative policy for the development of SMEs is devised and has been put into action recently (in 2004). The SME oriented strategy and policy trend is clearly presented in SPyME.

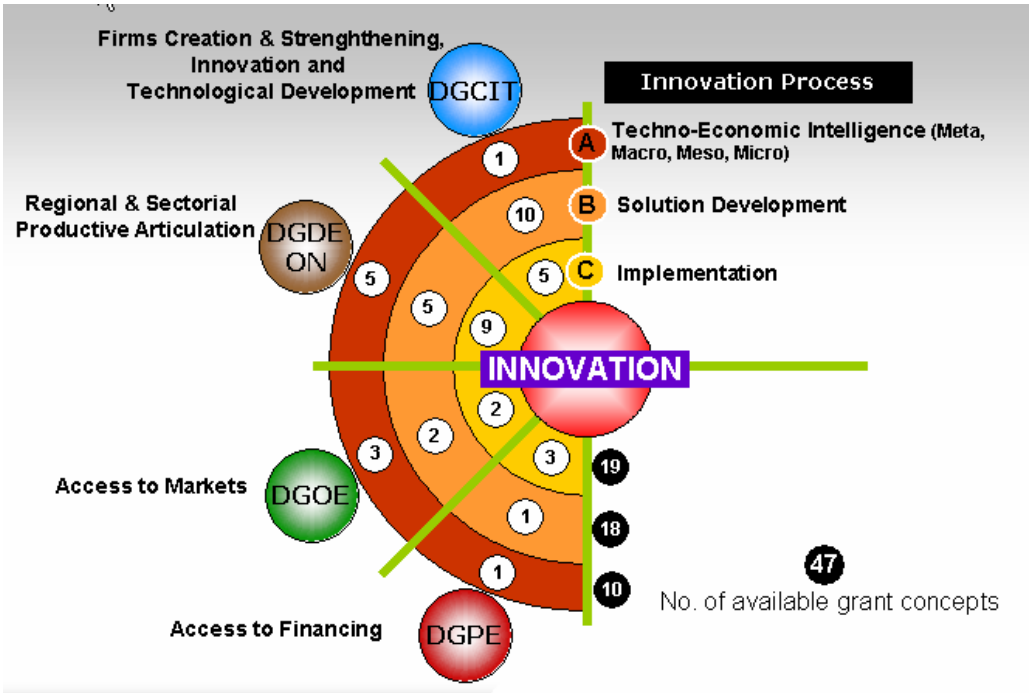
[18] OECD (2005) OECD SME and Entrepreneur Outlook

[19] This section is based on APEC Innovation Center Survey - Answers to the APEC´s Survey Questionnaire,
Office of the Undersecretary for Small & Medium Enterprises, Ministry of the Economy, Mexico

SPyME´s Strategies

With the introduction of SME fund strategy (SPyME), Mexico has set up a relevant strategy to implement SME related programs. The strategy encompasses three objectives: 1) Entrepreneurship encouragement, 2) Collective efficiency promotion and 3) Systemic model for growth.

The first factor of strategy is critical deviation from former policies in 1980s. Entrepreneurship relates to resilience, which in turn depends on high quality inputs. High quality and high value added economy demands well-developed human resources and supply of capable entrepreneurs. The collective efficiency can be achieved by building and exploiting a network, that is, wider collaboration between different political, entrepreneurial and knowledge entities. The third factor, systemic model for growth, takes into consideration the diverse geographical and economic aspect of Mexico. The strategy exhibits the trend of policy making to be more holistic and integrative.



<Figure 7.1> SME Grant Programs in the Four Categories of SMEs Policy[20]

The basic structure of the government administration and the policy measures are divided into

[20] Romo, G (2006), SMEs & Innovation Policies in Mexico, International KOSBI Seminar

four categories. Four Director Generals are responsible for the each category. They harmonize the policies at regular meetings with the Deputy Minister. To maximize impact, thirteen strategic support programs are implemented in the categories.

- Creation & Strengthening of Firms, Innovation & Technological Development
  - The Program for Innovation and Technological Development
  - The National System of Business Incubators
  - The Business Development Centers Network
  - Program for training and strengthening SME capabilities
- Financing Access
  - The National SME Guarantee Program
  - The National Program of Financial Extension
  - The Capital for Development Schemes
- Regional & Sectorial Productive Articulation
  - The National Network of Productive Articulation
  - The National Programme of Suppliers Development
  - Program for Strategic Productive Projects
- Market Access
  - The *Impulsoras´* Program for Exportable Offer
  - Program for Commercial Missions
  - The *Pymexporta* Centers´ Network

These programs are delivered through *the Fondo PyME*. *Fondo PyME* is a federal government's funding for the implementation of supporting programs. Almost 100 programs are integrated under *Fondo PyME*.

2.2 Marketing Policy

Export: Impulsoras´ Programme for Exportable Offer

The main objective of this program is to facilitate SMEs´ exporting activities through various measures. These measures include the coordination and setting of exportable offer contracts, the design and operation of technical assistance, and coaching system to consolidate exporting projects for SMEs. It is implemented through coordination between various parties: coordination among the Ministry of Economy, the Ministry of Foreign Affairs, BANCOMEXT (National Bank of Foreign Commerce) and NAFIN (National Development Bank).

There are currently 13 Impulsoras for Exportable Offer in Mexico and 18 abroad and 22 PyMexporta Centers, which provide technical assistance services to SMEs in exportable offer matters.

Procurement

There is a specific law[21] that promotes government tenders for up to 50% of contract value from SMEs (Article 42). However, there is no specific and major government procurement program dedicated to SMEs at the moment. Each Ministry and Government office takes the responsibility to promote the participation of SMEs in government procurement contracts.

2.3 Human Resource Development (HRD) Policy

HRD policy is relatively weak when compared with other policy areas. HRD is not specifically addressed in the Under-ministry because another government bureau for education undertakes HRD. The manpower policy for promoting the recruiting of R&D personnel for SMEs is not included specifically under current SPyME´s Integral Policy. However, as for training, a program for training and strengthening SME capabilities is on its agenda. It is an evolution from a previous training program FAMPyME. It obtains additional grants from *Fondo PyME* for topics and activities covering foreign trade and commerce, financing, productive chains integration, business partnerships, design of new business models as well as technology transfer and absorption. Except this SME specific programs, a general education policy helps training people in SMEs as well as those in large firms. Certain training programs, such as PROMODE, provide the function.

2.4 Technology Policy

The most prominent change in recent days in Mexico is the reinforced policy to promote technological development and innovation in SMEs. Two important programs constitute pillars to support innovative SMEs. The first is *The Programme for Innovation and Technological Development* and the second is *The National Network of Productive Articulation*. In fact the

[21] Cámara de Diputados del H. Congreso de la Unión (2005) "*Ley de adquisiciones, arrendamientos y servicios del Sector Público"* (Law of acquisitions, contracting and services to the public sector)

latter measure also aims to build knowledge based innovative cluster, but it is not restricted to geographical proximity. In particular, Business Acceleration Network is crowned subprogram in the *Program for Innovation and Technological Development.* Two programs (*The Program for Innovation and Technological Development* and *The Business Development Centers Network*) differ in terms of a cycle of business development. The first program covers very wide stages of development mainly very early and then mature stages but the second is mainly focusing on the growth stage.

As Mexico is one of lowest OECD economies in terms of government funding of business R&D (government subsidy about 0.02% of GDP goes to business R&D), the main tool is not R&D grant but R&D tax credit. These policy measures are supervised by the National Council of Science and Technology (CONACYT).

The Program for Innovation and Technological Development

The *Program for Innovation and Technological Development* (PITD) exhibits the integrated approach. The strategy of PITD is stimulating innovation in all the five areas: market, product, process, organization and business. In addition, both radical and incremental innovations are encouraged to improve the efficacy. *Fondo PyME* (The SMEs Fund) began operations in 2004. At the same time, the first support under the PITD was implemented.

The newly founded Under-ministry for SMEs decided to support the development of entrepreneurship from the inception, exploiting knowledge diffusion in particular. The program has the main objectives: 1) development of innovative technological capabilities to enhance competitiveness, 2) the development of new knowledge absorptive capacities, and 3) to access external knowledge efficiently. In this manner it contains not only technological aspects but also others to provide holistic support. Major programs under this program are detailed below.

- Support grants for inventors
- Innovation projects for individual firms
- Innovation projects for groups of firms
- Business Accelerators Network
  - National and International (TechBA Network)
- Innovation Labs in Specialized Niches

The Business Acceleration Network and the Innovation Labs are particularly dedicated to support SMEs in the following research and development activities and sectors: 1) ICT (Hardware, Software inclusive and particularly Wireless Technologies) 2) Biotechnology (food

and agricultural industries as well as pharmaceutical and medical devices) 3) Microelectronics 4) Robotics 5) Nanotechnologies 6) Advanced materials. In particular, 4 international business accelerators called 'TechBa' are an instrument where a package support system works for the chosen SMEs.

Within the development program, a subprogram - *Innovation Labs in Specialized Niches* - is of particular interest. The subprogram enable existing technology oriented firms to build a stronger market position. The Innovation Labs in Specialized Niches is developed as collaboration strategy between Applied Research Centers and SMEs. It is defined as: support centers for groups of firms and/or individual firms closely related to large firms, universities, research and development centers, or to any other organization or institution offering technical or scientific assistance to SMEs.

The National Productive Articulation Network: Technological Collaboration

The National Productive Articulation Network consists of a group of actions, instruments and actors that participate in a systemic way. Actions relay on a subsidiary backing derived from *Fondo PyME*. As this program started prior to *Fondo PyME*, the funding sources have changed from *FIDECAP* - from 2001 through 2003 (Productive Chains Promotion Fund) to *Fondo PyME* in 2004. Such actors are SMEs, federal and local governments, and investment agents. Resources derived from this fund are applied to reinforce regional and sectorial productive articulation projects if investment agents endorse the SMEs. The creation of 108 Articulation Centers in several regions, sectors and industries is the major activity. The centers provide business and regional development intelligence services.

2.5 Financing Policy

The general feature of the financing policy is to stimulate banks to provide money for SMEs. However, Mexico is not only focusing on debt financing but also on equity financing through intentional development of *investment clubs*.

The National SME Guarantee Program – Debt financing

The Under-ministry for SMEs has coordinated the loan guarantee program in close relationship with state and county authorities, development banks, commercial banks, specialized financial intermediaries and other organizations. The main objective of *the National SME Guarantee*

Programme (NGS) is to create a favourable and stable environment for tenders as well as for loan users.

All the current guarantee programs in the NGS are jointly administered and operated by the Ministry of the Economy and the Development Banks particularly, NAFIN and BANCOMEXT. The operation of these programmes is regulated by the Development Bank´s guarantee norms, which is reflected on the National Exchange Commission gazettes. The system is characterized by an efficient administration and operates through 22 financial intermediaries, 11 of which are non-banks, even though they offer all 28 financial products for SMEs.

Previously SMEs asking for loans were to present non-substitutive collateral guarantees. Today, SMEs are eligible for loans without collateral. The program is successful as it reduced financial costs and bank's response time - from months to only a few days. Financial costs for SMEs are around 8% of requested loans. Although the interest rate for the loan still stay high due to high demand of capital, the rate is continuously decreasing as macroeconomic environment improves.

The linkage between technology and financial policy is not presented in this guarantee program, but the Seed Capital Program addresses some aspect of technology-based loan guarantee program.

The Seed Capital Program – mixed between debt and equity financing

This is a subprogram of *The Capital for Development Schemes* focusing on the SME's access to financing with a special focus on supporting entrepreneurs. The operational schemes are adapted to entrepreneurs in business incubator centers. The result is a hybrid type of loans that have both aspect of debt and equity financing. The loan is granted in accordance with the technological level of the new business model (traditional, intermediate or advanced technology) and its range goes up to two million pesos (about $ 200,000). The term of loan can vary, depending on the technological level of the new business model. The longest time span of repayment is 48 months. For entrepreneurs with traditional business, the public funding share goes up to 80% of the project cost while the entrepreneur must provide the remaining 20%. For intermediate or advanced technology projects, percentages covered by the Seed Capital can go up to 85%. Seed Capital is provided through two different categories, and they differ in fundamental characteristics.

(1) Quasi Capital Scheme - loan

It is a simple loan with an annual interest rate of 6%. However, it aims to fund specific business projects and operates as a matching fund. A business incubator center or a financial intermediary (non-banks) previously authorized for this purpose can operate this scheme. With this option, the entrepreneur does not pay anything within the period of 6, 12 or 18 months, depending on the type of business model: traditional, intermediate or advanced technology accordingly.

(2) Contribution Partnership Scheme - investment

The scheme is partnership investment, the fundamental characteristic of which is tantamount to equity financing. The resources are provided to the business incubator centers, allowing them to make a strategic partnership with the entrepreneur, for a specific project and a period no longer than 4 years (a contract must be signed). Once the contract has expired, the partnership is dissolved and the profits or loses are shared among all project's partners and in accordance to their proportional contribution.

The Seed Capital Program started operations at the end of year 2005 with a total amount of 100 million Pesos granted by the Ministry of Economy through the SME Fund *Fondo PyME*. Since the inception, 302 SMEs and entrepreneurs have been the beneficiaries of this program.

SMEs' Investment Clubs

The Program of Entrepreneurial Development for the period 2001-2006 indicates that one of its strategies is to promote the venture capital. As a concrete measure, SMEs' Investment Clubs have been organised.

An *SMES' Investors Club* is a group of private or public businessmen, nationals or foreigners, with financial resources and a proven moral reputation, who are looking for how to increase their profits. Individuals or syndicated investments invest their resources in productive projects, especially in those early stages of SMEs.

The SMEs' Investment Clubs create a financing alternative for SMEs throughout the development of the venture capital industry, and offer Mexican investors the opportunity to operate in the venture capital market while participating in SMEs´ initial growth stages and development. Additionally, they provide SMEs' reduction of risk and transactional costs from the investments, contributing to educate potential Mexican investors in this new financial culture. They identify and support a feasibility study for venture capital fund managers to

promote risk capital culture. Successful investment clubs are recommended to duplicate in different regions of the member economy.

2.6 Management Innovation Policy

Business Accelerator Program provides management consulting as well as technical assistance. In addition, Mexico installed business information centers. These centers operate in a similar manner to the US e-Commerce program, and the strong incentive to improve information flows in SMEs is provided. In particular, the technological services information system aims to stimulate innovation in SMEs. However, e-commerce program specially designed for SME is not identified in this research.

2.7 Clustering and Networking Policy

The clustering policy can be generally described as a harmonious coordination between central and local governments. Clustering is a natural process and the formation of manufacturing clusters appears in the border region where MNCs operate. The Mexican government tries to maximize production chains, but the policy focus is moving toward knowledge clusters.

The National Program of Supplier Development

This program has been on the government agenda as a component of the *Entrepreneurship Development Program* 2001-2006. Following the suggestions from the *United Nations Development Program* (UNDP), the program advocates the intervention on a productive chain, considering large multi-national corporations (MNCs) as anchor firms. These anchor firms are called '*maquiladoras.'* The program aims to increase competitiveness through rationalizing the value chain between suppliers (majority of them are SMEs) and *maquiladoras.* To be more specific, the program proposes incentive schemes for large *maquiladoras* and exporters. Guarantee schemes with the Development Bank and grants of *Fondo PyME* are major tools to provide the incentives. The program also tries to produce knowledge spill over from foreign direct investors.

The National System of Business Incubators

The number of business incubators increased significantly - from fifteen in 2000 to three hundred and eight business incubators in 2006. Technical assistance and relevant services are supplied to entrepreneurs. From 2003, the Under-ministry for SMEs designs the operational scheme based on the *National System*, which means connecting all business incubators. The scheme contributed to the economic development of regions, states and territories.

The program includes grants support in different categories of *Fondo PyME*. It operates in the following manner. The Under-ministry approves business incubators to get *Fondo PyME*, which allocated through various intermediate organizations such as academic institutions, entrepreneurial organizations and NGOs. This mechanism ensures complementary financial resources from the state, county and private sector.

The National Network of Productive Articulation

The policy mainly aims to stimulate technological collaboration (thus elaborated in technology policy section) and it contributes to the innovative network consequently. Mexico tries to transform existing networks or to build a new network so that knowledge based clusters are newly facilitated through the policy.

3. Overall Assessment

Strength

The strategy of the Mexican government is to enhance SMEs focusing on technological development, innovation and entrepreneurship. This strategy moves forward from the previous strategy to utilization of *maquiladoras,* -the assembly MNCs- as a model for growth. In this new strategy, activities of the various programs aim at covering full cycle of business development from early stage of firm creation to the stage of consolidation and even internationalization. The policy framework enables to find the *gap* between policy supplies and demands, and visualizes where a bottleneck exists in SME innovation. The new strategy does not mean that Mexico abandoned attracting foreign direct investment. The policy to take advantage of the assembly MNCs continues, but the high value added economy must be created with Mexico's own efforts to extend the capability of local suppliers.

Mexican SMEs suffered from the pressure of international competition after NAFTA, but surviving firms and new start ups show more confident attitudes. The competitiveness of SMEs in Mexico is expected to increase with the new policy measures that promote technological development, innovation and entrepreneurship.

Mexico presents strength in university education of science and engineering, which can help the focus on technological innovation. Establishment of the integrated policy and association of corresponding funding resource is an effective method for future development. The recent harmonization between provincial and federal governments also makes positive impacts. Clustering has developed naturally around engineering colleges. For example, the *City of Monterrey* is often referred as a technology oriented cluster. The engineering university in the area played a critical role in the development of the cluster. The strength of higher education in science education led to the development of region and the local governments are keen to foster the existing cluster.

Mexico has cultural heritage and it starts to realize to mix the cultural competence and its technological potential to build new start-up companies. As some highly educated ex-pats return to Mexico and start his/her own business, the Mexican SME economy becomes more dynamic.

Weakness

The low percentage of R&D investment in Mexico with under-developed R&D activities in a private sector causes a vicious circle of under-investment in total research and development activities. Although the National Council of Science and Technology (CONACYT) has its own programs and tries to build an innovation-oriented society, the resources are concentrated on a few universities and institutes due to a limited amount of the budget.

Even though the interest rate has gone down significantly, still the market rate is high for SMEs. It is evident that SMEs want both the expansion of loan guarantee programs and the preferential treatment in terms of the interest rate.

Human resources still have to be improved, as the share of tertiary education graduates is low (19% in 2003 for the age of 25-34). The gap between rich and poor could hamper the human resource development (HRD). The policy for recruitment is not identified in this research. Fortunately a recent subsidy to the poor class is linked with HRD. It is important to give incentives to those who achieve high standards in education. Although Mexico has high potential, the use of information and communication technology (ICT) to upgrade the competence of SMEs is not easily perceived.

Recommendation

As mentioned above, HRD is the founding base for encouraging entrepreneurship. In addition, how to exploit the linkage with ex-pats in the US must be carefully designed. It is also recommended to diffuse information on SME policies so that SME can identify relevant and available policy programs easily. It is recommended that Mexico take actions to improve the current problem of under-utilization of policy programs occurring partly due to inefficient informing of policy.

The coordination between the CONACYT and other departments must be extended to the policy level since the organizing meeting of ministers within CONACYT cannot solve whole coordination issues. The government officials who supervise the actual programs have to cooperate on fostering technology-based SMEs and effective distribution of financial resources.

Reference

Office of the Undersecretary for Small & Medium Enterprises, Ministry of the Economy, 2006, *Answers to the APEC´s Survey Questionnaire –Mexico*.

OECD, 2005, *OECD SME and Entrepreneur Outlook*, Paris.

Appendix 7: Summarized Policies in Mexico

Policy Category	Elements	Detailed Program	Contents Note	
Marketing	Procurement of Government	Law of acquisitions, contracting and services to the public sector	SMEs as tenders with access to up to 50% of government contract value	All Ministries
	Overseas Marketing	PyMexporta	Export center to help exporters	SE-SPyME
		Impulsoras´ Program for Exportable Offer	Program coordinated effort between two ministries to operate technical assistance tools and coaching system to consolidate exporting projects for SMEs.	SE-SPyME & Ministry of Foreign Affairs
		The National Program of Supplier Development	Linking SMEs with large assembly corporations	SE-SPyME
HRD	Training	Program for Training and Strengthening SME Capabilities	General training program	SE-SPyME
		Competencias program	STPS technical training specific to industry	STPS
		Various	Bancomext, NAFIN, Economia, CONACYT etc. have own training programs	
Technology	R&D tax credit	Fiscal Stimuli program	30% R&D tax credit the second generous scheme in the world. The National Council of Science and Technology (CONACYT) initiates the program	CONACYT
	R&D programs	ADVANCE CONACYTT-NAFIN	Provides financial assistance to entrepreneurs who want to build company based on scientific discovery and technological development	CONACYT
		ADVANCE Ultima Milla	Mainly for established firms to finish up R&D projects	CONACYT
		Innovation Labs	Finance applied research to enhance SMEs´ knowledge absorptive capacity from R&D Centers and Universities	SE-SPyME
	Technological collaboration and network	TEChBA Accelerators	Supports high-tech SMEs to raise risk capital and expand business activities abroad	SE-SPyME

		DPyCI	The Direction of Policy and International Cooperation, aims to build international research collaboration either bilateral or multilateral.	CONACYT
Financing	Equity Financing	Seed Capital - Contribution Partnership Scheme	Investment partnership up to 50% in a project that last less than 4 years	SE-SPyME
		SME Investment Club	Identify and support feasibility study of the investment club's \to create a financing alternative for SMEs throughout the development of the venture capital industry	SE-SPyME
	Debt Financing	The National SME Guarantee Program	To satisfy SMEs' financial demand in close relationship with state and county authorities, development banks, commercial banks, specialized financial intermediaries and other organizations.	SE-SPyME
		Seed Capital-Quasi-Capital Scheme	Simple loan with an annual rate of interest 6%. Payback pending period of maximum 18 months	SE-SPyME
Management Innovation	Consulting	Program for Training and Strengthening SME Capabilities	General program for training SMEs, evolution from FAMPyME	SE-SPyME
		PROMODE	Consulting activities to enhance management knowledge	SE-SPyME
	Awareness	Network of Business Development Centers (BDCs Plus)	SMEs´ Encouragement for up-taking Knowledge Intensive Business Services to design and develop assisted technology and innovation projects	SE-SPyME
Clustering and Networking	Networking	The National Program of Supplier Development	The program aims mainly for suppliers' linkage with MNCs and large domestic firms, by-product of which is encouraging clusters	SE-SPyME
	Local Assets Level-up Program	The National Network of Productive Articulation	Establishing and promoting horizontal and vertical networks at the mezzo-economic level down to the states, the value chains and specific sectors in micro-regions	SE-SPyME
	Incubation	The National System of Business Incubators	Operates business incubator centers in diverse areas of Mexico	SE-SPyME

Chapter 8: Philippines

1. Economy and Industrial Structure and SME Position

1.1 General Economic Characteristics

The Philippines has long been regarded as 'excellent student who has not realized the potential' in terms of economic development. The Philippines hosts international organizations such as the Asian Development Bank and is considered as one of attractive destination of foreign direct investment, since English is an official language as in India. In spite of the advantage of international communication capability, the image of poor infrastructure and exaggerated security concerns caused less-than expected inward investment. With 83 million population dispersed in over 7,000 islands, it is not easy to build integrated infrastructure. Furthermore, compounding those facts, brain leakage is a serious problem as talented young graduates fled the Philippines for advanced economies (e.g. the United States). According to the World Bank, the Philippines is the third largest remittance recipient from foreign economies. Gross National Income (GNI) per capita is higher than Gross Domestic Production (GDP) per capita.

In recent days, the macro economic situation has been stabilized and the sign of increased interests from foreign investors is visible. Previously, the unregulated interest rate was so high for SME loans. Now, the interest rate has gone down in the current administration and business situation has been improved. The real growth rate of GDP in 2004 peaked 6.1%. Gross Domestic Production (GDP) amounts to $91.36 billion in 2005. Although it is slow, economic growth is on the trek.

The national innovation system of the Philippines is not clearly depicted in academic circles[22], but the heavy influence of Multi-National Corporations (MNCs) is clearly visible. Majority of manufacturing SMEs work either as suppliers to MNCs or as independent small manufacturers (*e.g.* handicraft and furniture manufactures). The Philippines has strong service industries (*e.g.* tourism). The agriculture sector still dominates economy - employing almost 40% of labor. The food processing industry has benefited from the link with the agricultural sector. Whether this competence can be guided to new competence in biotechnology sector is to be seen in the coming future. As the R&D capability in terms of R&D personnel is highly concentrated in universities and government research institutes, the contribution of these public sectors to the

[22] Except few exceptions, see Patalinghun (2003)

private sector is necessary for the innovation.

1.2 SMEs in the Philippines Economy

Firms with 1~199 employees are defined as SMEs or asset size less than 100 million P.Peso (about $ 2 million) are defined as SMEs. The National Statistics Office (NSO) recorded 810,362 SMEs in 2003. They account for 99.6% of the total number of establishments while large enterprises make up the remaining 0.4%. In the same year, SMEs employed 3.9 million individuals that account for 68% of the total labour force.

This firm size category further divides into micro, small, and medium enterprises. Barangay Micro Business Enterprise (BMBE) Act of 2002 divides SMEs into micro enterprise (asset up to 3 million P. Peso or less than 10 employees), small (up to 15 million P.Peso or less than 100 employees) and medium (100 million P. Peso or less than 200 employees). As the number of micro enterprises overwhelms others, they account for 91.7% of total business establishments and 37.7% of total employment in the Philippines.

<Table 8.1> Role of SMEs in the Philippines Economy

Categories of SMEs	Share of Employment	Share of Sales*	Share of Establishment
Micro enterprises (1~9 employees or ≤ 3M Peso)	37.7%	2.9	91.7%
Small enterprises (10~99 employees or 15M Peso)	23.1%	18.0	7.6%
Medium enterprises (100~199 employees or 100 M Peso)	7.1%	9.3	0.4%
Large enterprises	32.1%	69.7	0.4%

Source: NSO cited in SME Development Plan 2001-04

Note: * The figures from NSO 1998

SMEs have been traditionally the backbone of Philippines economy. Although the importance of MNCs' support to local supply chain cannot be too much emphasized, the local firms' own efforts to build capability are the most critical. However, SMEs of Philippines have not accumulated the capability to achieve the high-value added status in general. SMEs contribute to around 30~32% of the total sales and value-added in the manufacturing industry (NSO, 1994). Considering the number of SMEs, the GDP share by SMEs is quite mundane. About 60% of all exporters are SMEs, including both direct and indirect[23] contributions. In fact, indirect exports

[23] SMEs exports through subcontracting arrangement to exporting companies.

take a larger share about 30~35% and the sector's direct exports contribute to about 25% of total exports.

SMEs are intensely clustered within National Capital Region (NCR), and the share of NCR is about 24% in business establishment. Within the SME establishment, the share of micro firms in NCR is 22.5% and shares of small and medium firms are 43.8 and 46.9 percent, respectively. In terms of employment, the concentration on NCR is more significant as NCR region accounts for 40.1 % of total employments (NSO, 2000).

As of 2003, majority (54%) of the 810,362 SMEs are in the wholesale and retail trade industry, SMEs operating in manufacturing accounts for 15% of the total establishment. The third largest sector accommodating SME is also a service industry: hotels and restaurants, 11%. Other industrial sectors after these three are as follows; other community, social and personal services activities, 5.0%; real estate, renting and business activities, 4.7%; health and social work, 3.5%; financial intermediation, 3%; and transport, storage and communications, 1.7%. Geographic distribution indicates that majority of SMEs are concentrated in national capital region: 24% of SMEs are located in the area. The complete statistics on detailed firm size categories is available for the year 2001.

<Table 8.2> Number of Establishments by Sector and Size

	Establishment									
	Micro	**%**	**Small**	**%**	**Medium**	**%**	**Large**	**%**	**Total**	**%**
Agriculture forestry&Fishing	1,956	46.1	2,014	47.4	124	2.9	153	3.6	4,247	0.5
Mining	216	62.4	100	28.9	14	4.0	16	4.6	346	0.0
Manufacturing	108,986	88.0	12,627	10.2	988	0.8	1,194	1.0	123,795	15.3
Utilities	485	41.8	483	41.6	99	8.5	94	8.1	1,161	0.1
Construction	1,530	55.0	1,037	37.3	105	3.8	111	4.0	2,783	0.3
Commerce	415,924	95.6	18,469	4.2	408	0.1	300	0.1	435,101	53.6
Finance	17,791	75.8	5,477	23.3	84	0.4	109	0.5	23,461	2.9
Housing & real estate	34,527	88.3	3,928	10.0	299	0.8	361	0.9	39,115	4.8
Private services	92,500	89.5	10,237	9.9	318	0.3	244	0.2	103,299	12.7
Government service	70,304	89.5	7,390	9.4	484	0.6	376	0.5	78,284	9.6
Total	743,949	91.7	61,762	7.6	2,923	0.4	2,958	0.4	811,592	100

Source: Philippine NSO 2001

2. SME Innovation Policies[24]

2.1 Overview of SME Innovation Policies

The creation and proliferation of young, small, and dynamic enterprises has been identified as an important strategy for creating new jobs and for the economic growth. For this purpose, the Philippines government aims to create of six million jobs in six years via increasing (tripling) the loans to entrepreneurs.

About the trend of SME policies, historical review illuminates the increased interests in SMEs. The Philippines government recognized the importance of SMEs but the most significant milestone was Magna Carta for Small Enterprise. According to a report by APEC/ MITI (1995), before the *Magna Carta for Small Enterprise,* the Department of Trade and Industry (DTI) of Philippines took the followings into consideration in formulating policies for SMEs[25]: 1) enhance the global competitiveness of Philippine products and services 2) improve and increase infrastructure 3) promote the sustainable development of natural resources; 4) balanced development: disperse industry from already congested areas. When Magna Carta for Small Enterprise was introduced, the policy had shifted to emphasize the mandatory role of the government. In 1998 the *Philippine SME Development Strategy* was announced.

Magna Carta for Small Enterprises

The Magna Carta for Small Enterprises is a milestone legislation to foster a dynamic SME sector. This law is guided by three principles:

- Minimal set of rules and simplification of procedures and requirements.
- Participation of the private sector in the implementation of SME policies and programs
- Coordination of government efforts

There are three major provisions contained in the Act, namely:

- Creation of the Small and Medium Enterprise Development Council
- Creation of the Small Business Guarantee and Finance Corporation
- 8% mandatory allocation to SMEs (6% for small enterprises, 2% for medium)

Overall Policy Strategy is delineated in *the SME Development Plan* 2004-2010, which aims to

[24] This section is based on DTI (2006) Answer to the Survey of the APEC SME Innovation Center - the Philippines

[25] *Best Practices for SMEs in APEC, Small and Medium Enterprises Agency, Ministry of International Trade and Industry. Japan (1995)*

create globally competitive SMEs in the new industrial economic environment.

To address the challenges in developing a sustainable and competitive SME sector, the *Plan* adopted a three-pronged strategic approach, focused at 1) providing support to individual enterprises, 2) identifying growth or priority industries and 3) improving on operational and regulatory environment to be more conducive to SMEs. It endorses the implementation of 48 highly related *Activities*. Some *Activities of the Plan* have concrete programs with funding, other *Activity rules* work as guidelines. The SMED Plan came up with 12 major activities.

1) SME Information Support
2) SME Counseling and the Upgrading of SME Centers
3) Facilitating Partnerships/Linkages for Competitiveness
4) Enhanced Support for Trade Fairs and Access to Market Services
5) Product Development and Design Services
6) Industry Productivity and Quality
7) Information Technology Appreciation and Application
8) Entrepreneurship Training
9) SME Financing Support Programs
10) Streamlining of Business Registration Requirements
11) Advocacy of SME Related Laws.
12) SME Institutions Restructuring

As the strategy accompanies corresponding structure the Philippines government built a structure to support SME as shown in Figure 8.1 of the next page.

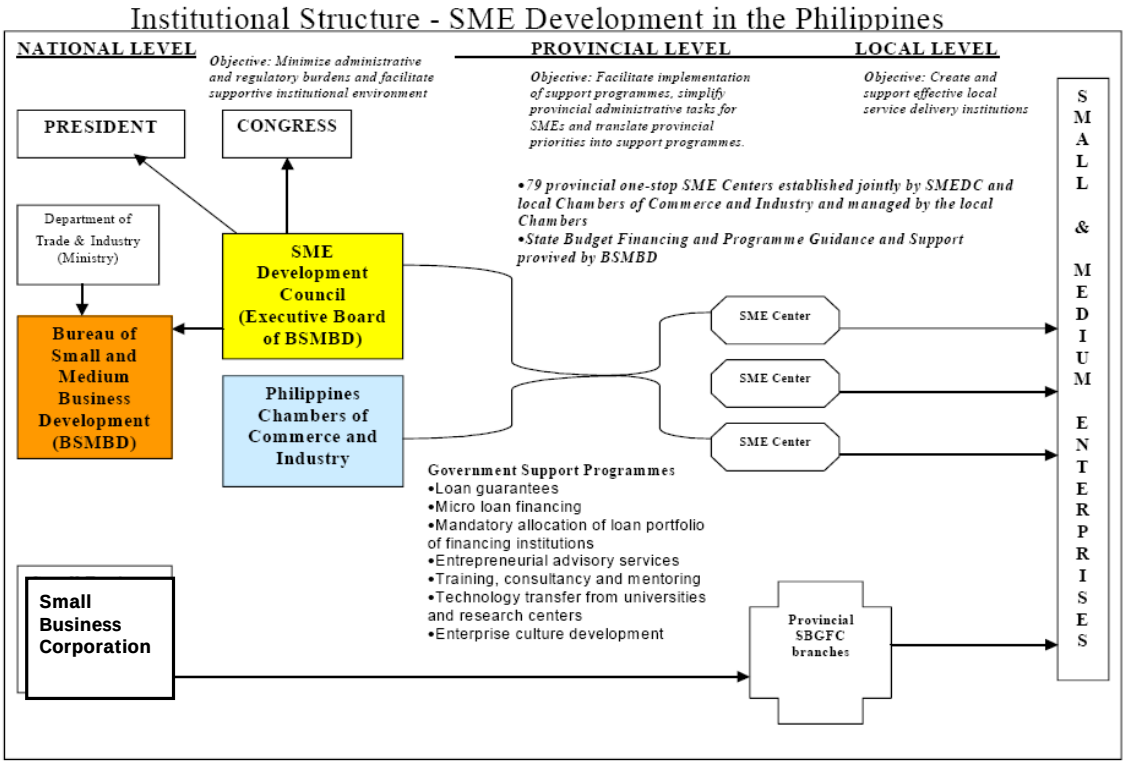
This can be summarized as SME Development Council playing the coordination role and the *Bureau of Small and Medium Business Development* (BSMED) with *Department of Trade and Industry* (DTI) playing the role of a responsible execution body. The DTI Secretary chairs the SME Development Council. The framework hints on how national and provincial subsidies are coordinated. The role of Small Business Guarantee and Finance Corporation (now Small Business Corporation) is to cover the provincial level. The public corporation has provincial branches to help provincial governments.

2.2 Marketing Policy

The marketing Policy may consist of various promotional activities, such as a subsidy to export exhibition, information providing centers, and securing special regional zone for export.[26]

[26] Philippines Export Zone Authority (PEZA) provides incentive (e.g. tax benefit) for the firms in the zone.

Philippines marketing policy heavily focuses on providing relevant information and networking of trade association.



<Figure 8.1> Institutional Structure of SME Development

Source: OECD (2004)

Information related supports

Majority of program and promotion centers support export of SMEs. The DTI's *Bureau of Export Trade Promotion* (BETP) operates *Export Assistance Network* (EXPONET) to connect government and private trade promotion offices including trade associations, foreign embassies and other entities. As a side program, it operates online database - Tradeline Philippines - that contains Philippines export and import statistics and other trade information. BETP also manages *Business Matching Centers* to link SME exporters and foreign buyers.[27]

The DTI's *Center for International Trade Expositions and Missions* (CITEM) has two major programs. *Catalog Online Program* is a virtual showroom that aims to attract an interest of foreign buyers. CITEM also conducts *Selling Missions* including export promotion projects. In

[27] Foreign Trade Service Corps (FTSC) also provides similar service

addition, CITEM organizes trade fairs such as the International Food Exhibition, Manila F.A.M.E. International, and Bio-Search.

Regarding exports, the *Philippine International Trading Corporation* (PITC), as the government's international trading arm, undertakes merchandising services regarding both import and export. The Department of Agriculture has its own program, *Agribusiness and Marketing Assistance Service* to promote agri-fishery products. Non-profit organization, such as *Market Encounter Goes to Manila* (MEGMA) Foundation, Inc. also operates programs for SMEs to maximize domestic market.

Procurement

Magna Carta for SMEs specifies the quota for SME in government procurement. That is SME should have 10% share of the total procurement value of goods and services supplied to the government.

2.3 Human Resource Development Policy

Education sectors undertake the role and it is implemented through alliances between educational institutes and industry associations in general. The literacy rate of the Philippines is high. However, due to the low rate of enrolling secondary education, the final result as of population achieved tertiary education in the age of 25-34 is relatively low 17% in 2003 (IMD World Competitiveness Database).

Recruiting

As for the recruiting, no specific policy providing incentives for those who work in SME can be identified. This is partly because any job related education program can be regarded as relevant to SME. However, encouraging youth to create business, a sort of entrepreneurship education is in place. The key institution is Technical Education and Skills Development Authority (TESDA). It operates regional training centers, where consultants are hired with the position title of 'career guidance focal person.' They conduct career guidance services.

Other organizations, such as the *Public Employment Service Office* (PESO) and *Philippine Youth Business Foundation* (PYBF), provide recruiting related service. For example, they report career guidance and provide career counseling to unemployed youth and adults looking for jobs

or encourage entrepreneurship to start business.

Training

Technical Education and Skills Development Authority (TESDA) manages and supervises technical education and skills development in the Philippines. Its mission is to mobilize the full participation of industrial and vocational institutions, the local government units, and civil society for skilled manpower development programs.

Major programs under TESDA are quality assurance programs (*e.g.* TESD system) and Technical and Vocational Education and Training (TVET) provision programs (*e.g.* International Skill Technology Transfer Program). Both school based TVET program and enterprise based TESDA programs exist in parallel. Enterprise based programs are the Apprenticeship Program, Dual Training System Program and TESDA Kasosyo Project. In addition, TESDA currently operates the National Manpower Information System (NMIS), which is an integrated computer-based management and planning information system network.

Another government department, Department of Labor and Employment (DOLE), initiated a program to improve productivity in the workplace. ISTIV-PAP (Productivity Awareness Program), the key human resource strategy for quality and productivity improvement, contributes to enhancing SME competitiveness. The concept of the program emphasizes human resource development. It is rooted on the five ideal attributes of a productive individual, I stands for industrious, S for systematic, T for time-conscious, I for innovative, and V for strong value for work.

The *University of the Philippines-Institute for Small-Scale Industries* (UP-ISSI) offers a wide range of courses designed for owners, managers, supervisors and staff of SMEs as well as for officers and staff of government and non-government organizations. DTI initiated industry centers such as the *Cottage Industry Technology Center* (CITC), provide skill training relevant to industry. The *Philippine Trade Training Center* (PTTC) operate a program on marketing and management skill training.

2.4 Technology Policy

R&D tax credit

R&D related tax credit is mainly on the capital goods used for experiment. No special treatment for SMEs can be found at the moment of this research.

R&D grants

No policy program that provides R&D subsidies to SMEs is identified. The grant program is mainly implemented by Government Research Institutes (GRIs). The loans to experimental equipment can be available but grant is very rare. Tax benefit for R&D is mainly designed for purchasing capital goods.

There are some government programs that specifically aim to enhance technological competitiveness of SMEs. The *Department of Science and Technology* (DOST) operates Small Enterprise Technology Upgrading Program. DOST is currently offering more than 15 technological development assistance programs for SMEs. These include DOST-Academe Technology-based Enterprise Development (DATBED), Special Technology Financing (STF), Venture Financing (VF), Pilot-Plant Assistance (PPA), Technology Business Incubator (TBI), Technology Packaging (TP), Prototype Development and Testing (PDT), among others. These government research institutes constitute a major frame of the technology policy. A certain program targets specific industries like *Furniture and Handicraft Industries S&T Support Program (FHISTSP),* where DOST- Forest Products Research and Development Institute (FPRDI) rendered assistance to furniture/handicrafts firms.

2.5 Financing Policy

Debt Financing

Debt financing is the main tool for financing SMEs. One of crowned financing program for SME is SULONG which means ‘go forward’ in Tagalogue and also acronym of the SME Unified Lending Opportunities for National Growth. SULONG is a component of *the Magna Carta for SMEs.* It does not replace previous loan guarantee program but complement them.

Magna Carta for SMEs (RA 6977 later amended by RA 8289)

Small Business Corporation (i.e. SB Corp.) is a government financial institution to provide credit financing and guarantees to Philippine SMEs. Small Business Corporation was created originally in 1991. Based on *the Magna Carta for Small Enterprises* it merged with the Government Fund for Small and Medium Enterprises (GFSME) in 2001.[28] SBC is one of major financing institutes of the Philippines along with the other two: Quedancor (domestic) and Tidcorp (export). SB Corporation's SME Financing Programs are categorized into three, depending on client capability of financing. The danger of moral hazard in the guarantee program caused the Philippines government to limit coverage (e.g. less than 80% in the case of SULONG program).

SULONG Program

To improve accessibility of financial resources by SMEs, the SME Unified Lending Opportunities for National Growth (SULONG) Program is implemented by The National SME Development Plan. With SULONG, participating 65 accredited government financing institutions (GFIs) apply simplified and standardized lending procedures and guidelines, *e.g.* loan purpose, fee structures, interest rates, application forms, financial rations and other lending parameters for evaluating the loan application of SMEs.

The programs divide SMEs' capability to receive loans. Interest rates are pegged to 9 percent annum for short term (within a year) and 12.75 for long term loans. The SULONG program has fund allocation of 100 million P.Peso.

SMEs must be Filipino owned (60% or more). The program demands collateral but the collateral could be assets acquired from the financing. It is stated that 'the borrower must be willing to mortgage any available business and personal collateral including assets to be acquired from the loan to secure the borrowing.'

(DTI web page http://www.dti.gov.ph/contentment/66/69/671.jsp)

<Table 8.3> SBC Program by Categories

Already bankable SMEs: whole sale funds	
SME-Funding Access for Short Term Loans	a wholesale short-term funding conduit through banking institutions, with recourse to the bank
SME-Funding Entry Point for Entrepreneurs in Livelihood Program	a lending program for microfinance institutions
SME-Funding for Investments in Regional Markets	aims to cater SMEs in provincial cities and other areas outside of the traditional centers of lending

[28] Despite the merger, the Small Business Guarantee and Finance Corporation the name is in parallel use.

Near bankable SMEs: credit guarantee	
SME-Guarantee for Enterprises in Manufacturing and Services	intended for projects which are or will be engaged in manufacturing, services and trade activities, whether for domestic or export market
SME-Guarantee Resources for Agribusiness Investments	for projects in agribusiness except direct farm level of production, livestock, poultry, fishing, and aquaculture.
SME-Guarantee Lines for Anchor Industries)	for SMEs that supply goods and services to private business firms commonly referred to as Big Brother Companies
SME-Guarantee Undertaking of Industries in Livelihood Development	program implemented in partnership with common interest groups such as cooperatives, non-government organizations (NGOs), trade and industry associations
Non-bankable but promising SMEs: direct loans	
SME Financing for Receivables of Suppliers' Transactions (SME-FIRST)	direct lending to suppliers of domestic firms with proven track record
SME-FIRST Expanded	The financing is transactional where the object of credit is the buyer's purchase orders issued to the supplier
SME-Financing Reach for Exporters thru Network Development	aims to provide credit access to exporters
SME-Financing for Organizationally Competent and Excellent franchise businesses	medium-term financing intended for the start-up or expansion of a franchise outlet
SME-Guarantee Incubation for DTI-Endorsed Projects	a direct financing facility of SBC without a bank conduit, which is extended to DTI-endorsed SMEs.

Source: The Survey of the APEC SME Innovation Center, 2006

Mandatory Allocation is dictated by Sec.13 of RA 8289. All lending institutions shall set aside at least 6% and at least 2% for small and medium enterprises, respectively of their total loan portfolio. As of 31 March 2003, the banks have set aside a total of 143.1 billion P.Peso for small enterprises and 99.7 billion P.Peso for medium-scale enterprises, that is, share of 14.78% for small enterprises and 10.29% for medium enterprises respectively in the total loan portfolio of 968.721 billion P.Peso.

Barangay Micro Business Enterprises (BMBEs) Act of 2002

Included in the BMBEs Act of 2002 is a provision on 'Technology Transfer, Production and Management Training, and Marketing Assistance.' SMED Council administers the BMBE Development Fund. Implementation can be endowed to third organizations. For example, the *Philippine Amusement and Gaming Corporation* (PAGCOR) operates a fund with the size of three hundred million pesos.

Equity Financing

Recently, 'Venture Capital Fund' is introduced as *Activity 37* of the SME Development Plan. However, no government agency responsible for the equity financing is identified. At the

current moment, *Angel Networks* are working, but it mainly concerns the introduction of foreign investors to domestic venture funds. Government selects and introduces SMEs to foreign investors.

2.6 Management Innovation Policy

SME Information Support Programs

There have been efforts to produce/update/distribute relevant SME-related information materials. In 2005, close to 57,000 hard and soft copies of relevant SME publications and brochures were distributed nationwide.

E-Business Promotion

The Philippine Trade Training Center conducts e-commerce training/seminars such as - Webpage Development, E-retailing: Internet Business Gateway for Entrepreneurs, Microsoft Office Programs for the entrepreneurs. These courses are held at their e-Business facility, which has top-of-the-line networked computers for the use of the participants. In addition, SME Regional Centers develop SME databases as a component of SME Development Plan.

Certificates

SME Awareness Programs

A presidential consultant on entrepreneurship was appointed and accordingly the Philippine Center for Entrepreneurship was established as a private sector-funded institution. The center works in association with various schools, NGOs, and private corporations to improve entrepreneurship education.

Awards for Promotion of SME Excellence

There are many award programs in operation. *Presidential Awards for Outstanding SME Graduates* are granted to SMEs biannually. The eligible firms are 100% Filipino-owned. *The SB Corporation Bank Partners* is a unique award that praises partners of SMEs to encourage banks to give loans to SMEs. *Golden Shell Awards* is biennial awards and it is the highest recognition given by the DTI, but this award is not exclusive to SMEs. *Philippine Quality Award* (PQA) is the highest level of national recognition for exemplary organizational performance. Although

major recipients are large firms, the Center for Industrial Competitiveness of the DTI designed a PQA template specifically formulated for SMEs. The Philippine Chamber of Commerce & Industry took the lead in implementation of the template.

SME Business Counseling

The *Small and Medium Enterprise Development Council* (SMEDC) established SME Centers as a flagship project. There are 25 selected SME Centers nationwide. Business Counsellors have been trained by DTI to work in these Centers to assist existing entrepreneurs. SME Centers operate through close cooperation between the DTI, Local Government Units (LGU), Local Chambers of Commerce, and Provincial SMEDC. The center provides technical consulting and advisory services including information materials. It also coordinates entrepreneurship training programs.

The SME Counseling and Advisory Program is in operation with SME Regional Centers/ Desk. Advisors can be selected from an expert pool comprised of former CEOs or senior officers of consulting organizations. Advisors are full-time employees and some advisors are invited from other advance economies as well.

2.7 Clustering and Networking Policy

Institution based

SME Centers function as hubs to increase innovative networking in the region. The centers provide professional consulting services to SMEs in almost all the areas of business including financing, quality production and marketing. Provincial Opportunities Caravans for SMEs is a program to provide integrated assistance to priority industry clusters, where problems are identified and solutions are suggested through multi-sectorial dialogues.

The Philippine Export Development Plan (PEDP)

The *Philippine Export Development Plan* (PEDP) introduced in 1999, mandates clustering as the main strategy. The area is not exclusive to SMEs but majority of beneficiary are SMEs. The effort to link marketing policy with clustering policy resulted in an integrated region for production and export. It is also sector specific. In 2000, the DTI identified two industry sectors for industry clustering and development: the furniture and the food processing industries.

Today, industry clusters have emerged in the sectors like gifts and house ware. PEDP is implemented by optimizing clustering to industrial characteristics. They are: (1) Material-based (e.g. wood, steel, agro, aqua), (2) Labor-based (e.g. low, intermediate, high), (3) Product-based (e.g. automotive, consumer electronics), and (4) Technology-based (e.g. biotechnology, information technology).

More specific programs under this plan are 'One Town, One Product (OTOP)-Philippines' and 'Big Enterprise, Small Enterprise Program.' The OTOP-Philippines offers a comprehensive assistance package through a convergence of services from local government units, national government agencies (NGAs), and the private sector. Big Enterprise, Small Enterprise program exemplifies the partnership between public and private sectors. The *National Wages and Productivity Commission* (NWPC) undertakes the program in partnership with the *Employers Confederation of the Philippines* (ECOP).

Incentives for Specified Locations

Registered Economic Zones, Less Developed Areas and Local Government Units (LGU) Designated Area attract an interest of SMEs because of various associated benefits. In fact, many of them originated from the natural process. Private sector clustering such as CALABARZON (Cavite, Laguna, Batangas, Rizal, and Quezon – the area within 50 km radius of Metro Manila) and IT Park perform superbly. In general, the Philippines government tends to support these natural clusters instead of intentional build-up of artificial cluster (e.g. Philippine Assistance Plan's Calabarzon Industrial Program).

Incubation Policy

University based incubating centers such as University of the Philippines (UP)-Ayala Foundation Technology Business Incubator (TBI), attract technology start-ups, research and development service providers, and technology venture capital firms. As the TBI is located in the university - unlike its counterparts in Eastwood and Makati, the facility offers startup SMEs the advantage to share their ideas with academics as well as other technology entrepreneurs and venture capitalists.

The Technology Business Incubator Program by DOST provides another public funded incubation centers. They are located in or in the vicinity of DOST research institutes.

3. Overall Assessment

Strength

Policies of the Philippines reflect learning from the recent success of India. Heavy emphasis on information technology based innovation can be detected from various programs. In this line of effort, the policy for management innovation incorporates various on-line information databases as well as off-line counselling.

In addition, the legalized enforcement is successful to make financial resources accessible to SMEs. The best policy is the *Margna Carta for SMEs,* which set portions of bank loans to SMEs. Accordingly, the loan guarantee programs are sophisticated to cater for SMEs. It is not only covering financial policy but also addressing marketing, such as allocating portion of government procurement to SMEs. In sum, the strength is integrated policy implementation.

The *Margna Carta for SMEs* facilitated institutional restructuring to increase effectiveness of the policy. The rebirth of Small Business Corporation and creation of SME Development Council gave birth to SME centers. The Philippines also demonstrated its effort to reorganize previously scattered SME related policies. The mid-long term execution plan is revised recently. With international collaboration (Japan international Cooperation Agency), Department of Trade and Industry of Philippines set up the *SME Development Plan 2004-2010*.

Weakness

The Philippines government have implemented diverse policy measures covering all areas, but the resources are limited to cover the wide area of policy program. Therefore it is difficult to judge whether each sectoral policy is successful or not based on the existence of programs. The size and concentration of financial resources is necessary for successful implementation.

In particular, the Philippines has not achieved the sizable mass for research and development yet. The number of R&D personnel is low, and they are concentrated in university and government research institutes. Technological collaboration between public and private sector can be important, but the current technology transfer program is too small to link the competence of universities and government research institutes with private firms effectively. The lack of high technology domestic corporations accounts for the situation – low participation from private sector. It is also difficult to witness active creation of ventures from the technology business incubator as the history of the program is short and the invested resources are limited.

As for the HRD, although the progress from secondary school to tertiary education is high, the overall outcome of human resource development is poor. The lack of incentives also accounts for the reason why graduates cannot find decent jobs. Even worse for technological innovation, a low rate of science and engineering graduates is reported. The technology policy does not work properly without proper human resource development policy. TESDA was an institutional reform, but providing incentives to get trained and preparing the content is more crucial. As for training technicians, the Technical and Vocational Education and Training (TVET) program has been criticized because its training program is not addressing current industrial demands. The program is under review to increase its relevance.

Financial loan program has been improved, but it is questionable whether the fund for loan guarantee programs is sufficient. SMEs still feel the qualifying standard for loan guarantee program is high. In addition, the fund for start-up firms such as venture capital is rare and the government does not have a specific policy program for this.

There are problems to solve for improving competitiveness of SMEs. In 2005, a Philippines government agency implemented a survey on the obstacles to SME innovation. The result shows that lack of information, government bureaucracy, and lack of trust between government and private sectors are critical problems.

Suggestions

The aim of the current administration is to create more jobs. This is important but must be addressed to create *quality* jobs. People do invest in education when it pays back. Quality jobs are incentives for education. As a government budget is limited, foreign direct investment is critical to create jobs. The government can introduce special benefits for FDI firms that create quality jobs directly or through linkage with local SME suppliers. Policies must be simultaneously implemented. Exploitation of FDI can be achieved when introducing incentives to MNCs that purchase local suppliers' components and providing technological supports to domestic products.

The policy for encouraging firms to conduct research and development in-house is not visible. Although established centers can help SMEs, the incentive for in-house research of private firms is critical. The caveat is that the research can be training and increasing productivity that is not visible on balance sheets in the case of SMEs.

The large Filipino community can contributes to the development of mother country, as India has exploited the potential of ex-pats successfully. Considering the interest in IT and

agricultural strength in the Philippines, encouraging new start-up firms in the fused area of information and biotechnology is preferable. Internationally operating high technology SMEs (*e.g.* SMEs have bases in both the US and the Philippines) may grow from the policy.

Reference

Patalinghun, E, 2003, The Philippines National Innovation System: Structure and Characteristics, *Philippines Institute of Development Studies Discussion Paper Series*, No. 2003-04.

DTI, 2006, Answer to the Survey of the APEC SME Innovation Center – the Philippines.

DTI, 2004, SME Development Plan 2004-2010.

OECD, 2004, Promoting Entrepreneurship and Innovative SMEs in a Global Economy: Towards A More Responsible And Inclusive Globalisation, 2nd OECD Conference of Ministers Responsible for SMEs.

Appendix 8: Summarized Policies in the Philippines

Policy Category	Elements	Detailed Program	Contents Note	
Marketing	Procurement of Government	N.A.	Magna Carta for SMEs has legal recommendation	
	Building up Capacity of Overseas Marketing	DTI Center programs/ And EXPONET	DTI operates various centers that promote export of Philippines firms.	
		PEZA	Special zones for export promotion.	
HRD	Recruiting	Regional training centers	Technical Education and Skills Development Authority operate centers where consultants provide guidance.	TESDA
		PESO	The Public Employment Service Office provide guidance to unemployed and students	
	Training	Regional training centers	Technical Education and Skills Development Authority operate centers for career development	TESDA
		TVET	Technical and Vocational Education and Training	TESDA
		TESDA Kasosyo	Enterprise based training programs	TESDA

Technology	R&D tax credit	RA 7459	Tax/Duty Exemptions Assistance, Loan Assistance Program, Testing Analyses, Travel Assistance and accreditation of inventor's organizations.	
	R&D grant	N.A.	GRI projects may provide partial benefit to SME	DOST/ TAPI
		Small Enterprise Technology Upgrading Program	Not exactly for R&D project but can be associated	DOST
	Collaboration	N.A.		
Financing	Equity Financing	Venture Capital Fund of Activity 37	The actual program is not perceived	
	Debt Financing	SBC program	Loan guarantee program adjusted to the level of SME capability to borrow.	
		SULONG	Multi-department standard of SME loan	
		RA 8289: Mandatory Allocation	Setting quota of financial loan: 8% is allocated to SMEs	
		BMBE fund	Micro-firm can get the benefit	
	Certification of SMEs	SME Awareness Program	Provide entrepreneur training and issue	
		Various Awards	Presidential Awards for Outstanding SME Graduates The SB Corporation Bank Partners	
Management Innovation	Support for Counseling	SME Center	The centers provide both technology and management related advices	
		SME Counseling and Advisory Program	SME regional centers employ full time advisors to consult SMEs	
	Support for e-business	The Philippine Trade Training Center	The center provide E-commerce training	
		SME DB	SME regional centers operate the information system	
Clustering and Networking	Local Assets Level-up Program	PEZA, CSEZ, SSEFG	Specific Zone for export can constitutes clusters	
	Programs to promote Networking	SME Centers	Hub to increase innovative network and also providing consulting service	
		Provincial Opportunities Caravans for SMEs	Multi-sectoral consultation on SMEs' training and technical assistance issues	
	Capabilities Development Program	Technology Business Incubator Program	GRI or university based TBIs	DOST

Chapter 9: Chinese Taipei

1. Economic and Industrial Structure and SME Position

1.1 General Economic Characteristics

Today Chinese Taipei has a dynamic capitalist, export-driven economy with gradually decreasing state's involvement in investment and foreign trade. The most apparent characteristics of Chinese Taipei is that the economy has been dominated by SMEs rather than large business groups unlike its neighbor such as Korea and Japan. It enabled Chinese Taipei to have little suffer from the Asian financial crisis in 1998–1999 compared with many of its neighbors. The global economic downturn, however, combined with increasing bad debts in the banking system, pushed Chinese Taipei into recession in 2001. The year 2001 was the only year when the Chinese Taipei's economy had negative growth since 1947, although the real growth in GDP has averaged about 8 % during the past three decades. Nonetheless, Chinese Taipei has economically rebounded since 2002. Chinese Taipei's real GDP recorded a rapid increase in 2004 accounting for 6.1% growth, while unemployment rate decreased from 5.7% in 2002 to 4.4% in 2004.

In terms of the industrial structure in Chinese Taipei, the agriculture sector constitutes only 2% of national GDP down from 35 % in 1952 (http://en.wikipedia.org/wiki/Republic_of_China). Also, traditional labor-intensive industries have steadily moved offshore, while more capital and technology-intensive industries have been replaced. Due to the relocation of many labor intensive firms in the manufacturing sector to the People's Republic of China, unemployment also reached a level not seen since the 1970s oil crisis. As a result, Chinese Taipei has become a major foreign investor in the People's Republic of China, Thailand, Indonesia, the Philippines, Malaysia, and Vietnam.

<Table 9.1> Economic Trends in Chinese Taipei

Year 2001		**2002**	**2003**	**2004**	**2005**
GDP (US$ billion)	291.9	294.9	299.6	322.3	346.1
GDP per capita (US$)	13,028	13,093	13,254	14,205	15,120
Real GDP growth (%)	-2.2	4.2	3.4	6.1	4.1
Unemployment (%)		5.7	5.0	4.4	-

Source: compiled from http://www.dfat.gov.au/geo/fs/taiw.pdf

1.2 SMEs in the Chinese Taipei Economy

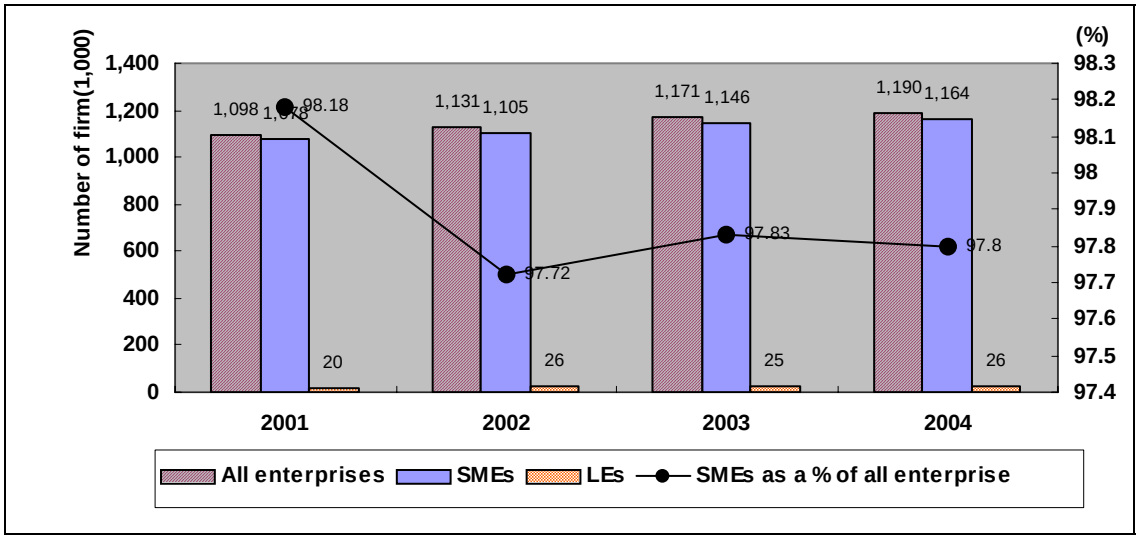
According to the latest version of the definition of SMEs, revised in May 2000, enterprises in the manufacturing, construction and mining and quarrying sectors with paid-in capital of less than NT$80 million or less than 200 regular employees are categorized as SMEs. For other industries, those enterprises that had annual operating revenue of less than NT$100 million in the previous year or that have fewer than 50 regular employees are classified as SMEs.

<Table 9.2> Definition of SME in Chinese Taipei

Sectors	SMEs		Micro Business
	Fixed Asset	Employment (Employees)	
Manufacturing, Construction, Mining, Quarrying	< NT $80 million	< 200 persons	< 20 persons
Commerce, service	< NT $100 million	< 50 persons	< 5 persons

Source: http://www.moeasmea.gov.tw/eng/about_smea/a09.asp

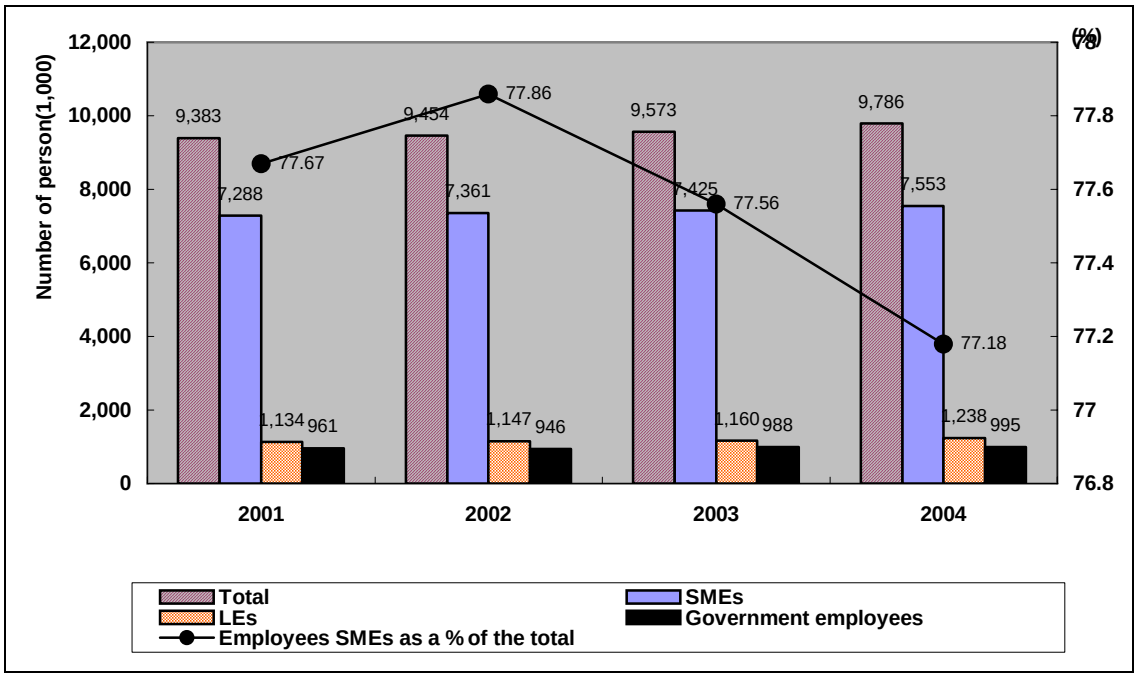
Observing and comparing the development of SMEs in the most recent five years (2000–2004), the number of SMEs had increased with each year, especially in 2003 when the growth rate of 3.8% was the largest during the 5-year period. At the same time, the ratio of SME enterprises as a percentage of all enterprises remained at an average of over 97% (Figure 9.1).



<Figure 9.1> Numbers of SMEs, 2001-2004

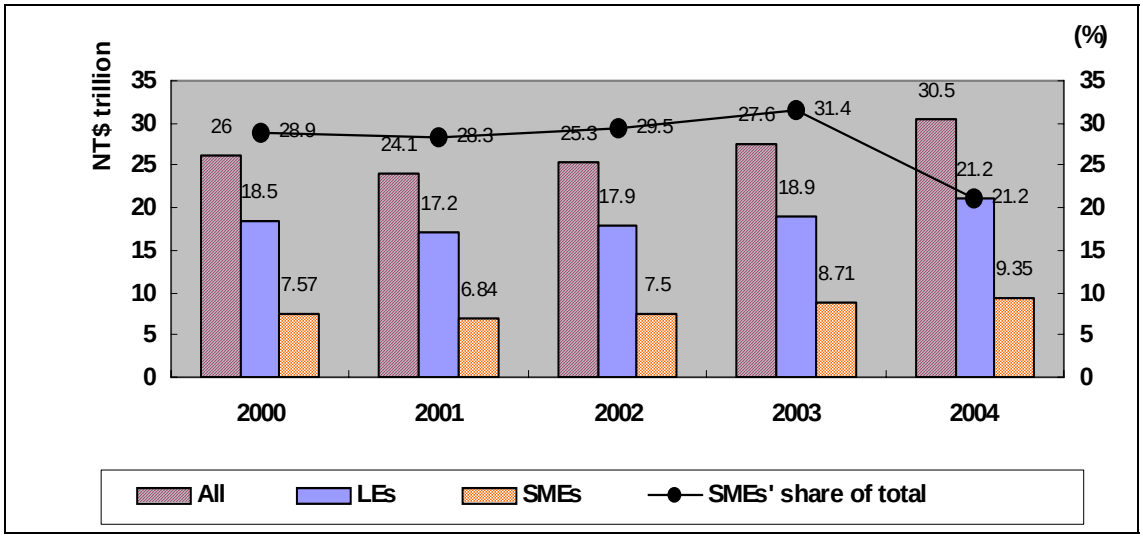
Source: SMEA, 2005

The average number of employed persons in Chinese Taipei in 2004 was 9,786,000, representing an increase of 213,000 (2.2%) over 2003. This total included 995,000 government employees, accounting for 10.2% of all employed persons. 7,553,000 employed persons were working in SMEs; they accounted for 77.2% of all employed persons in Chinese Taipei. The number of employed persons working in SMEs increased by 128,000 (1.7%) compared to 2003 (Figure 9.2).



<Figure 9.2> Number of Employed Persons in Chinese Taipei, 2001-2004

Source: SMEA, 2005: 35

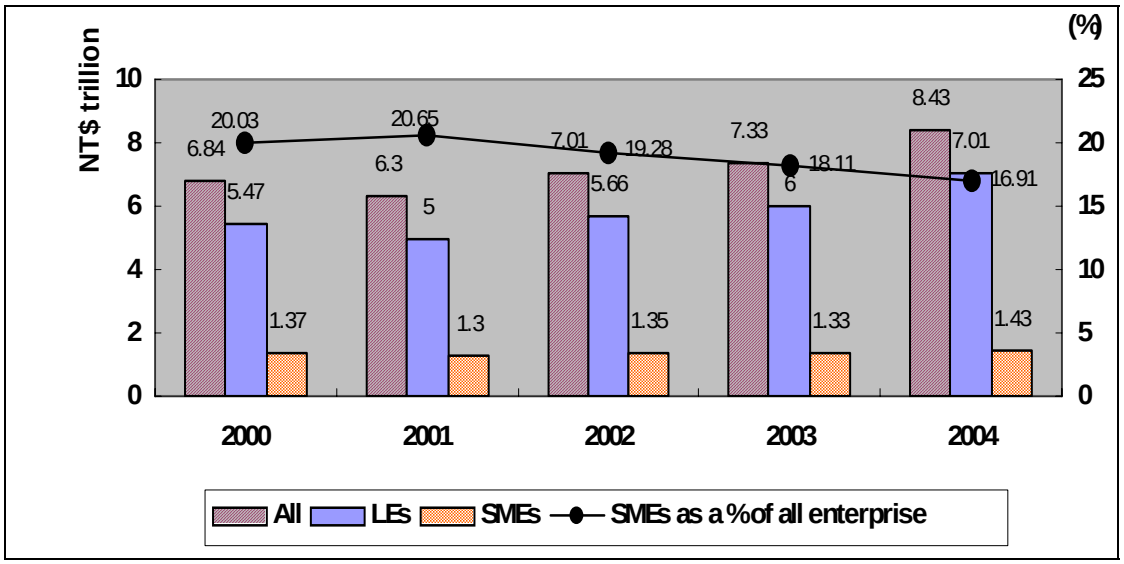


<Figure 9.3> Business Enterprises' Total Sales, 2000-2004

Source: SMEA, 2005: 41

In 2004, Chinese Taipei's large enterprises posted total sales of NT$21,208.7 billion, accounting for 69.40% of the total sales for all Chinese Taipei enterprises. This figure represented an increase of NT$2,245.2 billion (11.8%) over 2003, while the share of large enterprises decreased from 71.1% in 2000. SMEs posted total sales of NT$9,352.5 billion, or 30.6% of the total for all enterprises; this figure represented an increase of NT$645.4 billion (7.4%) compared to 2003, and at the same time its share of the total increased from 28.8% in 2000 (Figure 9.3).

In 2004, Chinese Taipei's large enterprises posted total exports of NT$7,006.5 billion, representing an increase of NT$1,001.6 billion (16.7%) over 2003. Chinese Taipei's SMEs achieved total exports of NT$1,426.4 billion, representing an increase of NT$98.5 billion (7.4%). Large enterprises accounted for 83.09% of total exports for all enterprises, while the SMEs' share fell from 18.1% in 2003 to 16.9% in 2004 (Figure 9.4).



<Figure 9.4> Export Sales, 2000-2004

Source: SMEA, 2005: 44

2. SME Innovation Policies

2.1 Overview of SME innovation policies

Faced with the changes in the economic environment following Chinese Taipei's accession to the World Trade Organization (WTO) in order to maintain their competitiveness, SMEs have had to focus on making their products stand out from the crowd. Therefore, greater importance for SMES is being attached to ongoing R&D operations to increase product value added.

Toward this end, the government has made much effort to promote R&D spending in SMEs already undertaking R&D and to help them to increase total R&D personnel in SMEs already undertaking R&D.

The overall strategy focus for SME innovation in Chinese Taipei is placed on fostering innovative start-ups. Due to numerous start-ups in the economy, it is impossible to provide all of them in-depth consultation and training. Hence, the assistance programs should be divided into several levels based on the business conditions of start-ups. There are three levels in the assisting system for start-ups. The first level is 'The Business Start-up Consulting Service Center.' It offers general and instant consultation services for a wide range of areas in business creation. The second level is the Entrepreneur Lab, which provides in-depth, on-site and individualized services for qualified start-ups. The last level is incubators. They provide very detailed, in-house, and intensive training and consultation services to start-ups that reside in incubators.

By 2003, Chinese Taipei only had the first and the third levels of assistance. It was obviously not enough to provide all-dimension services to start-ups. Something was missing between very general and very intensive assistance. To complement this insufficiency, Chinese Taipei created the middle level service, Entrepreneur Lab, this year. It carries various functions including playing role of bridge between upper and lower levels and being responsible for recommending qualified firms to incubators or to the Consulting Service Center. It opened a window for the firms that are not satisfied with the assistance from Consulting Service Center but are also unable to enter incubators.

2.2 Marketing policy

Government Procurement

Government procurement (including expenditure on construction work, materials and labor) accounts for over 40% of the government's annual budget and most of the rest goes to personnel related expenses. However, SMEs' efforts to secure government procurement business opportunities often end in failure because of unfamiliarity with the relevant laws, regulations and procedures. To help SMEs participate in government procurement, Articles 37 and 38[29] of

[29] **Article** 37 : An entity shall not restrain competition unduly and shall only prescribe the qualifications essential to contract performance in prescribing the qualifications referred to in the preceding Article. The

the section of the SME Development Statute covering public purchasing and public construction were formulated.

In addition, the July 1997 revision of the Constitution included a clause intended to protect SMEs' rights in this area. Article 97[30] of the Government Procurement Law, which was promulgated in May 1999, clearly stipulates that the regulatory authorities may take appropriate measures to help SMEs secure a specified share of government procurement business opportunities. The SMEA has been working actively to help overcome the various problems that have inhibited SME participation in government procurement in the past. The Administration's key work items for 2004 were as follows: (1) Provision of information regarding government procurement opportunities and provision of consulting services relating to the Government Procurement Law. (2) Holding of seminars regarding SME participation in government procurement activities. (3) Ongoing statistical analysis of the level of SME participation in government procurement in Chinese Taipei.

Export promotion

Export plays a significant role in the economic development of Chinese Taipei. The government has been actively working in many ways to assist SMEs in trade promotion. The measures include financing facilitation, e-commerce promotion, export promotion service unit, the plan on product image improvement, and personnel training. Some of important policies adopted by Chinese Taipei on export promotion are introduced herein.

---

tender submitted by a supplier who does not meet the qualification requirements referred to in the preceding Article shall not be accepted, except for financial qualifications that the supplier may submit in lieu a bank guarantee or an insurance policy under which the bank or insurer shares the performance and compensatory liability with the supplier jointly and severally.

Article 38: A political party and a supplier who is affiliated to a political party shall not participate in tendering. The provisions of "Affiliated Enterprise" prescribed in the Company Act shall apply *mutatis mutandis* to the aforementioned supplier who is affiliated to a political party.

[30] **Article 97** (*Amended and promulgated by presidential decree on February 6, 2002 for Articles 97)*: The responsible entity may take into account the requirements of the relevant laws and regulations to adopt measures assisting small and medium enterprises in contracting or subcontracting to the extent not less than certain %age of government procurement in value. The regulations of assistance referred to in the preceding paragraph shall be prescribed by the responsible entity. (www.phhg.gov.tw /CHINESE/tender /pg02/01-pgl910206e.pdf)

Firstly, the lack of finance resource is a common problem for SMEs to conduct export. A difficulty for SMEs to access to financial resource is their credit insufficiency. In order to help SMEs gain financial resource to conduct exporting, the SMEA provides SMEs with *credit guarantee* when they make a loan for their export business.

Secondly, to meet the trend of increasing e-commerce worldwide, the Board of Foreign Trade Cooperated with the External Trade Development Council set up a website which is called *Taiwantrade***.** Taiwantrade is a global online trading hub designed to stimulate immediate access to B2B e-commerce for SMEs and to help them gain a digital edge over their global competition. It is sponsored by the Bureau of Foreign Trade (BOFT), MOEA and administered by the Taiwan External Trade Development Council (TAITRA).

Thirdly, to help resolve problems facing traditional exporters, the government established the *Export Promotion Service Unit*. This Unit, cooperating with all major business associations, provides instant consultation services to SMEs. It also introduces new trends of international markets and export opportunities to SMEs through seminars, information distribution, and case-by-case consultation.

2.3 HRD Policy

Recruiting

On November 18, 2002, the Council for Economic Affairs formulated the concept of "creating jobs through the promotion of public services." In 2003, the President promulgated the Provisional Statute for the expansion of employment through public services; the measures related to the *SME Manpower Assistance* were subsequently drawn up in accordance with Article 3 of this provisional statute. The scope of assistance was expanded from middle-aged and older workers to include all workers aged 18 or over who had yet to find their first job. As of the end of 2004, the number of employees recruited by enterprises under this project had reached 51,488, exceeding the target of 32,000 set by the Executive Yuan. The program had succeeded in reducing the unemployment rate by around 0.3% points. Enterprises continued to employ 65% of the workers taken on under the project even after the government subsidies ended; the project was thus creating long-term rather than short-term employment opportunities.

Training

The government has been working to promote lifelong learning mechanisms, encouraging the adoption of diversified manpower cultivation planning and encouraging the sharing of experience so as to help SMEs to upgrade the quality of their employees and of their specialist expertise, thereby contributing to the formation of a consensus regarding industrial development and instilling new vitality into Chinese Taipei's SMEs as a whole. The five main work items in this area in 2004 were as follows; (1) promoting plans for training center establishment, (2) organizing training courses for specialist talent, (3) the cultivation of management guidance experts (4) the holding of conferences to forecast future development and propose response strategies, and (5) ongoing promotion of the lifelong learning system.

2.4 Technology Policy

Promotion of R&D in SME

The Department of Industrial Technology (DIT) of Ministry of Economic Affairs (MOEA), launched the *Small Business Innovation Research* (*SBIR) program*, mostly referred to the SBIR US version, in November 1998 in order to encourage local start-up companies pursuing innovative research of industrial technologies and products without any retrieve from the subsidy. The SBIR program is also to develop a brand, concept, or new technology, to apply an existing technology to a new application, to apply a new technology or business model to an existing application, and to improve existing technology or products on various aspects.

This program has two phases. Phase I is to evaluate scientific technical feasibility as well as industrial impact of an innovative idea or application. In this phase, the government provides a subsidy up to NT$1 million with company's self-funds, no less than 50%, for up to 6 months periods. For R&D alliance, the subsidy would be up to NT$5 million for up to 9 month periods. Phase II is to implement R&D upon the innovative and precise technical target which has completed feasibility evaluation. In this phase, the government provides the subsidy up to NT$10 million with company's self-funds, no less than 50%, for up to 24 months periods. For R&R alliance, the subsidy would be up to NT$50 million for up to 24 months periods. Up to the end of June 2006, over 2,978 proposals applied in this program, and over 1,760 proposals were awarded. The accumulated government subsidy is NT$3.8 billion with company's self-funds of NT$7.9 billion. Also, accumulated direct R&D manpower benefited from this program has achieved more than 18,000 persons, excluding outsourcing R&D resources.

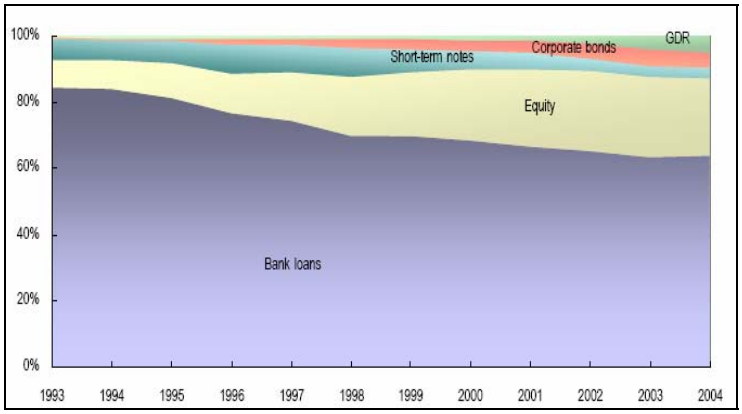
Promotion of Technology Collaboration

The efforts of the government for technology collaboration have been made since 1992 by encouraging the industrial and academic sectors to jointly form a research team to conduct R&D of innovative technologies. In particular, the Chinese Taipei government has launched the *Academia Science and Technology Project*, which facilitates universities to develop industrial technology since 2001. This project enabled universities to establish industrial technology R&D centers, encouraging professors to form research teams on specific subjects and utilizing universities' research capacity. By 2003, this project had approved 29 research programs and established 30 industrial technology R&D centers. Also, in order to facilitate technology dissemination, Technology Transfer Centers were established at universities to develop well-functioning mechanisms on technology transfer or licensing. By 2003, 10 institutions had been approved for government sponsorship to establish their respective technology transfer centers.

In addition, the government established 6 regional industry-academia collaboration centers across the island in 2002. The missions of these centers are to back up the technological development in the regions and turn themselves into strategic allies to both industries and universities. They coordinate the usage of resources owned by university and industry, and serve as a bridge between the two parties. These functions contributed to successful implementation of long-term joint research projects and were conducive to the partnership building between university and business.

2.5 Financing Policy

Before the 1980s, equity financing in Chinese Taipei was limited, and bank loan were mainly destined. Thus, financial dualism was prevalent in Chinese Taipei with informal financial markets as the major lender for SMEs (Chow 2005). However, since the 1990s equity financing has increased, especially since 1997, while bank loan financing has decreased incrementally. Therefore, the debt-equity ratio has been declining over time. In particular, equity financing rather than debt financing has become the main source of innovative SMEs thanks to the government's preferential policy.



<Figure 9.5> Business Financing Channel, 1993-2004

Source: SMEA 2005:76

Nonetheless, debt financing still dominates in Chinese Taipei. The most important financing policy for SMEs in Chinese Taipei is *SME Credit Guarantee Fund*. SMEs often find it difficult to secure financing from financial institutions because of their small size, concerns about repayment ability, the lack of collateral, or their unsound accounting systems. To help overcome this problem, the government established the SME Credit Guarantee Fund in 1974. The main function of the SME Credit Guarantee Fund is to serve as a financing bridge between banks and SMEs. By providing credit guarantees for those SMEs that are unable to provide sufficient collateral of their own, the Fund helps these SMEs to secure financing.

In 2004, the government formulated a development plan for the SME Credit Guarantee Fund. This plan encompassed five main development and transformation strategies – (1) the expansion of the direct credit guarantee mechanism, (2) the promotion of new appraisal systems, (3) the development of innovative new credit guarantee services, (4) putting the SME Credit Guarantee Fund on a sound financial footing, and (5) enhancing the efficiency of service provision. It was anticipated that the implementation of these strategies would help to improve SMEs' ability to secure financing, open up new financing channels, facilitate the implementation of the government's industrial policy, bring about better coordination of guidance resources, leverage the power of centralized credit databases, and help to improve risk management techniques.

As a part of the transformation program, the SME Credit Guarantee Fund will also be setting up a new risk management department and introducing new performance appraisal systems, so as to gradually reduce the loss. Thus, it can continue to function as an important source of support for Chinese Taipei's SMEs.

Provision of Consulting and Guidance Services for Financing

The SMEA established the *SME Troubleshooting Center* in 1996 to help SMEs to mainly overcome financial problems related to the availability of land for factory construction, access to market and technical information, the tax burden (including import duty), etc. During the past nine years, the Center has provided service to more than 20,000 SMEs. Over 80% of the problems for which the Center provided assistance were related to financial matters; more than 500 SMEs that would otherwise have been forced to close down were able to remain in business, thereby protecting the jobs of almost 30,000 workers.

2.6 Management Innovation Policy

To improve the capabilities of internal information management, the SMEA has been working actively to provide guidance to SMEs in the areas of e-enablement and internet technology, encouraging them to make full use of internet to develop new distribution channels, and stepping up the provision of guidance to promote e-business and the enhancement of competitiveness, etc.

Overall Information

The information management capability of SMEs has been strengthened through the **'***e-Land***'** project promotion by expanding the software and hardware equipment and network content to improve the functioning of these systems. For example, 51 issues and reports were published in e-papers and magazines in the e-Land portal site.

Another way in which the government strengthens the information management capability of SMEs is placed on increasing the broadband penetration rate by assisting SMEs with the adoption of broadband e-enablement infrastructure, market research and work planning; monitoring the rate at which SMEs are implementing e-enablement through the establishment of broadband Internet access; and adjusting the annual work plans in light of this information. As a result, 2001 SMEs were benefited from this item.

Promotion of e-business

Industry-specific online databases and e-business mechanism, which is called *e-Enablement system*, were established for 58 industries in 2004. This has been implemented by *SME e-Enablement service team* and *e-Enablement deepening service team*, which were established as a joint effort between government, industry and academia. Besides providing on-site diagnostics service and offering SMEs guidance with respect to e-enablement, the Teams also formulate e-enablement processes and model mechanisms for individual industries, provide assistance with e-enablement appraisal operations, and investigate the degree of improvement that enterprises experience after implementing e-enablement. In addition, the SMEA has provided assistance to several industries in the setting up of online marketplaces, helping them to make use of the relevant mechanisms, and assisting with the collection of information, so as to boost the competitiveness of SMEs in international markets.

The second way in which the government strengthens the information management capability of SMEs is the promotion of e-learning by establishing e-learning platform, which is called *Business Zone*. It implements two online marketing management courses: one is online health and safety education course and the other is online enterprise management class.

Consulting

There is a provision of SME e-enablement consulting and diagnostic guidance services by promoting information management application adoption among SMEs. It is to assist SMEs with the process of e-enablement, while at the same time collecting information on information management utilization among SMEs for future reference.

2.7 Clustering and Networking Policy

Industrial Park Policy

As in many economies, the industrial parks in Chinese Taipei provide firms with land and facilities at a very low cost, while also offering them a number of administrative services. In addition to this traditional strategy, Chinese Taipei has recently adopted a series of innovative approaches to make the newly established parks even more successful than Hsinchu Science Park.

(1) *The core company strategy*: To attract firms to locate themselves in the parks, we target the core companies of concerned industries, and give them the opportunity to participate in park designation and development planning. Once the core companies have agreed to invest in a park, a large number of smaller firms are sure to follow their lead, ensuring that a cluster can be built up.

(2) *An integrated approach*: In addition to manufacturing firms, the newly established industrial parks are also home to research institutes, venture capital firms, incubators, and other service providers. The parks have thus turned to integrated clusters with a variety of functions.

(3) *Cross-industry interaction*: In order to create more opportunities for innovation, some industrial parks deliberately arranged different industries to be located close to one another. For instance, in the Nankang Software Park, an area was circled exclusively for the companies and related institutes in the bio-tech industry. It is believed that these bio-tech newcomers can benefit from interaction with software companies in the areas of information provision, new medicine development, and micro-chip production.

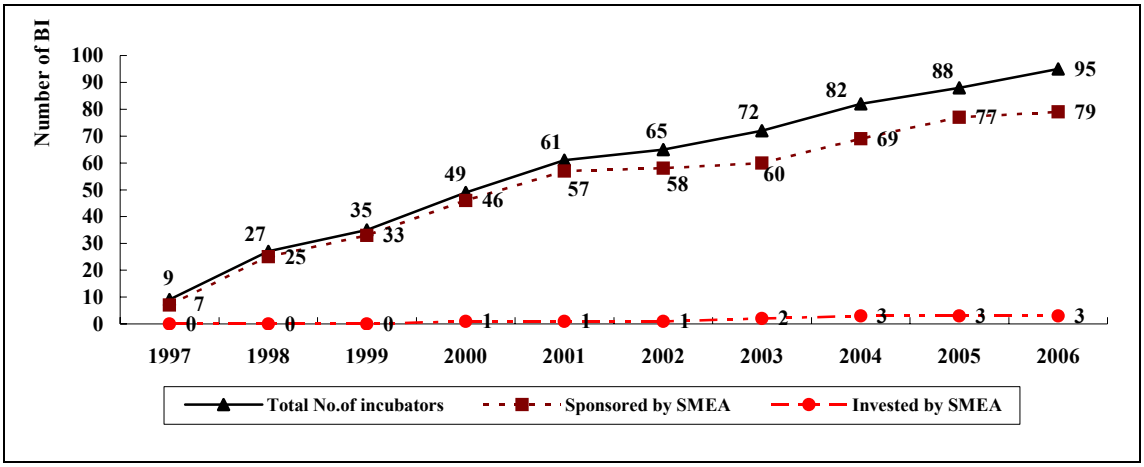
(4) *Localizing and privatizing industrial park operation*: Adopting a different approach from that used with the Hsinchu Science Park, Chinese Taipei's new science-based industrial parks were mainly constructed with active participations from the private sector. The minimized role of the government reduces the need for public funding and capitalizes on local advantages to foster a more flexible business environment.

Business Incubation Policy

Promoting the establishment of new enterprises is a key element in the government's strategy to reinvigorate the Chinese Taipei's economy. It has also reduced unemployment and boosted the competitiveness of the Chinese Taipei's industry. In line with its strategy of developing Chinese Taipei into an ideal location for SME start-up, growth and development, the government formulated the *Asia Entrepreneurial Development Center* (AEDC) plan in 2002, aiming to build up a comprehensive SME incubation platform that would integrate incubator centers, access to knowledge and information, and venture capital funding.

The promotion of incubator center establishment began in 1996; within the space of eight years, a total of 1,883 enterprises had benefited from SME incubation services, of which 12 went on to secure stock market or OTC listing. By the end of June 2005, there were 95 incubator centers in Chinese Taipei. Three of these were established directly by the SME Development Fund, and

the Fund provided support for the establishment of 79 others so as to strengthen Chinese Taipei's overall incubation capabilities (see Figure 9.6). Of 95 incubators, 93 incubators are located in universties across Chinese Taipei and 2 are located in Hsinchu Science Park and Nagang Software Park. Over 90% of incubator centers in Chinese Taipei receive funding support from this fund; the total amount of funding for incubator centers every year runs to nearly NT$200 million. As the fund is already making a loss, there is a clear need to review the necessity for the current subsidy mechanism.



<Figure 9.6> Trends in the number of business incubators in Chinese Taipei

Source: SMEA in-house data

3. Overall assessment

Chinese Taipei economic environments surrounding SMEs have several strengths in promoting SMEs innovation activities: 1) building an environment conducive to SMEs innovation, 2) technology spillover from universities to SMEs, and 3) governmental policy's focus on incubation centers.

Firstly, the government has made great efforts to establish an environment in which SMEs can be innovative by adjusting institutional framework and infrastructure for SME operation. Overall government efficiency for SMEs in marketing, technology and business incubation are quite advanced compared to other developing member economies. The example of building an environment conducive to SME innovation could be found out in the development and completion of the institutional framework for marketing, especially exports. Also, the establishment of the SBIR program to encourage start-ups by pursuing innovative research of

industrial technologies and products provides good business environments for SME innovation.

Secondly, there are many efficient policies for disseminating technology and R&D output generated by universities into SMEs by building technology infrastructure and business incubators in universities. The establishment of Regional Industry-Academia Collaboration Center, Technology Transfer Center and BIs in universities has led SMEs to participate in the process of R&D and technology development of university Labs.

Finally, recently Chinese Taipei has been an ideal location for SME start-ups by paying much attention to the complementation of BI's function. By 2003, assistant programs for start-ups in Chinese Taipei only had the consulting service and incubator service level. It was obviously not enough to provide all-dimension services to start-ups. Something was missing between very general and very intensive assistance. To complement this insufficiency, the government created the middle level service, Entrepreneur Lab, this year. It carries various functions including playing the role of a bridge between upper and lower levels and being responsible for recommending qualified firms to incubators or to the Consulting Service Center.

Despite of these strengths, Chinese Taipei economic environments have a number of weaknesses in promoting SMEs innovation. In particular, some weaknesses could be found out in BIs, which are likely to be best practice in Chinese Taipei SME innovation policies. Recently the SME development fund for business incubation centers has been making a loss. It shows that there is a need to review the necessity for the current fund system for operating BIs. In addition, the characteristics of both the products and technologies generated in BIs are very similar in all incubators.

Therefore, the government could be recommended to promote the privatization of BIs by participating venture capital firms in the operation of BIs and to concern the ability of BI managers to generate profits. It needs to make more efforts to consider the locational and technological assets of BIs to establish specified business incubators by fitting start-ups into the special feature of BIs.

Reference

SMEA, 2005, White paper on small and medium enterprises in Chinese Taipei.

http://www.mof.gov.tw (Ministry of Finance, R.O.C.)

http://eng.dgbas.gov.tw (Directorate-General of budget, Accounting and statistics, Executive Yuan, R.O.C.)

http://www.moeasmea.gov.tw(Small and medium enterprise administration)

http://en.wikipedia.org/wiki/

http://www.ntuiic.com

http://www.sbir.org.tw

Appendix 9: Summarized Policies in Chinese Taipei

Policy Category	Elements	Detailed Program	Contents Note	
Marketing	Procurement of Government	Article 97	-Provision of information -Holding of seminars	
	Building up Capacity of Overseas Marketing	Credit Guarantee	when they make a loan for their export business	SMEA
		Taiwantrade	Global online trading hub designed to stimulate immediate access to B2B e-commerce	BOFT TAITRA
		Export Promotion Service Unit	Seminars, information distribution, and case-by-case consultation for export	
HRD	Recruit	Manpower assistance program	- Include all workers aged -To recruit from the unemployed and young people who had yet to find first job	SMEA
	Training	Human resource development and training	To promote lifelong learning mechanism by encouraging the adoption of diversified manpower cultivation planning	
Technology	R&D Promotion	SBIR Program	-Phase I is to evaluate scientific technical feasibility as well as industrial impact of an innovative idea or application -Phase II is to implement R&D upon innovative and precise technical target which has completed feasibility evaluation	DIT
	Collaboration	Industry-academia collaboration centers	To back up the technological development in the regions	

		Academia Science and Technology Project	To establish industrial technology R&D centers, encouraging professors to form research teams on specific subjects and utilizing universities' research capacity	
Financing	Equity financing			
	Debt financing	SME Credit Guarantee Fund	To help overcome the problems related to the lack of collateral	
		Troubleshooting Center	Consulting and guidance service for financing	SMEA
Management Innovation	Overall information	E-land	Platform functions, information service network, collecting business data, promotional and publicization activities	
		Raising broad-band penetration rate	-Helping SMEs to adopt broadband e-enablement infrastructure -Publicization of broadband e-enablement applications for SMEs	
	counseling	Provision of SME e-enablement consulting and diagnostic guidance services	To assist SMEs with the process of e-enablement, while at the same time collecting information on information management utilization among SMEs for future reference.	
	Promotion of e-business	e-Enablement system	-On-site diagnostic service -Providing assistance with e-enablement appraisal operation	
		Business Zone	- E-learning platform - Online enterprise management class	
Clustering and Networking	Local Assets Level-up Program	Industrial Park Policy	-The core company strategy -An integrated approach -Cross-industry interaction -Localizing and privatizing industrial park operation	
		Asia Entrepreneurial Development Center (AEDC) plan	To build up a comprehensive SME incubation platform that would integrate incubator centers	

Chapter 10: Thailand

1. Economic and Industrial Structure and SME Position

1.1 General Economic Characteristics

During the last four decades, the Thai economic structure has changed from an agriculture-based economy to an economy in which the industrial sector has gained distinctive significance. The share of the agriculture sector in GDP has been reduced remarkably from almost 40% in the 1960s to around 10% in the late 1990s. In particular, the composition of exports in resource-based and labor-intensive manufacturing sectors has gone down, while that of the science-based sector has undergone a significant growth especially in 1990s.

However, it seems that the significant growth in science-based export in the 1990s does not imply the transition of the Thai economic structure to more technology-intensive, because indexes categorized in Table 10.1 do not reflect the sophistication of technological activities required to produce goods. The industrial policy of Thailand in the export-oriented regime (1980s-1990s) did not pay enough attention to the development of indigenous technological capability as an integral factor in the process of industrialization. Also, the main direction of the investment policy, especially the promotion of foreign direct investment (FDI), was aimed mainly at generating inward foreign capital flow and employment. It led Thailand to rely on the foreign capital and technology significantly. In other words, the industrial and investment policy of Thailand overshadowed the need to develop local initiatives and indigenous technological capability development. These economic structural problems have led to economic crisis and the major shift in policy regime under the Thaksin government since the early 2000s, which is called 'Thaksinomics.'

<Table 10.1> Distribution of Manufactured Export by Technological Categories (%)

	1980 1990 1999		
Resource-based	21.7	13.8	10.7
Labor-intensive	47.0	45.5	35.8
Scale-intensive	7.8	6.3	7.7
Differentiated	22.2	14.1	19.5
Science-based	1.2	20.2	26.4

Source: compiled from Intarakumnerd, *et al*., 2002

The Thaksin government as like other newly developing economies such as Chinese Taipei and Korea has focused on indigenous technology capability development as a key factor to enhance meso- and micro-level foundation for international competitiveness. It has been mainly implemented by the 10-years science and technology action plan (2003-2013) by addressing serious 'selective' policies in specific sectors such as automotive, food, tourism, fashion and software sectors. At the same time, both large enterprises and SMEs have made great efforts to increase their R&D activities and absorb the product design and know-how from foreign experts. As a result, the Thai economy in recent years has shown the direction for strong economic growth due to the policy transition to the development of indigenous technology capability.

Total GDP reached the value of USD161.9 billion in 2004. The real growth rate has increased from 4.4% in 1999 to 6.1% in 2004. Although the real GDP growth rate in 2004 is slightly lower than previous year, it is still strong compared to other Asian economies. Regarding to employment, unemployment rate has decreased incrementally from 4.2% in 1999 to 2.2% in 2004. It shows that the Thai economy has recovered, thanks to the policy transition to indigenous technology capability development.

<Table 10.2> Economic Trends in Thailand

	1999 2000	2001 2002	2003			2004
GDP(US$ billion)	122.5	122.4	115.4	126.3	142.9	161.9
Real GDP growth* (%)	4.4	4.6	1.9	5.2	6.8	6.1
Unemployment	4.2	3.6	3.2	2.2	2.0	2.2

Note:* At constant 1988 price

Source: OSMEP 2004 and 2005

1.2 SMEs in the Thailand Economy

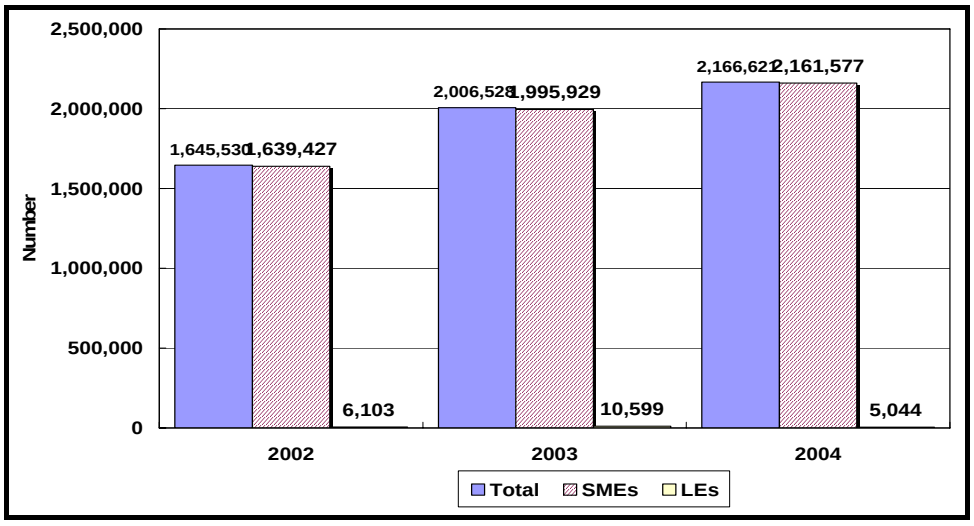
According to the regulation of Ministry of Industry issued on 11th Sep. 2002, the definition of SMEs limits the size of SMEs by using the number of employment or value of fixed asset excludes land. It is based on the number of full-time employees or fixed assets. For example, in manufacturing sector, small enterprises do not exceed 50 people in the number of employment or does not exceed THB 50 million in fixed assets. If the number of employment ranges between 51 and 200 people or fixed asset; excludes land, exceeds THB 50 million but less than THB 200 million then it is considered as medium enterprises.

<Table 10.3> Definition of SME in Thailand

	Employment (Employees)		Fixed Assets (1 million Bhat)	
	Small Medium		**Small Medium**	
Manufacturing	less than or equal to 50	51-200	less than or equal to 50	>50 - 200
Services	less than or equal to 50	51-200	less than or equal to50	>50 - 200
Trading **- Wholesaling** **- Retailing**	 less than or equal to 25 less than or equal to 15	 26 - 50 16 - 30	 less than or equal to 50 less than or equal to 30	 >50 - 100 >30 - 60

Source: http://www.actetsme.org/thai/thai98.htm

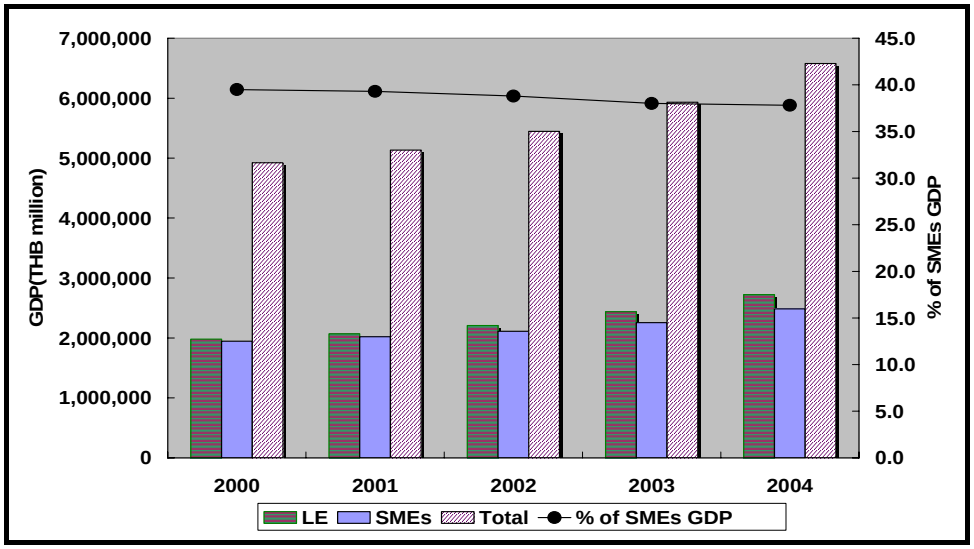
SMEs are a major driver for economic development in Thailand, as most of registered firms are SMEs and the contribution to GDP and export has been significant. As shown in Figure 10.1, there were 2,161,577 SMEs in 2004. It accounts for 99.8% of total number of enterprises. Also, the number of SMEs has gone through a dramatic increase from 799,033 in 1997 to 2,161,577 in 2004.



<Figure 10.1> Number of SMEs, 2002~2004

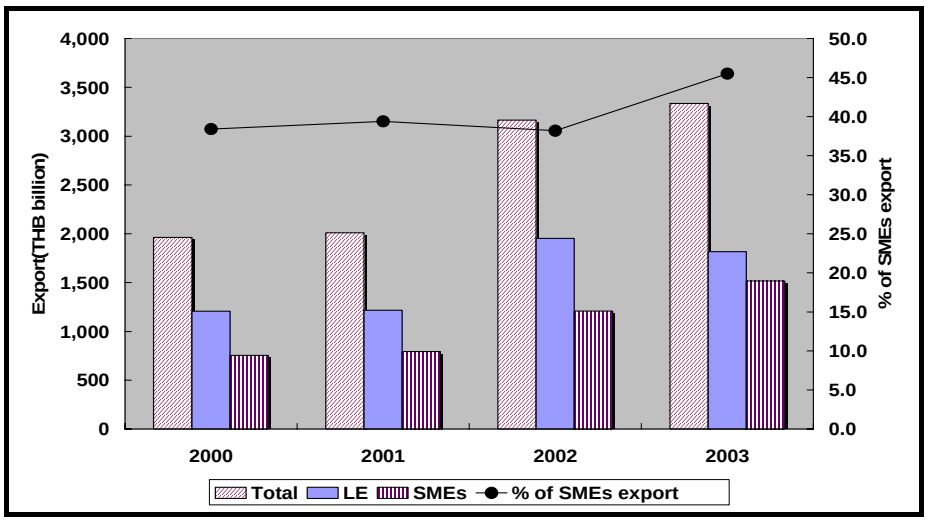
Source: Compiled from OSMEP, 2004 and 2005

In particular, the contribution of SMEs to GDP and export in Thailand has been significant. As shown in Figure 10.2, the contribution of SMEs to GDP is still critical, accounting for 37.8% of total GDP in 2004, although its proportion of GDP has slightly decreased from 39.5% in 2000. Also, regarding to SME contribution to export, its export value of manufacturing products was THB 1,516.9 billion in 2003, which is 45.5% of export value (Figure 10.3). The export value of manufacturing products has shown a tendency of increasing during 2000-2003.



<Figure 10.2> GDP by enterprise size in 2000-2004

Source: Compiled from OSMEP, 2005



<Figure 10.3> Exports by Enterprise Size in 2000-2003

Source: Compiled from OSMEP, 2004

2. SME Innovation Policies

2.1 Overview of SME innovation policies

According to a number of literature and evidences, the main reason for the 1997 economic crisis in Thailand is likely to result from the fragmented economic structure overwhelmed with huge foreign debts and high non-performing loans (NPLs) of large enterprises (LEs). Thus, the Thai government has emphasized the innovation of SMEs as an alternative engine for economic recovery and sustainable economic development. As one of ways in which enhance SMEs' innovative activities, the Thai government enacted the Small and Medium Enterprises Promotion Act in 2000, and established the Office of the SMEs Promotion (OSMEP). OSMEP works as an independent government agency, acting as a central planning office, coordinating the strategic plans and works of all relevant agencies related to SMEs development.

In addition to the establishment of OSMEP, the government proposed the Promotion Plan of Small and Medium Enterprises of Thailand (2002-2006) in the line with the 4th Social and Economic Development Plan, to emphasize the importance of SME development. What is more, the SME bank was established in 2002, as a specialized financial institution, providing financial support to SMEs and promoting new SMEs.

At present, there are three committees in charge of SME promotion; the Competitiveness Development Committee of the National Economic and Social Development Board, the One Tambon One Product (OTOP) Committee and the SMEs Promotion Committee of the OSMEP. The above committees draw funding from the same SME promotion fund (Poonpatpubul and Lithammahisorn, 2005: 20). Although they have different origins, their main strategic priority is placed on the development of the technologic facilities and the innovative development of SMEs.

2.2 Marketing Policy

In terms of government procurement in Thailand, the government has not initiated it for SMEs, although it has idea and concepts to contribute the government bidding to promoting the marketing activities of SMEs in the near future. Instead of it, the government has made an effort to promote SME marketing by integrating SMEs into the global supply chain of MNCs or LEs. It has been implemented through the *National Supplier Development Program* (NSDP) and the Board of Investment (*BOI) Unit for Industrial Linkage Development* (BUILD).

The NSDP is a kind of subcontracting development programs to foster linkage with large enterprises, while the BUILD is (1) to stimulate more consumption of local parts and components, (2) to provide chances for the parts' manufacturers to enter new assembly markets, (3) to help parts' manufacturers understand related businesses and (4) to encourage more investment in parts and components' manufacturing in Thailand. Thus, they provide opportunity for SMEs to promote domestic and international marketing by integrating into the global supply chain of MNCs or LEs.

In addition, substantial assistance for SMEs in exports is to be offered by establishing *ISO Certification Program*. This program is to control the quality of products by setting up the standard towards enhancing SME innovation.

2.3 HRD Policy

In order to solve the skill gap faced by all industries and enhance the awareness of entrepreneur culture, the Thai government has paid attention to the investment in training. In particular, the training program had been activated through the New Entrepreneurs Creation (NEC) program. The Department of Industrial Promotion (DIP) hired consultants from central and local educational organizations, financial institutions, associations and independent organizations for training operation with short-term and long-term periods.

The short-term course (training 72 hours) was set up for people with basic knowledge and experience in business operation. It is composed of knowledge about establishing business, related laws, business investment analysis, marketing strategy, manufacturing management, accounting system, conducting investment and business plans, and proposing business plans to financial institutions.

The long-term course (training 138 hours and provide advisory services in creating a business 60 hours) was set up for people without basic knowledge and experiences in business operation. This focuses on preparing readiness in business operation, providing knowledge of establishing business and related laws, business investment analysis, marketing strategy, manufacturing management, organization and human resource management, accounting system, conducting investment and business plans, and proposing business plans to financial institutions.

2.4 Technology Policy

The Department of Industrial Promotion (DIP) is promoting linkages between local SMEs and foreign firms. However, because of inadequate technology, outmoded production processes and low management capabilities, local SMEs are not able to take full advantages of the linkage with foreign firms. It resulted from governmental protection and promotion without strengthening the absorptive capability of Thai suppliers. Therefore, the Thai government has focused upon the promotion of the technological collaboration by increasing consultancy, advice and technology transfer service, and creating new spin-offs.

One of the main policies which promote technology-based SMEs' R&D in Thailand is placed on the increase in public R&D fund emerged by the Board of Investment (BOI). In practice the *Vendors Meets Clients (VMC) program* within BOI is the only scheme with a specific focus on technology development or transfer. The main aim of VMC is to match vendors/manufacturers with customers/assemblers. It would involve parts' manufacturers in assembly plants. This linkage opportunity assists the manufacturers to initiate business deals to supply parts and components for their plants. As a result, the parts' manufacturers lean what assemblers want, while assemblers learn more about the firms who can supply parts they require.

In addition to this, the National Science and Technology Development Agency (NSTDA) launched the *Industrial Technology Assistance Program* (ITAP). The main contents of the program are composed of industrial consultancy and technology acquisition services for SMEs. Firstly, industrial consultancy is served through the diagnosis of preliminary technical problems by both local and overseas experts to solve technical problems as well as assist in production R&D which may include technology management. Secondly, ITAP facilitates the process of searching for and acquiring appropriate technology.

ITAP provides Thai SMEs with the opportunity to obtain first-hand information on technological advancements and innovation. It also provides them with visions of tomorrow for their future technological and business development. This is done by arranging overseas technology trips and organizing in-bound and out-bound matchmaking events. These activities offer SMEs the opportunity to find new and appropriate technology and to establish technological and business partnerships with foreign companies. The trips normally involve visiting sources of technology in particular fields such as research organizations, companies and production plants, meeting with potential partners according to pre-arranged schedules, and visiting industrial trade fairs to obtain the latest technology information and market trends.

2.5 Financing Policy

Financing measures related to the banking sector and capital markets have been initiated with the Promotion Plan of SMEs. The measures include both debt and equity aspects of financing.

<Table 10.4> Loans to SMEs from Specialized Financial Institutes

Financial Institutes	Total Loans for 2003 (THB million)	Results (Jan.-Dec., 2003)		
		Number (item)	Total (THB million)	% per year
SMEs Bank	30,000	6,197	27,372	91.2
Krung Thai Bank, PCL	29,000	3,117	52,115	179.7
IFCT	15,000	1,724	17,855	119.0
SCIB, PCL	12,000	4,855	20,850	173.5
Bank for Agriculture & Ag ricultural Coop.	9,500	180,751	10,370	109.1
EXIM Bank	5,000	595	9,081	181.6
The Gov ernment Saving Bank	5,000	65,288	4,724	94.5
Bank Thai, PCL	3,750	589	9,164	244.4
Total	109,250	263,116	151,531	138.7

Source: OSMEP, 2004

As for debt side, Small Industry Credit Guarantee Corporation (SICGC), state-owned specialized financial institution, is the only financial institution that engaged in loan guarantee for SMEs. There are three kinds of *loan guarantee programs* for the whole loan which has no collateral evidence. The first guarantee does not exceed 50% of total amount of the loan and the maximum value for the guarantee is not over THB 40 million. The second is also not over 50% of the total amount of the loan and maximum value for the guarantee is not more than THB 3 million[31]. The final is the guarantee of the risk participation. The SICGC guarantees a new loan which has no collateral and the guarantee does also not exceed 50% of the total amount of the loan. In 2003, the 8 public Specialized Financial Institutes (SFIs) had a mutual agreement to

31 There are three cooperative projects in this type of guarantee: (1) project with the Government Saving Bank; (2) Project with the financial institution to assist the investor in allocating the collateral evidence for the their debtor; (3) Project that supports loan for SMEs that have ability to operate the business of the Bank of Thailand

achieve an objective in offering the loan for SMEs. At the end of year 2003, they provided loans to SMEs in the amount of THB 153,531 million, which is 138.7% of initial target loans for 2003 (THB 109,250 million)

Concerning equity financing policies, two main initiatives are the establishments of *Venture Capital Funds* (VCFs*)* in 2003 and the stock exchange for SMEs called *Market for Alternative Investment* (MAI). VCFs were raised to enhance the competitiveness of Thai businesses. Target groups are fashion & design-based, software and IT, food & herbs, automotive parts, tourism, export-oriented business, and supporting industry. There are two main objectives of VCFs. Firstly, it is to raise capital fund for SMEs who have high business potential and belong to the selected business categories. Additionally, it is to promote SMEs in accordance with SMEs' Strategic Promotion Policies in order to elevate Thai business potential. Secondly, it is to reduce debt to equity of SMEs and offer support to SMEs in management, marketing, accounting, etc until they are able to raise their own equity financing from the Stock Exchange of Thailand (SET) or Marketable Alternative Investment (MAI). As for the MAI, it has started its operation since 1999 with the objectives to provide an alternative funding channel for SMEs as well as offer a greater range of investment alternatives for investors.

Concerning both loan and equity sides, the government initiatives are more successful on the debt financing rather than the equity side. As mentioned earlier, bank loans to SMEs exceeded the target by 38.7% in 2003, whereas the VCFs and MAI have faired much less satisfactory. The total value of the three existing VCFs is far below the government's initial targets. By 2004, only 97 SMEs have found their counterpart investors. In addition to this, the goal of the MAI was set at having 500 listed SMEs in the market, but there were only 27 firms with listed stocks in this stock exchange. The most important factor limiting the number of firms entering this market is their obligations to reveal financial information to the public (Poonpapibul and Limthammahisorn, 2005:29). It is costly for SMEs outside the MAI to upgrade their accounting practice to meet the required standard.

<Table 10.5> Value of Investment in the three VCFs in 2004

Funds	Establishment	Target (THB million)	Value of investment (THB million)	Number of SMEs
OSMEP Fund	2004	5,000	145	15
The SME Bank Fund	2003	N.A.	534	28
The One Asset Fund	1999	1,000	492	54

Source: complied from Poonpapibul and Limthammahisorn, 2005:29

2.6 Management Innovation Policy

To make management innovation come true, in the macro perspective, the government has introduced the private sector's management style to improve the efficiency and effectiveness of bureaucratic system. Chief Executive Officer (CEO) style is now being implemented both at central and local government levels in order to integrate related government policies under clear leadership.

Consulting

OSMEP has the in house consultancy service such as the coordination & service center for SMEs that include the facilities and the general consultancy service and business matching both domestic and international fields.

Promotion of awareness of SME innovation

NIC undertaken by OSMEP propagates research works in universities through activities and seminars to build recognition and awareness on SME innovation. Also, the National Innovation Agency (NIA) launched knowledgeable innovation projects for the public and SMEs to stimulate the recognition and awareness of the SMEs on the innovation based economy.

Information provision system

It is to improve the innovation management technique by giving specific tools like value analysis, benchmarking, technology watch and business matching with international organizations. It is also to deliver a government program to make innovation be effective and raise their competitiveness through increasing the capabilities of the domestic and grass-root economies by implementing the Village Fund.

2.7 Clustering and Networking Policy

In Thailand, the cluster concept has been used as a means to rectify weakness and fragmentation of innovation systems. It has been resulted from predecessors who pay most attention to macro-economic stability. Therefore, the Thai government has placed emphasis on enhancing meso- and micro-level foundations for international competitiveness. The high priority of

competitiveness is the establishment of the *National Competitiveness Committee* chaired by the Prime Minister. The main strategic direction has been 'selective' policies addressing specific sectors and cluster. Its outcome is the pursuance of five strategic clusters in automotive, food, tourism, fashion and software sectors[32]. As of 30 November 2004, 17 clusters in different industries were established. As for SME clusters, concerted efforts to develop SME clusters are yet to be formulated, but the OSMEP has been working on a plan for regional SME clusters establishment.

What is more, the network brokers or intermediary organizations in Thailand have played an important role in elaborating networks among innovative actors such as SMEs, LEs, MNCs, PRIs, universities, professional service providers in clusters to promote and support the R&D and technology transfer. They perform functions of stimulating information and knowledge sharing, and building trust among participating firms in clusters. Thus, the Thai clustering and networking policies have intended to work closely with intermediaries and strengthen their institutional capabilities especially in linking a number of firms to other actors in clusters. However, as this kind of mechanism for stimulating clusters has launched since a few years ago, the clear performance has not appeared yet.

Business Incubation Program

In addition, the Thai government has policies for business incubation to encourage start-up SMEs. The main government policies or programs for business incubating have been governed and coordinated by the Department of Industrial Promotion (DIP), the Institute of SME Development (ISMED)[33], OSMEP and National Science and Technology Development Agency (NSTDA).

The first government incubation program was created under the Thai national master plan for the development of SMEs in Southern Thailand. With funding and technical supports from the EU, the first incubation center was established in 1999 by the DIP, and the ISMED. The pilot center was set up on the grounds of the Regional Industrial Promotion Center in Hat Yai, Songkhla (www.ismed.or.th /IASBIA.php).

Significant business incubators emerged in 2002 using a new budget from the New Entrepreneurs Creation (NEC) program which aims to promote entrepreneurship development

[32] It includes Kitchen of the World (food cluster), Detroit of Asia (automotive cluster), Asia Tropical Fashion, World Graphic Design and Animation Centre (software cluster), and Asia Tourism Capital.
[33] The ISMED has been set up since 1999 as a core technical center that serves as an interface between SME owners and the government.

throughout Thailand[34]. The incubation center was one of the major activities under the NEC program. The representative business incubation programs under the NEC program are *'Young SMEs entrepreneurship project,' 'Creative Technician transform to SMEs Business Project,'* and *'Technopreneur training project.'* 'Young SMEs entrepreneurship project' and 'Creative Technician transform to SMEs Business Project' are the projects to endorse SMEs undertaken by the incubation center of OSMEP. The technopreneur training project is to reinforce innovative entrepreneurships undertaken by the incubation center of NSTDA.

3. Overall Assessment

The 1997 economic crisis which resulted from huge foreign debts and high no-performing loans of LEs in Thailand has led the government to make great efforts to promote the innovation of SMEs. In particular, the government has focused on the development of indigenous technology capability of SMEs by increasing technology collaboration, expanding market opportunity, establishing BIs and enhancing financial funding measures related to the banking sector and the capital market.

Nonetheless, some problems with the promotion of SME innovation could be found in the lack of institutional and provisional infrastructures in marketing, entrepreneurship and access to finance. First of all, there is no real marketing policy for SMEs. Although SME marketing has been supported by SMEs and MNCs/LEs linkage development programs, they are mainly focused on training level to enable SMEs to integrate the supply chain of MNCs or LEs by improving their technological capabilities.

Secondly, institutional environment for enhancing entrepreneurship is insufficient in Thailand. Although there are a number of programs for reinforcing innovative entrepreneurship of SMEs in the name of business incubator programs, there is no real system to connect the SME sectors

[34] There are two different models of business incubators in Thailand. If classified by space utilization, it could be grouped into two; in-wall and out-wall/Out-reach. An incubator in-wall refers to actual physical infrastructure that houses start-up SMEs. It provides office space and infrastructure, access to networking of contacts, technology resources, human resources, operational expertise, and legal and accounting supports.' An incubator out-wall does not provide official infrastructure. These centers accelerate the process of starting, which may already have their own office and equipment, by offering expertise and services only. This may include consulting services to bolster the business plan, repositioning the firm, validating the business model, or bringing products to market (OSMEP 2004).

with educational institutions and government agencies. For example, as the government prohibits professor from holding an additional position in an industrial firm, it is difficult to generate real linkage and coordination between academy and industry sectors.

Finally, the access to equity financing sources of SMEs is poor because of the complexity of borrowing procedure and lack of information and advice from financial institutions in the side of SMEs, and the inadequacy of loan collateral and below standard accounting in the side of financial institutions. In particular, there remain a great number of SMEs with access to bank credit due to insufficient collateral and lack of ability to demonstrate feasible and viable business plans. Most SMEs do not possess enough information and qualification to participate in the sophisticated scheme of equity financing. In other words, traditional collateral-based lending program and low experience and financial literacy are likely to be the main impediments to the innovation of financing system for SMEs.

Therefore, the Thai government needs to make more efforts to develop practical sales channels for products produced by SMEs and to promote real industrial linkages between SMEs and MNCs/ LEs in the perspective of SME marketing. It is also required to make an effort to upgrade institutional infrastructure related to the entrepreneurship of SMEs by building an innovative system, which manages to promote research outputs generated by collaboration between academia and industrial sectors. What is more, loan programs to SMEs need to transit the direction from collateral based to more credit based lending by promoting an increase in credit assessment capability of financial institutions.

Reference

Intarakumnerd, P, 2004, Thailand's National Innovation System Transition, *Paper to be presented at the first Asialics International Conference on Innovation Systems and Clusters in Asia: Challenges and Regional Integration,* 1-2 April 2004. Bangkok, Thailand.

Intarakumnerd, P, 2005, The roles of intermediaries in clusters: The Thai experiences in high-tech and community-based on clusters, *Asian Journal of Technology Innovation*, 13(2), 23-43.

Poonpatpibul, C. and Limthammasisorn, W., 2005, Financial access of SMEs in Thailand: What are the roles of the central bank.

OSMEP, 2004, The White Paper on SMEs of Thailand in 2003 and Trends 2004, OSMEP.

OSMEP, 2006, Executive Summary: White Paper on SMEs 2004 and Trends 2005, OSMEP.

Appendix 10: Summarized Policies in Thailand

Policy Category	Elements Detailed	Program	Contents Note	
Marketing	Building up capacity of overseas marketing	National Supplier Development Program ISO certification	Subcontracting development program to foster linkage with large firms. A prerequisite for exports	No policy releted to the global supply chain
HRD	Training	Training course from NEC	To develop highly effective training and advisory methods and tools To upgrade SME personnel as well as professionals who provide various types of services to SMEs To develop an extensive, nation-wide network of training and support agencies/units, in sufficient quantity and quality to serve the needs of SMEs	DIP
Technology	R&D promotion	Industrial Technology Assistant Program (ITAP)	Industrial consultancy and technology acquisition services	NSTDA
	Collaboration	Vendor Meets Clients Program	Enhancing linkage opportunity between vendors/ manufacturing and customers/ assemblers	BOI
Financing	Equity fund	Venture capital fund	Long-term financial resources which supporting the investors in the important economic sector and high efficiency businesses	
	Debt fund	Direct loan program	8 government's financial institutions had a mutual agreement to achieve an objective in offering the loan for SMEs	
		Loan guarantee program	Guarantee does not exceed 50% of total amount of the loan and the maximum value	
Management Innovation	Overall information	Information provision system Knowledge innovation project	- To create the correlation between ISO certification and country openness - To offer the comprehensive information on SMEs support policies and SME operation	- NIA
	Support for counseling	In house consultancy service	- Coordination and service centre for SMEs that include facilities, general consultancy service and business matching both domestic and international field	-OSMEP

	Enhancing awareness of innovation	Spillover of research works(through seminar, activities)	-To build recognition and awareness of SMEs innovation	- NIC
Clustering and Networking	Local asset level-up program	Selective policy Business incubation program	To contribute the selective policies addressing to the specific sectors and clusters especially on the area of 5 strategic clusters in automotive, food, tourism, fashion and software sectors Department of Industrial Promotion (DIP) In-wall Out-wall/ Out-reach	National competitiveness committee ISMED
	Program to promote networking	S&T Breakthrough Strategy Industrial Linkage Development Program	Establishing S&T intermediary mechanism such as innovative SMEs incubators to promote and speed up the S&T commercialization process Promoting the growth of supporting industries in clusters	BOI unit
	Capability development program	Young SMEs entrepreneurship project Creative technician transform to SMEs business project Technopreneur training project		- OSMEP - OSMEP - NSTDA

Part Ⅲ:

Best Practices of

SME Innovation Policies in APEC

List of Best Practices

1. Australia: Technology Commercializing - COMET 1

1.1 Overview 1

1.2 Operation 2

1.3 Lessons Learned 3

2. Canada: Industrial Research Assistance Program (IRAP) 5

2.1 Overview 5

2.2 Operation 5

2.3 Lessons Learned 7

3. China: Business Incubator in Zhongguancun Haidian Science Park 9

3.1 Overview 9

3.2 Operation 10

3.3 Lessons Learned 11

4. Japan: SME Support Centers 13

4.1 Overview 13

4.2 Operation 14

4.3 Lessons Learned 16

5. Korea: SME Technology Innovation Development Program 17

5.1 Overview 17

5.2 Operation 18

5.3 Lessons Learned 20

6. Malaysia: Integration into Global Supply Chain - ILP & GSP 23

6.1 Overview 23

6.2 Operation 24

6.3 Lessons Learned 26

7. Mexico: International Network for Technology - TechBA 29

7.1 Overview 29

7.2 Operation 30

7.3 Lessons Learned 31

8. Philippines: Financing Program - *Magna Carta* 33

8.1 Overview 33
8.2 Operation 34
8.3 Lessons Learned 36

9. Chinese Taipei: Business Incubator - Asia Entrepreneurial Center.....37

9.1 Overview 37
9.2 Operation 38
9.3 Lessons Learned 42

10. Thailand: Building Indigenous Technology Capability - ITAP 43

10.1 Overview 43
10.2 Operation 45
10.3 Learned lessons 46

List of Tables

<Table 1> Participation of SMEs in GSP 1st Initiative, 2004 25

<Table 2> Most important government wholesale credit funds 35

LIST OF FIGURES

<Figure 1> Type of business incubator in Chinese Taipei.....38

<Figure 2> Establishing the Mechaism of SME Enrepreneurship and Innovation.....39

1. Australia: Technology Commercializing - COMET

1.1 Overview

The general focus of Australian federal government's SME policies is on improving the flow of finance into business innovation and on stimulating the growth of innovative firms by enhancing Australia's capacity to commercialize research and new technologies. The Australian government recognized that commercialization of technology is essential for an effective Australian innovation system. However, the government finds it difficult for early-staged technology companies with potential high risk to attract capital and to obtain management and business skills. The government has concluded that the good quality research has not been successfully commercialized due to this reason. The COMET (Commercializing Emerging Technologies) program, which provides a comprehensive support measure combining financial assistances and management consulting services to early stage companies, is the best measure to cope with these difficulties.

The COMET program is designed to support early-growth stage companies, spin-off companies and individuals to commercialize their innovation technology. COMET is a merit-based assistance program which provides business assistance through access to private sector consultant Business Advisers as well as access to merit-based financial assistance. It also provides business assistance in the following areas: management development including participation in approved management skills development courses; engagement of mentors; strategic and business planning, including export strategy if appropriate; market research; market validity; Intellectual Property strategy; and Proven Technology (including finalizing Working Prototypes).

At 31 December 2004, outcomes include more than $313 million raised in equity capital by COMET customers, over 600 strategic alliances, licenses and agreements, and around 265 manufacturing commencements and products / services launched. COMET has been extended until June 2011 with additional funds of $100 million as part of the Australian Government's innovation statement, Backing Australia's Ability – Building Our Future through Science and Innovation. More than 1,000 companies will benefit from the extended program.

1.2 Operation

The eligibility for COMET assistance is for 1) early-growth stage companies commercializing their innovation, 2) spin-off companies formed by individuals from either public or private research institutes. The eligibility criteria for application of COMET grant require that 1) innovation has commercial potential, 2) the majority of the applicant's current business activities, employees or assets must be within Australia, and 3) the applicant must be prepared to become an incorporated entity under the Corporations Act 2001, 4) the applicant must have ownership of, or beneficial us of, any intellectual property necessary to commercialize innovation, 5) the applicant companies must be less than five years old, 6) the total turnover for the applicant companies over the previous two years must is less than $8 million, and 7) the applicant must be solvent, 8) the applicant must be prepared to enter into "a success fee agreement."

The merit criteria for assessment of applications are 1) actual or potential management capability to commercialize the innovation with appropriate COMET support, 2) market opportunity and strategy, 3) technical feasibility of the innovation, and 4) demonstrated need for COMET funding. Applications are considered on an ongoing basis, which is assessed by COMET business advisors, and applicants will receive the notification within 14 days of the program delegate's decision.

COMET offers two streams of business services assistance: Tailored Assistance for Commercialization (TAC), and Management Skills Development (MSD). Under TAC, eligible firms work with private-sector business advisers on strategies such as developing a proper business plan, and a product prototype and market analysis to attract and manage capital. TAC provides assistance of 80% of eligible costs incurred under the customer's TAC plan. Assistance averages $50,000 to $60,000 and is capped at $100, 000 for exceptional applicants. MSD provides dollar-for-dollar assistance up to $5,000 to enable individuals to undertake courses in relation to management of innovative practices and the financial management of commercialization. COMET assistance is available for up to two years.

The COMET financial assistance for companies is available through a two tier funding structure. In the tier 1 stage, grant value up to $ 64,000 can be provided. The rate of assistance is available at 80% of the eligible expenditure. In the tier 2 stage, grant value up to an additional $56,000 can be provided. The rate of assistance is available at 50 % of the eligible expenditure.

Assistance to individuals is available to develop management skills required to progress their innovation towards commercialization. Grants to individuals are limited to $5,000.

PageUp

PageUp is the computer software service provider specialized in HR management software. In 1997, Melbourne-based PageUp began when Simon and Karen Cariss started building web-browser-based software for various organizations. PageUp focused on providing world-class human resources technology for recruitment and recently became a service provider for Australia's largest employer, Coles Myer.

Since PageUp received an Australian Government Commercialising Emerging Technologies (COMET) grant in 2000, it has won a number of awards and made the BRW's Fast 100 list in 2004. Simon and Karen worked with their COMET business advisor Bob Beaunont to use their $80,000 funds for market research, developing intellectual property and strategic planning.

Over the last five years, PageUp has worked hard to become the clear market leader providing HR services to Australia's top 100 companies and PageUp has grown from six employees to 28 and tripled its turnover to $3 million per annum. In 2004, PageUp was listed by BRW as Australia's 33rd fastest growing small to medium enterprise. It also won the Telstra and Victorian Government Small Business Award for the 20-50 employees category.

1.3 Lessons Learned

The strength of the COMET program is the focus on the commercialization of scientific research results and on the high-tech start-up companies. The COMET program is the customized and comprehensive services combining financial grants and management consultation for newly established start-ups. Since the market failures in economic growth and job creations are mainly centered about the formation of new firms, the policy focuses on promoting commercialization and high-tech start-up companies is appropriate for Australian SME innovation and economic growth. In this regard, the COMET program played the major role in pursuing the innovation strategy in recent years.

The success of the COMET program is due to the combination of financial support and

management advisory services. Often newly start-ups face difficulties in raising long-term stable capital and also difficulties in obtaining managerial talents to handle with business growth. Even if a start-up company can finance their R&D investment from outside capital, they often end up in failing commercialization of their scientific researches because of lack in managerial skills. Thus, with financial assistances to start-ups, managerial advisory and consultation services should be accompanied for the successful commercialization and production of high-tech research results.

In this approach, the Australian COMET program could achieve high success in assisting the commercial growths of Australian high-tech start-ups and spin-offs.

2. Canada: Industrial Research Assistance Program (IRAP)

2.1 Overview

Canada has b een successfu l in fostering technology-based SMEs. The R&D share of SMEs is one of the highest in APEC member econo mies. Canada has high level of public R&D expenditure when co mpared with other high-in come APEC mem ber economies, such as the United States, Japan, and Korea.

As lar ge port ion of g overnment expendi ture goes to NRC[1] and 20 NRC institut es spread over the territory , the NRC-based support center for SMEs is a reasonable choice. The balance between direct and in direct supports has been maintained, as Canada has provided ind irect support with a strong R&D tax credit policy for SMEs and direct support wi th R&D prog ram through the Industrial Research Assistance Program (IRAP). IRAP reflects Canad a's international network with its international m ission with t he US and EU linkage. IRAP is a major tool to support SME innovation and provides advice and project funding.

IRAP is the longest serving policy program for SMEs for almost 6o years. IRAP aims to directly support SME s to develop technology , enhance co mpetitiveness and grow SME business. Its functions are not defined in a few words. IRAP is 1) providing R&D guidance to SMEs through the stages of an innovatio n cy cle covering from earl y stage of develop m ent to pilot stage, 2) working part ner in buil ding i nnovative clusters and pr omoting collaboration 3) coordi nating international technology missions (including match-making assi stance by li nking SMEs with foreign partners), 4) providing inform ation and technology transfer service (in association with Federal Partners in T echnology Transfer), 5) working as connection point for ext ernal organizations, such as venture capital, HRSRC on internship p rogram and DF AIT on trad e issues.

2.2 Operation

IRAP delivers its activities in two wa ys, carry ing out project and providing advi ce. The budget for IRAP for the financial year 2006/7 is C$127 million, and C$80 million is allocated to project

[1] NRC is the third largest spender in public sector with C$ 800 million annual budget

and C$27 million to advice and support. The subsidy is shared in principle. For consultants, 50-75% of cost is paid by NRC-IRAP, and as for subcontracts, up to 50% of total or 80% of salary whichever applicable. From the C$80 million project funding, C$14 million is repayable contribution.

As for the project, the size of project varies from less than C$15,000 to maximum C$1 million.[2] Although the small project criteria are less than C$15,000, it aims to enhance innovation capabilities through training and improving problem solving capacities.

The area of IRAP-funded project heavily concentrated on information and communication technology and professional services in terms of the number of projects.

Sector	**Number of Project**
Natural resources	123
Agricultural and Food related	306
Manufacturing process etc.	477
Life Science	54
Information and Communication Technology	638
Professional Service	545
Service Secotr	137
Other	335
Total	**2,615**

Source: NRC-IRAP

The eligibility to apply for the project award is that the SME is incorporated in Canada (the company should not be virtual or 'shell' company nor subcontracting the award), engaged in technology with specialty in physical and life sciences or engineering, financially sound and able to exploit the result in Canada so that public subsidy can be justified. The company approaches IRAP with 4-5 pages of an initial plan paper looking ahead of 6~36 months. IRAP provides consulting to build sound proposal of 10~20 pages.

The selection process for awarding project demands a sound proposal from SMEs. They have to demonstrate validity of the project in terms of technical scope, risk, soundness of approach, structure of task, budget and timing, resources, and target markets. IRAP has its own selection

[2] Typical project last 1~3 years with IRAP funding of C$ 15K – 100K.

criteria. They are, 1) level of technical and co mmercial risk 2) econom ic benefit to Canada 3) management quality 4) increase of co mpany R&D capability through the pr oject 5) level of commitment 6) consistency with national priorities 7) social benefit to Canada 7) contribution to regional development 8) advancement of scientific knowledge.

NRC- IRAP facilities employ a nationwide networ k of advisors with 1 10 different locatio ns, called Industrial T echnology Advisors (ITA). There are 260 IT As who take care of 10,000 clients per year. They play a critical role in s upporting SMEs. ITAs have more than ten years of accumulated industrial knowledge a nd mostly engi neers. So me of them are retired expert s. IRAP hires full-time ITAs on a two-year contract basis and assigns them to clients (SMEs) upon request. IRA P also provides half of co nsultant salar ies and half of the salarie s are paid by the clients. In general, ITA's consulting service usually lasts more than 3 months. Thus, IRAP and a company which requests consulting service can build trusted r elationship. I TA and IRAP projects are not separate entity . In m any cases, ITA helps SMEs prepare the proposal for applying IRAP project award.

IRAP is very active in building a collaborative network. NRC-I RAP enco mpasses more t han 100 research and technology based organizations. In addition, IR AP utilizes NRC's 34 network centers of ex cellence. International networking is clearly visible. International mission program sent 75 SMEs in 2004/5 , and many of them are multi-year long-t erm mission. IRAP also h as US-ERI and EuroTranBio linkages to facilitate SME-led research collaboration.

Performance measured in ter ms of contributions to sales is esti mated to be over 20 tim es more than the invested IRAP funding. The world's fi rst innovation is 3 7.2% against general case o f 10.6% in Canadian m anufacturing. A study of the IRAP perform ance presents that the growth rates of IRAP-funded SMEs exceed other university spin-off firms. They also show significantly higher level of investment attraction and higher possibility of becoming acquisition targets.[3]

2.3 Lessons Learned

IRAP became a benchmark model for developing technology-based SMEs. The research project awarded to develop new technology ba sed i nnovation and to incr ease innovation capabilit y of SMEs is closely linked with advisors. This incr eases the suc cess rate and s atisfaction fro m the client SMEs. In addition, po licy makers should note that wholeness of I RAP program that

[3] According to Dr. Cooper's presentation material on NRC-IRAP.

integrates R&D subsidy and advising, and networking. The focus on high-technology can be varied when modified IRAP program is implemented in developing member economies, but the simultaneous support on project funding and advisors must be kept for successful migration to this policy program.

3. China: Business Incubator in Zhongguancun Haidian Science Park

3.1 Overview

The Chinese governm ent's strategy for developing high-tech st art-ups and SMEs has been implemented mainly t hrough develo pment of in dustry cl usters and incub ators which can provide econom y of scale, strong market influe nce, suf ficient talents, technologies and information provisions to SMEs. When considering the huge numbers of SMEs in the Chinese economy, the decentralized industrial clusters, su ch as Science Parks and Incubators are the best way to achieve the innovation of SMEs in the Chinese economy.

The Zhon gguancun cluster , which is l ocated at Be ijing, t he capit al of China, is the national center of high-technolog y developm ent with 16 sp ecialized science parks, the world-renown Beijing unive rsity and Tsinghua univer sity, Chi nese Academ y of Science, 70 universities, 5 0 state key labs, 40 R&D and engineeri ng centers , 50 incubators, 13 thousands co mpanies and 360 thousands more-than-college-degrees hu man resources. The Zhongguancun cluster is t he center of Ch inese high-tech industries, co mmercialization and high-tech venture firms and SMEs. In 1999, the State Council of China officially approved the "Note of Request to Expedite the Building of Zhongguancun Science Park," which planned to develop Zhongguancun Science Park as the Silicon Valley of China. To m eet the challenges emer ging from the rapid social development and to prom ote vigorously the progress of Zhongguancun Science Park, the Beijing municipal government drafted and pr omulgated the Regulation of Zhong guancun Science Park in 2000, thus cultivating a favourab le environm ent for the healthy growth of market economy, legal system and internationalization.

The Business Incubation Center of Zh ongguancun Haidian Science Park, which is the f irst national hig h-tech pioneer service center , is a non-p rofit publ ic science & technolo gy serv ice provider invested and established b y Zhongguancun Haidian Science Park in August 198 9. The Overseas S tudents Pioneer Park, which is jo intly established by Beijing O verseas Personal Service Center and Haiden Incubation Center in 1997, is the first-established national park for enterprising overseas r eturnees. The Incubation fra mework con sists of one center (H aidian Incubation C enter), three parks (The Overse as S tudents Pioneer Park, H aidian Returnee s Development Park and Zhongguancun Biomedical Park) and one base (the Education Base for Children of Returnees).

The Overseas S tudents Pioneer Park prom otes new business establish ments by returned

overseas students and the business establishments reach to almost 100 companies. The Haidian Returnees Development Park is consisted of around 40 companies, which successfully finished the residing period of Overseas Students Pioneer Park. Zhonggguancun Biomedical Park provides high-tech research labs in bio-medical industries, which are utilized by around 20 companies. Haidian Incubation Center has provided services to total 439 companies among which 101 companies graduated from the incubation center. The graduation criterion for incubating companies is to reach the annual revenue more-than 5million yuan in three years of residency. More than 50 % of these venture companies belongs to the IT industry. In 2005, total revenues of all companies in the incubation center recorded 1.3 billion yuans. In 2005, top 10 companies exceeded the revenues of 100 million yuans. After the establishment of the incubation center, total three thousands people received training services, 577 companies received financial assistance with total amounts of 133 million yuans, and 61 companies received the loan services with total amounts of 104 million yuans.

3.2 Operation

The Business Incubation Center provides five kinds of services to venture firms, which are business, financing, technical, logistics, and recruitment services. For new start-up companies, the incubation center provides consultation and professional intermediary services. These professional services include accounting consultation, legal counseling, patent consultation and assistance with governmental business registration and high-tech certification. The special feature of this incubation center is the 'SME evaluation system', which is utilized for the assessment of SME performances and growth potential. The center 's feature also provides merit-based assistances to SMEs in the incubation center. The 'SME evaluation system' is leveraged for an across-the-board monitoring ranging from entrance to graduation of the incubation center. The evaluation system is not just for evaluation but for identifying the strengths, weaknesses and problems of SMEs in order to provide appropriate consultation services.

The incubation center assists SMEs to secure governmental financial supports. The recommended businesses are entitled to the SME innovation funds from the Ministry of Science and Technology, the selected project aids for returnees from the Ministry of Personnel, the aids for entrepreneur by returnees from the Zhonggguancun Science Park, and the Haidian Park innovation funds. Besides, the incubation center circulates regular information releases on returnee's projects to attract venture capital investments, and aids SMEs to apply for low-

interest bank loans. For technical services, Zhongguancun Biomedical Park provides 49 standard laboratories in the biomedical technology fields with pur pose-built labs for bioengineering, chemical synthesis, agricultural bioengineering, analysis and testing. Professional incubator resources in Zhongguancun cluster provide software technology support and IC design services for SMEs in the incubation center. Logistics services such as conference rooms, multi-functional rooms and business center services are provided. HR-related consultation services are available for the residing businesses and the post-doctoral incubator, the MBA internship base of Tsinghua University provides high-quality talents for business. Moreover, the businesses residing at the incubation center are entitled to the incentives promulgated by the Zhongguancun Science Park for high-tech businesses on income tax.

The specific feature of the Business Incubation Center is the incentive programs for returned-overseas-students. The returnees can convert all their legitimate incomes from their businesses into foreign exchanges acquiring a special credential from local taxation authority. The returnees are exempted from sales tax about starting their own businesses, technology transfers and R&D activities. The returnees are entitled to the preferential policies of the Beijing municipal government on rights in residence, real estate property purchase and children's enrollment to school. The children of legal representative of the residing returnee-run enterprise may enroll to primary and middle schools affiliated to Tsinghua University.

3.3 Lessons Learned

The Chinese strategy to promote SMEs innovation and growth through clusters and Science Parks should be regarded as an appropriate one when considering the economic environment and Chinese National Innovation Systems (NIS). Since Chinese aggregate economic size and the number of SMEs in the economy is too huge to provide effective direct support for SME innovation, the decentralized and network-based cluster formation is the best way to promote SME innovations. Moreover Chinese NIS possesses the world-class qualities in basic researches and sciences/technology educations through public research institutes and public universities. With this basic research capabilities and huge domestic demand markets, the Chinese economy holds one of the best environments in forming network-based high-tech clusters. With limited public resources for SME innovation and growth, the policy focus on cluster formation brings forth the budgetary efficiencies.

The Zhongguancun cluster and the Business Incubation Center of Zhongguancun Haidian

Science Park is the first national high-tech pioneer service center, which accomplished high success in IT industries' ventures and R&D commercialization. While these successes are basically due to economic environmental factors such as the world-class PRIs and universities' scientific researches, the easy access to high-quality human resources, and Beijing, the population-concentrated capital of China, the several policy elements of Business Incubation Center of Zhongguancun Haidian Science Park are considered commendable in its contribution to commercial success of high-tech ventures in the Science Park. The incubator thoroughly maintained a merit-based competition from the selection of SMEs entry into the incubator, to provision of financial assistance to SMEs. The evaluation methodology is not just utilized for evaluations but for providing management consultations to tenant SMEs. The incubator played the role of network-brokerage connecting financial institutions, governmental assistance programs, human resources and high-tech SMEs. The core element of the incubator's policies is the incentive policies attracting overseas-students to return to homeland incubators starting new venture firms. The incentive for overseas-students return is substantial even including the residential rights to remain Beijing and providing top-class education for overseas-students' children without mentioning to tax-exemptions. Attracting worldwide huge talented human resources with Chinese ethnicity is the core element of SME innovation policies and has been highly successful to promote Business Incubation Center of Zhongguancun Haidian Science Park.

4. Japan: SME Support Centers

4.1 Overview

The Japanese government has foremost comprehensive and extensive policy measures for SMEs innovations and com petitiveness acquirem ents. The financial supports are enor mous in a way that governmental direct loans consist of more than 10% of total outstanding lending to SMEs in Japan. Financial guarantees for SMEs liabilities are more than 10 times of direct loans. However, management consulting services are the area where the Japanese government has recently put its policy a pri ority. The gove rnment even dispatch es fulltime-hired-specialists and consultants t o SMEs in a sp ecified time period. The management and technolo gy consultation public services for SMEs in Japan should be considered as the most sy stematic and the m ost com prehensive policy measures in the APEC region.

The Small and Medium Enterprises Agency established three types of business support s ystem for SMEs: 1) SME and Venture Business Support Centers, 2) Prefectural SME Support Centers, and 3) Regional SME Support Centers. These cen ters, in collaboration with t he private SME support i nstitutions such as the Co mmerce and I ndustry Associations and the Cham bers of Commerce and In dustry, work as one-stop service counters which provi de inform ation concerning SME support strategies and implement support projects. SME Su pport Centers are established to provide one-stop services for SM Es, which inc lude over -the-counter (OTC) consultation, dispatches of experts a nd inc ubator managers, o n-site professional assist ance, business feasibility assessments, info rmation service and training program s. The focuses of the centers ar e on business creation and new start- ups, and busines s innovation. The centers not only provide management strategy , marketing and consulting services to SMEs and entrepreneurs, but also they provide support for specific management issues of each SME.

The SME/Venture Business Support Centers have 8 l ocations in the main large city level, while the Prefectural SME Sup port Centers have 57 l ocations in prefecture level and the Regi onal SME Support Centers have 261 locations in the local city level. The national support centers are composed of specialist groups: 30 project managers, 840 specialists, which include management consultants, accountants, lawyers, patent attorneys, consulting engineers, persons experienced in corporate management, and 300 retired-but-talented peoples. In 2005, the num ber of enterprises under the national center ’s support increased to 510. The total sales volum e of these enterprises increased fro m $4,957 m illion to $6,196 m illion after the SME support cent ers’ assi stance.

The current SME consultant system was established upon SME support law, which was set in force in 2001, with the National Certification program which covers private SME consultants and officials for public consulting. As title holder of National Certifications, SME consultants have the role of an intermediary between company and administration as promoters of SME policy. The total number of SME consultants exceeded more than 18,000 as of 2003.

4.2 Operation

The national SME support centers provide high-level management consultation about business strategy planning, public offering of stocks and financial/technological matters. The centers provide over-the-counter consultation services given by experienced experts in management and technology, and hold consultation sessions. The centers operate expert dispatch and incubator manager dispatch programs, through which the centers provide appropriate advices according to a level of company's development stages. The expert dispatch program provides a long- term and continuous dispatch of experts in management, technology, finance, and legal affairs targeting specific and difficult management problems such as getting patents. The incubator manager dispatch program delivers incubator managers to organizations with incubator functions in order to provide consultation services to tenant enterprises such as drafting of business planning, expansion of sales channels, and patent strategies. The national centers collect outstanding business ideas of SME entrepreneurs who are undertaking start-ups or management innovations.

The project managers of the centers provide comprehensive supports that ensure consistency throughout the project, from the stage of compiling plans of operations to the stage of actual implementation. In the national SME support centers, management consultations were performed 21,781 times in 2005. Expert deployments were provided to 400 enterprises in 2005. Semi-retired professional advisors, who retired no loner than three months up to 10 months, were dispatched to 167 enterprises in 2005.

The Prefectural SME support centers implemented over-the-counter consultation services, provision of information, dispatch of experts, and evaluation of business feasibility. The Prefectural centers examine and evaluate the feasibility of projects from various aspects considering potentiality, technological level, and original expertise. The Regional SME support centers provide consultation services for local SME entrepreneurs, over-the-counter consultation, and information about SMEs support system of the national and Prefectural governments. In

order to support the overall management of small-scale enterprises in accordance with the actual conditions of their management infrastructures and styles, the Commerce and Industry Associations, and the Chamber of Commerce and Industry provide consultation and guidance services, guidance services on book-keeping, and management and technology reinforcement support.

The national support centers for SMEs have the roles of supporting venture firms and of handling high-level management issues. The Prefectural SMEs support centers provide supports for solving managerial problems of local SMEs. The Regional SMEs support centers, which were related with the Commerce and Industry Association, are most familiar and accessible to SMEs.

Otis Co.

Otis Co., which was founded in 1987, is a manufacturing SME which produces light electric appliances parts. The company recorded the $87,000 in capital, and the sales are $26 million per annum with 128 employees as of 2005.

The SME support center provided management consultation services to Otis Co., through which the structural reinforcement and human resource development in accordance with the plant profit plan were implemented. This restructuring through consultation services includes 1) analysis of the difference between monthly results and goals, and discussion of improvement activities such as materials cost ratio analysis, 2) review and reinforcement of inventory management structures, 3) specific consideration to reduce materials costs, 4) creation of management structures for individual teams, and 5) making workloads visible and excess man hours visible. Through this management consultation, the plant work flow has been reformulated for efficiency: the 1st step (the integration of work flows), the 2nd step (adoption of a single press and rectification of sheet cutting and inspection), and 3rd step (continuous operation of a single press).

As the results of work process restructuring, the production lead time of Otis Co. plant was reduced by 3.5 days. The work in process was reduced by 45%. Through this efficiency gains, The Otis Co. experienced 30% increase in sales with the same employment: from 20 million yens (in 2003) to 26 million yens (2005).

4.3 Lessons Learned

The strengths of Japane se management consultation services l ie in 1) com prehensive and systematic supports for SMEs innov ation, and 2) expert and incubator manager dispatch program for consistent and long- term supports m odified to specific needs of SMEs. The 3 26 SMEs support centers, which consist of three levels of SME business support centers, possess huge human resources of m ore than 1,000 specia lists even with full-tim e-hired consultant s. Three ty pes of SME supports centers play the different roles in providi ng m anagement consultation for SMEs innovati ons, w hich produce the co mprehensive coverage of SMEs management innovation n eeds: the national s upport centers for supporting v enture firm s and high-level managem ent issues, the Prefectural SMEs support centers for solving m anagerial problems of local SMEs, and the Regional SMEs support centers for sm all business with easy access. This co mprehensiveness and econom ic scale can provide a sy stematic management consultation services to Japanese SMEs.

Expert dispat ch program , which cannot be easily found out fr om other member econom y's policy m easures, has the s trength to provide appr opriate advice s in accordanc e with stage s of company de velopment. The expert dispatch pro gram, which provides th e long-term and continuous dispatch of exp erts in m anagement, technology, finance, and legal a ffairs, can tar get specific and dif ficult m anagement pro blems inhere nt in each S ME. Becaus e of this intimate long-term residency of specialists in SMEs, the management consultation services can be practical and appropriate for each SME and can ea sily lead to management restructuring for efficiency gains. Even in the ch ange case of a specia lists or incubator manager , the transfers o f duties to a ne w appointee are complete and sincere in practice so that the fam iliarity with each SME in supports will continue without interruption.

5. Korea: SME Technology Innovation Development Program

5.1 Overview

Korean SME policy during the 1970s to 1980s was geared toward protecting SMEs in a vulnerable position from market structure driven by large companies. Starting in the late 1990s, the trend of world economy has been shifted from the comparative advantage over production factor costs structure to the innovation-led economic structure using knowledge and information. To meet the ever-changing environment, the needs for technology and knowledge-led industrial development and SME technology innovation have become stronger than ever. Given SMEs were suffering from shortages of capital and skillful labors, it became a top priority for the government to promote SME technological innovation and to sharpen SME competitive edge.

In 1997, the government created the *SME Technology Innovation Development* program with a budget of 30 billion won in an effort to assist SMEs suffering from technology development. This program was designed to foster SME technology innovation by partly providing fund to SMEs capable of their own product development so that they can use it for new product development. The government-led program to support SMEs, therefore, is being implemented to enhance SME development capacity and technology competitiveness. The government receives back 30% of its contribution as technology fees in installments for five years when the development task is successful. The success rate of the program was 92.3% in 2002 and 93.7% in 2003, respectively.

As of 2004, 47.5% of 2002 project was on the market for sale and 77.9% of it was in the process of marketing and production. Only 10.3% out of the 2002 project failed to be commercialized. Given that 38.3% of 2003 project, which was due to be finalized in one year, was introduced in the market for sale, it is highly marketable. As for 2002 project, it ended up obtaining 570 million won per task in sales with an annual averaged 110,000 dollars of export(as of 2004), and it reached 860 billion won in sales, 9 times high compared with the 2002 budget(99.3 billion won). Moreover, among the government-offered budgets for 3,503 tasks from 1997 to 2001, government contributions for 1,981 tasks were repaid. Overall, the program is highly efficient SME assistant policy with a repayment rate of 56.5%.

Technology independence of SMEs participating in the 2002 project(as of 2004) was improved to 92% from 61%, while their technological level in comparison with advanced economies was upgraded to 90% from 55% with technology gap being narrowed to 1.6 years from 5.6 years.

Dramatic improvement was made during the process of project implementation, and such positive effects came even after the government-initiated project was completed.

As of late 2005, SMBA had provided fund worth 735.5 billion won for total 11,425 SMEs after the SME technology innovation development program was firstly initiated in 1997. It also offers R&D budget worth 159.6 billion won for 2006 budget.

5.2 Operation

Since the foundation of SMBA in 1996, SMBA established a basic plan to support R&D project and created the SME Technology Innovation Development program in 1997. It set up *strategic tasks* to assist high tech areas which can create a new growth engine for SME In 2001, designated a specialized institute for the program oversight in 2002, and a credit card system for SME technology development was introduced in 2003 in order to increase transparency of technology development fund.

Meanwhile, 100 million won for one year project is offered for *general tasks*, in which SMEs freely apply for a project. 300 million won at maximum for two years is also offered for *strategic tasks,* of which areas are specially selected after the government conducts studies on technology demand for SMEs. For the SME Technology Innovation Development program, fund is provided within 75% of total technology development costs. SMEs whose projects are evaluated as successful by a specialized institute should repay 30% of the government contribution in five years in installments one year after completion. There is fee-reduction for SMEs when they pay back technology fees in early times.

In 2004, a comprehensive management system for the program was established (www.smtech.go.kr) to facilitate computerization and real-time performance analysis, and it conducted comprehensive performance analysis for SMEs who had applied SME Technology Innovation Development Program from 1997 throughout 2001. In 2006, qualification for the application is limited to SMEs with their affiliated research institutes, venture businesses and Inno-Biz.

Financing target is limited to SMEs capable of their own technology development but having inferior condition compared to large companies. In other words, small and medium-sized manufacturers holding factory registration certificates are entitled to apply for the government-funded projects. Possible candidates are as follows: 1) SMEs equipped with their affiliated

research institutes according to the Technology Development Promotion Act; 2) SMEs who prepare to move into venture and technology incubation centers; 3) micro enterprises having less than 50 employees with less than 500 squared meters of its factory area according to the Act on Special Measures for Support of Small Enterprises and Small Commercial and Industrial Businessmen.

The characteristics of the program lie in using new technologies and develop new products or new product models so that they can bring positive economic impacts. Applicants can apply for the program in order to enhance overall technology competitiveness as well as patent technology development.

Each regional office of SMBA accepts project proposals, conducts on-site visits to applicants and examines research work force, equipment and technology development. When visiting the site, a SMBA official in the local areas is supposed to be accompanied by an expert to ensure expertise in on-site visit. As for selecting tasks, regional offices of SMBA establish an evaluation committee comprising more than 5 experts from industries, academia and research institute and conduct evaluation of technology and marketability of selected tasks. In case of *strategy tasks*, an institute specialized in evaluation undertakes the job regardless of region. In addition, the 7,000 expert pool from industries, academia and research institute conducts evaluation procedure. In particular, experts on accounting must be included into the committee for evaluation of marketability.

Patron Co. Ltd.

Patron was established in 2003 by 25 engineers who had been responsible for the RF field at Samsung Electro-Mechanics. It offers RF (Radio Frequency) parts and materials using dielectrics. In 2005, its duplexer, the smallest in the world was designated as one of the best products in the global market. It ranks the second in the global market for duplexers based on its technological competence.

In the Hwaseong headquarters 110 employees are engaged in sales, R&D, prototyping and pilot production of dielectrics and isolators, to accelerate success of R&D activities and pilot production. In the Pyeongtaek Plant, 184 employees are working hard to produce crystals, camera modules and antenna for mobile phones. In order to supply competitive products using cheap and skilled labor and advanced production technologies in a timely manner, the firm established a local operation in Yantai, Shandong Province in China. In the China Plant, 705 workers are responsible for production of dielectric ceramic chip antenna, GPS antenna and

isolators. Patron was founded in January 2003 with 2.39 billion won in capital.

Its domestic market share was over 50 % in US-PCS and K-PCS prior to joining the SME Technology Innovation Development program. In case of WCDMA, however, most of major parts market in Korea was taken by Japanese companies and WCDMA duplexer had technological difficulties due to its smaller size and less features compared with Japan's MURATA and EPCOS. As such, Patron decided to join the SME Technology Innovation Development program, accomplishing an isolators monobloc duplexer development task for WCDMA. For the contributions to technology development, the government financed 86 million won while Patron made 30 million won investment.

Patron-developed products show more features than those of EPCOS, its initial target for development, and its products have electronics features equivalent to those of MURATA. As a result of technological development, Patron was approved by both Samsung Electronics and LG Electronics in the WCDMA market and began to make a mass production. Patron had been engaged in the domestic market only before it participated in the government-initiated program. Right after the program participation, however, it secured additional 20 employees and 705 employees in China as of late 2005.

When it comes to market share of its representative product, it ranked the second in duplexers and the fourth in isolators globally in 2005. As for domestic market, market shares of duplexer and isolators are 40% and 30 % respectively, while chip antenna holds 50 % of the market, which stands number one in market share.

5.3 Lessons Learned

Since most of SMEs have a short life cycle in developing new technologies and products or they are only engaged in developing parts of final products, timing is highly critical in developing products. Therefore, SMBA, since its foundation, established a basic plan to support R&D project and launched the SME Technology Innovation Development program to support the R&D project in 1997. The SME technology innovation development program is of a great help to SMEs suffering from financial crunch because SMEs, as major players of conducting technology innovation development, are beneficiaries of direct fund from the government.

Starting from 2003, the government has introduced a technology development credit card system, in which the government contribution is being paid by the credit card issued by the

government. In addition, concerning about moral hazard, the government introduced a comprehensive management system for SME technology development to make sure that SMEs can check to see whether a task they undertake is overlapped by other government assistant programs.

In 2004, a comprehensive management system for the program was established to facilitate computerization and performance analysis (www.smtech.go.kr). This system enables a paperless work environment: all application procedures, including application proposal, evaluation and follow-up services, are being managed electronically. It clearly reflects the development of Korea's IT infrastructure and informatization. In general, the system is very useful in a way that applicants are able to check the status of their application procedure online at any time.

SMBA continued to conduct comprehensive and integrated evaluation of all participating SMEs, studying their work performance before and after they join the project. As a result, SMBA successfully undertakes reasonable performance management initiative by reflecting the difficulties and improvements of SME project participation in the SME Technology Innovation Development program down the road.

6. Malaysia: Integration into Global Supply Chain - ILP & GSP

6.1 Overview

For more than four decades, its economic growth has been sustained through an open global trading environment. In particular, Malaysia strives to sustain itself as an attractive investment location for FDI, adopting a liberal investment regime. As Malaysia further liberalizes its investment regime in keeping up with market changes and meeting investors' needs, it continues to receive a sizeable inflow of FDI into selected sectors. In addition, it has stimulated the technology spillovers from MNCs to local SMEs.

Nonetheless, the industrial linkage between MNCs and local SMEs was still weak in Malaysia. When FDI stably increased, the weak industrial linkage would not receive so much attention. In the late 1990s, however, the complex economic factors such as rising China, Asian Currency Crisis, and the prevalence of supply chain management made Malaysia witness the importance of industrial linkage and competitive domestic firms. Especially after the FDI for Malaysia began to decrease since 1997, the industrial linkage and the development of local SMEs became more serious issue (Junichi Mori, 2005). Therefore, the 8th Malaysia Plan emphasized the marketing of SMEs by integrating SMEs into the global supply chain of MNCs. It has been mainly implemented by introducing the *Industrial Linkage Program (ILP)* and the *Global Supplier Program (GSP)* as good practices. The ILP and the GSP are likely to be the most important ways that promote the innovation of SMEs as a catalyst for economic development in Malaysia.

The ILP initiated by SMIDEC in 1997 aims at enhancing SMEs participation as reliable and competitive suppliers of parts and components or services to MNCs or LEs[4]. In other words, it is to develop the capability of SMEs to meet the requirement of MNCs and LEs. Under this program, as of June 2003, 181 SMEs were appointed as suppliers to MNCs with total sales value of RM115 million. Since then, the program has been increased significantly. For example, in December 2005, a total of 1,088 SMEs was registered under the ILP, out of which 429 SMEs were linked to MNCs and LEs with actual total sales value of RM335 million.

[4] The Ministry of Entrepreneur and Development has a similar program, which is named Vendor Development Program (VDP). It also aims to promote the industrial linkage between MNCs and SMEs, but the ILP focuses more on SMEs that produce production parts for MNCs.

In addition, a partnership between SMIDEC and a foreign-based hypermarket chain in Malaysia has been formed under this program. The partnership is to identify and develop local SMEs into global suppliers. For example, SMEs in the food sector will supply their products to hypermarkets in Malaysia and their outlets worldwide under the hypermarket's brand name and the SMEs' own brand (Economic Report 2003: 28)[5]. The concept of ILP is synchronized with the GSP, and they are complementary each other.

The GSP is designed to complement the goals outlined under the ILP. The GSP is a skills development/ training program to enhance knowledge and capabilities of SMEs into world-class suppliers of services and products. Under the GSP, training and assistance are provided to SMEs with an aim at enhancing their ability to provide high quality goods and services to MNCs in Malaysia, as well as to their global production network. In short, the program is to train local SMEs to provide world-class products and services in the value chain.

The program originally comes from massive increase in FDI in the late 1980s and from the shortage of highly qualified labor such as technicians. MNCs started to recruit skilled labors by offering higher salary, which resulted in an increase in labor cost. It led MNCs to work together with the local government for establishing a training center that could provide education and sufficient skilled labors for all MNCs. As a result, the federal government and the local government established Skills Development Center in local. The most successful and initiative region in this case was Penang. In 1989, the first Skills Development Center was established in Penang[6].

After the program first started in 1999, the GSP has trained 1,518 employees from 385 SMEs by October 2004. In addition to training, the program attempts to instill the importance of quality, cost, swift delivery (QCD), and flexibility as essential attributes of effective SME suppliers.

6.2 Operation

The GSP is divided into two initiatives. The first initiative consists of training for manufacturing and materials suppliers in critical skills, and more importantly, acquiring competencies to adopt and use new technologies. The focus is on quality and productivity. There are three levels of training (see Table 1 for the number of participants and SMEs involved in three-stage training

[5] Economic Report, 2003, *Economic Performance and Prospect*. (http://unpan1.un.org)
[6] PSDC (Penang Skills Development Centre) (http://psdc.co.my)

programs). The first level, core competencies (CoreCom1), involves 9.5 training days spread over 4 months, and covers 13 courses. Malaysia hopes that it becomes the entry standards for all suppliers. The second level, Intermediate Systems (IS2), involves 7.5 training days spread over 4 months. The third level, Advanced Systems (AS3), elevates SMEs into a predictive mode and requires a large investment and commitment from both vendors and buyers (FIAS 2003)[7].

The training initiative is implemented in collaboration with Skills Upgrading Program mainly initiated by local Skilled Development Centers. In order to spillover the successful case of the Penang Skilled Development Center, the federal government (SMIDEC) established 22 more training providers up to now to undertake technical skills training for SMEs. The Skills Upgrading Program is aimed at enhancing the skills and capabilities of employees of SMEs in the technical and managerial levels, particularly in critical areas such as the electrical and electronics, information technology, industrial design and engineering fields.

In terms of assistance mode, SMEs that send their employees for courses at any of the training providers will be eligible for 50% training grants from SMIDEC. In addition, the remaining costs can be claimed through the Human Resource Development Fund (HRDF), if the company is registered with the Human Resources Development Board (HRDB). The main difference of the training program under the GSP from the other training programs is that the program is organized by MNCs participating in the GSP. Through this training program, therefore, MNCs could properly evaluate the capability of local SMEs, while SMEs can absorb MNCs' technologies.

<Table 1> Participation of SMEs in GSP 1st Initiative, 2004

Stage	*Number of Employees*	*Number of SMEs*
CoreCom1	910	239
IS2	106	29
AS3	502	117
Total	**1,518**	**385**

Source: Mori, 2005: 6[8]

After qualifying those training, SMEs can proceed to the second initiative and start actual business with MNCs. The second initiative promotes technology transfer from MNCs to SMEs

[7] FIAS, 2003, *Toward a Knowledge Economy: Upgrading investment climate and enhancing technology transfers*, FIAS

[8] Mori, J., 2005, Malaysia's Challenges to Industrial Linkage: Policy Coordination at local and National Level, VDF Mission to Penang, Malaysia. (http://vdf.org)

under the close monitoring of progress. This initiative calls for investment of time and commitment of both MNCs and SMEs. Although the program does not guarantee the business contract between MNCs and local SMEs, local SMEs would certainly find more business opportunities through the GSP and may increase their investment in order to meet MNCs' demand (Mori, 2005: 6). Currently, eight MNCs and nine SMEs are under the second initiative.

While the GSP provides opportunities of training and business linkage with MNCs for local SMEs, the ILP allows tax incentives for both MNCs and SMEs at the national level. In the ILP, qualified SMEs will be eligible for pioneer status with 100% exemption on statutory income for five years, or 60% Investment Tax Allowance (ITA) on qualified capital expenditure incurred within a five-year period with 100% exemption on statutory income. MNCs that participate in the ILP will be allowed to deduct the expenditure incurred in i) the training of employees, ii) product development, and iii) testing and factory auditing to ensure the quality of vendors' products from the computation of income tax.

6.3 Lessons Learned

The main lessons learned from the ILP and the GSP in Malaysia could be drawn into four.

The first lesson is that information channel to catch the latest demand of MNCs has played a significant role in enhancing the technology capability of SMEs and stimulating international marketing. It could be found in the quick response of the Penang state government and the federal government to the demand of MNCs in acquiring relatively cheap but high-skilled labor in local. In this respect, it is important that the government needs to establish information channel aimed at catching the latest demand of MNCs.

The second one is that the program enhances the technology capability of local SMEs to cope well with the demand of MNCs by letting MNCs participate in the GSP and manage all training programs for SMEs, while continuously providing funding supports.

The third lesson is that industrial linkage between MNCs and local SMEs could be more developed by bottom-up activities than top-down activities. SMIDEC tried to transfer the mechanism of a successful local case into other local states, and reflect it to a national level strategy.

The final lesson is that there is a need to consider the coordination of inter-policy for SMEs.

Incentives provided by the ILP are unlikely to contribute to the development of industrial linkage significantly. In terms of tax incentives, many MNCs and SMEs have already received double or triple tax exemption by building factories in Free Trade Zone or industrial parks and by applying for Technology Acquisition Fund. Although tax incentives are important to show the direction of government policies, those incentives would not generate the significant effect on the development of industrial linkage.

7. Mexico: International Network for Technology - TechBA

7.1 Overview

Mexico has attracted massive amount of Foreign Direct Investment (FDI) from the United States and other economies who want to penetrate NAFTA market. The previous Vincente Fox government has significantly reinforced policy measures to support SMEs with creation of a dedicated SME government division. In terms of performance, the increased number of business incubators and increased budget for SMEs are clearly visible. The hindsight is that Mexico should evolve further from FDI oriented development.

The most prominent development can be considered to be the initiation of a program that targets technology-based SMEs. The Mexican government intends to upgrade its economy to be creative and high value added instead of depending on labour-intensive assembly manufacturing, where innovative SMEs have to be the key to achieve the goal. After incubation period, newly established firms and growing SMEs are in need of technology upgrade. TechBA – Technology based Business Accelerator program is devised for this purpose, the central measure to support those technology-based firms. TechBA is a high-profile initiative and part of Mexico's strategy aimed at helping Mexico's technology-based SMEs compete in the global marketplace.

Mexico benchmarked Canadian IRAP network program and modified the program with emphasise on international network. The result is TechBA – technology based network that accelerates the development of SMEs by building strong linkage with the international hub of high technologies. The scheme attracts interests of talented ex-pats and also home-grown technology based entrepreneurs to establish high-technology SMEs in Mexico because they can enjoy the merit of accessing advanced economies' technologies even though the SMEs base is within Mexico.

The TechBA program received wide accolades from the participating SMEs as it is effective in meeting client demand. TechBA is a subprogram of the *Business Development Center Network* to create and strengthen technological development of SMEs. 25 high-technology companies from Mexico participated in the TechBA acceleration program in 2005. 30 new companies are participating in the 2006 TechBA program.

7.2 Operation

TechBA is an execution program of SPyME strategy and funded by Fondo PyME. In many cases, the subsidy is provided as matching fund. The awarded company can implement a research project on the premises (as of 2006, 4 different TechBA premises in three countries).

TechBA is not just providing physical place for SMEs but providing integrated supports. For example, a software security company, Seguridata Privada SA. has received marketing and investment related diagnosis and consulting from Gartner. The TechBA subsidy allowed the reduction of expensive consulting cost by providing half of the cost. The table below indicates the exemplary cases of awarded SMEs. Three SMEs differ in terms of which sector they engage in. However, all the SMEs share a common interest in that they need strong international network for developing innovative capability. The level of satisfaction is high as the cost of building the network would be extremely high without TechBA. As a concrete fruit of the effort, JackBe was the first TechBA company to secure venture capital investment. They closed a $6.5M round in November 2005.

Exemplary cases of TechBA participants

Company	*Major Product*	*Associated TechBA*	*Major Benefit of TechBA*
Seguridata Privada	Security Software	TechBA Silicon Valley	Investment and Technology
Berni Labs	Eco-friendly Substitute for Pesticides	TechBA Montreal	Technology & Marketing
NOCTURNA	Innovative Candle	TechBA Montreal	Marketing

Source: from the interviews

TechBA operation started in 2005. The program established the first TechBA in Silicon Valley, it has extended a similar base in Texas Austin, and it further stretched its network with another NAFTA region establishment, Canada Montreal. Recently Mexico has built European TechBA to exploit its Spanish connection. The fourth TechBA is established in Madrid. The TechBA program involves collaboration between Under-ministry for SMEs and other foreign (local) organizations. The Mexico-U.S. Foundation for Science (FUMEC) and the Entrepreneur Network (TEN) are the major partners for TechBA in Silicon Valley. The TechBA program in Texas has similar cooperative partnership with IC² at the University of Texas in Austin, and Montreal TechBA with Inno-centre in Montreal, Canada.

TechBA adopts a competitive process where SMEs submit proposals to carry out a project in

foreign countries. A selected company is bound to go through multi-stage evaluation and if the company wants to get subsidy, it has to register and attend an orientation workshop. In addition, the eligible company must have realized streamline of cash flow within domestic market. Each SME applicant prepares its business plan and presents it at the first round evaluation by domestic panel, and those successful SMEs have to go through the second round of evaluation by an international panel. The awarded SME has prestigious benefits of having international technology centers outside Mexico. The benefit includes a physical facility, advisors and financing projects. Within the TechBA centers, advisors help SMEs build business connection with international firms.

A possible benefit of participating in TechBA is to learn how to attract interests of foreign venture capitalists. During the selection process, applicants participate in a workshop, and they learn about international business models. The diverse benefits indicate integral aspect of TechBA. The selected companies in international TechBA develop customer relation, attract venture capital, and build technological alliances.

7.3 Lessons Learned

The caveat of 'center programs' intends to provide technical information only when there is no proper advice and finance. However, TechBA avoids such caveats and it surpasses the function of simple information and liaison office.

Mexico has demonstrated how to foster competitive high-technology SMEs within its territory. As Mexico identified many ex-pats start their companies in the US, the need to establish connection there and tap into cutting-edge technology seemed inevitable. In this sense, TechBA functioned in both encouraging home grown SMEs and attracting those potential entrepreneurs who want to build technology-based SMEs in the US. As TechBA provides necessary network to accessing top-edge research, the potential ex-pat entrepreneurs can be attracted to establish companies in Mexico to get the benefit of TechBA.

Mexico has excellent science and engineering education but the merit has been less exploited. The potential can be fully exploited only by appropriate policy programs. While both incubating program and BAN program (of which TechBA is the most critical) produce good result, Incubation and TechBA provide supports to cover early stage and growth stage. It demonstrates the importance of the policy design that addresses a whole cycle of innovation and firm growth.

8. Philippines: Financing Program - *Magna Carta*

8.1 Overview

The Philippines is currently under relatively high external debt equivalent to 72% of GDP in 2004, but the inflow capital from long-term government loans has not been spent on building infrastructure in an efficient way. Infrastructure investment accounted only 3.6 percent in 2003, which is lower than other South Asian economies (e.g. Thailand spent 15.4%).[9] Due to policy related issues and low infrastructure, the level of foreign direct investment (FDI) is moderate when compared with other South East Asian economies. Without FDI, the internal capital market is significant. In fact, the dependency on foreign capital for the industrial development is not so severe as the saving ratio is 17.6% and the saving deposit accounts almost 75% of GDP.[10] The banking sector is relatively healthy with low rate non-performing loans. The major problem is that the internally accumulated capital is not available to local SMEs due to conservative behavior by banks. Despite the fact the Philippines has relatively a sound banking system, SMEs suffered from lack of financial resources. The result is that the majority of SMEs are active in the fields that demand less capital - at the moment a high number of SME employees work in furniture, garment, and handicraft industry in the case of manufacturing sector. To alleviate the problem of growing SMEs that demand capital, the Philippines government devised financing programs, which are based on *the Magna Carta for Small Enterprises*.

The Magna Carta for Small Enterprises is a milestone legislation to promote a dynamic SME sector. This law was enacted in 1991, and revised in 1997. The Act covers various kinds of SMEs regardless of industry sectors. The three principles of *the Magna Carta* are, 1) Reduced administrative burden with a minimal set of rules and simplification of procedures 2) Active participation of the private sector 3) Coordinated effort.

[9] US Library of Congress, Country Profile, March 2006
[10] As of September 2004, the total volume of savings in the Philippine banking system amounted to $46.2 billion.

8.2 Operation

The Magna Carta for Small Enterprises has an impact on four different organizations and policy related innovations.

1) Creation of the Small and Medium Enterprise Development (SMED) Council: The Council is the primary coordinating agency responsible for the promotion, growth and development of SMEs.

2) Creation of the Small Business Guarantee and Finance Corporation (SB Corp.): The SB Corp. is a government-owned firm that provides various alternative modes of financing for SMEs.

3) *Mandatory Allocation of Credit Resources to Small Enterprises*: All lending institutions as defined under Bangko Sentral ng Pilipinas (BSP) rules, whether public or private, shall set aside at least six percent (6%) and at least two percent (2%) of their total loan portfolio for small and medium enterprises respectively.

4) 10% share of SMEs in Government Procurement: SMEs should have 10% share of the total procurement value of goods and services supplied to the government.

The department of Trade and Industry- the Bureau of Small and Medium Business Development undertakes the acting role and it supports the SMED Council and supervises SB Corp. It sets up SME innovation centers in the Philippines in association with the SMED Council. Although *the Magna Carta* has many aspects of SME promotion policies, this report focuses on the financial aspect of policy implication.

The major structure of the financing policy of the *Magna Carta* is indirect financing where the government is not a direct evaluator of bank loans. The indirect loan program is the majority of loans to SMEs and the indirect method is often praised for exploiting the efficiency of market evaluation. The SME Unified Lending Opportunities for National Growth (SULONG) Program[11] is implemented by the National SME Development Plan. As a policy measure, the development plan is carried out under the guidance of *the Magna Carta*.

About the indirect loan program, some funds come from government or international organizations instead of private savings. The main source of these wholesale financing for

[11] A coordinated standardized loan program by diverse government agencies, explained in the member profile section.

SMEs is through government-owned institutions, such as the Land Bank of the Philippines (LBP) and the Development Bank of the Philippines (DBP), and the BSP microfinance bureau. In addition, private sector firms such as the People's Credit and Finance Corporation (PCFC), a registered finance company under the Securities and Exchange Commission, also plays a significant role for agricultural SMEs.

These credit lines are lent at market or near-market interest rates. In the face of widespread conservatism in bank lending, the availability of finance does not necessarily mean SMEs' easy access to the financing. The need for external refinancing is symbolic. As banks have over-liquidity status, they search for proper SME candidates aggressively.

<Table 2> Most important government wholesale credit funds

Wholesaler	Type and number of retail institutions	Outstanding loan($ million)	Interest rate(annual)	Final clients
LBP	400 rural banks< 1000 cooperatives	355.4 (Dec. 2004)	7.5%	SMEs, small farmers, fishers, veterans and pensioners.
PCFC	199 (107 rural and cooperative rural banks, 54 coops, 34 NGOs, 3 thrift banks, 1 lending investor)	51.7 (May 2005)	12%	1.2 million persons, for livelihood, 95 % women
DBP	Cooperatives, banks, local government units, NGOs	0.65 (Dec. 2003)	7.38%	SMEs
BSP microfinance rediscounting window	15 microfinance oriented thrift and rural banks	0.31 (March 2005)	5.9%	33,000 micro borrowers

Sources: Interviews and website information from PCFC, LBP, DBP, BSP. Report of JBIC (2004). Cited in http://cgap.org/savings/philippines_assessment.html

However, as stated in the Overview section, banks are good at evaluating but conservative at lending. Therefore a certain direct aspect is also incorporated within financing policy programs. Loan guarantee program and direct loan is more direct support as the government institutions examine qualification of applicants. SB Corp. has identified the stringent standard of SME loan program and modified its loan guarantee program into three categories based on borrowing capabilities, where the SMEs that have difficulty to qualify for bank loan standards can get the benefit. As loan guarantee is usually partial, SB.Corp. also implements direct loan program for those who have difficulty in qualifying for loan guarantee program.

8.3 Lessons Learned

The conservative investment behaviour of banks in developing member economies can lead to underfinanced situation even though there are ample financial resources. That was the case of the Philippines where over-liquidity and under-finance of SMEs co-exist. The *Magna Carta* tries to break the deadlock by taking compulsory measures to set proportional lending quota for SMEs. The financing policy of *Magna Carta* is supported by concrete measures such as multi-agency SME financing program, SULONG, and SB Corp.'s loan guarantee/ direct loan programs. However, there is room to improve for the better performance. *The Magna Carta* deals only with debt financing aspects, and the majority of implementation programs still demand stringent criteria in general. It is necessary to complement the current policy program with equity financing to stimulate technology-based SMEs.

9. Chinese Taipei: Business Incubator - Asia Entrepreneurial Center

9.1 Overview

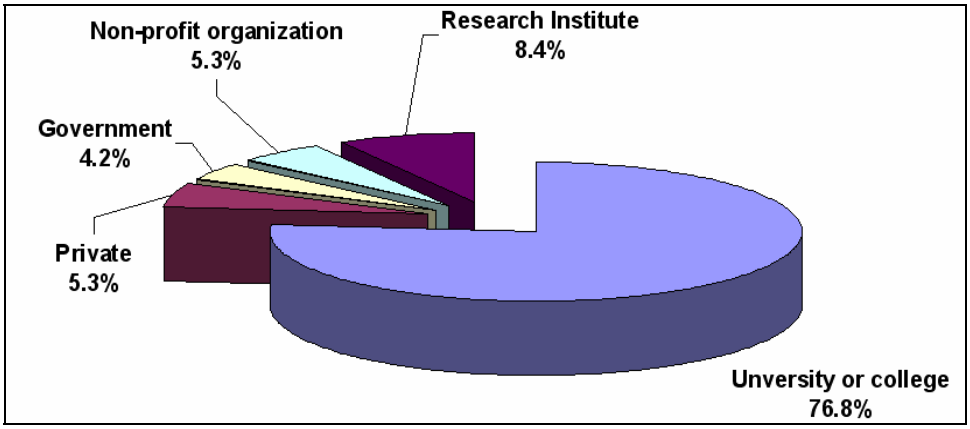
There has been a significant increase in Chinese Taipei's FDI in China since the openness of the Chinese economy in the 1980s. In particular, the great movement of productive capital has been occurred in the labor intensive manufacturing sectors mainly composed of SMEs. It had resulted in the increase in unemployment rate in the 1990s. It reached a level not seen since the 1970's oil crisis. Therefore, the government has made great efforts to reduce it by nurturing new technology start-ups and expanding the scope of SME business operations. As a result, the Chinese Taipei government has focused on the establishment of business incubator (BI) as one of foundations of economic development.

The Small and Medium Enterprise Administration (SMEA) of the Ministry of Economic Affairs (MOEA) has taken the lead in fostering the development of BIs in Chinese Taipei since 1996. The MOEA devised three core strategies, focusing on (1) Incubation Centers, (2) Entrepreneurial Knowledge and Information, and (3) Financing Support and Start-ups. These strategies are to form the basis of the creation of SME incubation platform. The main aim of the policy is trying to help entrepreneurs start new businesses in all aspects such as office space, information, research capability, raising capital, etc.

The strategy for the development of BIs comes from "the Challenge 2008 National Development Plan"(2002-2007) in Chinese Taipei. This Plan is composed of *Three Reforms* and *Ten Key Individual Plans*. One of the elements in the Ten Key Individual Plans was the establishment of various types of innovation and R&D centers with a sub-plan for developing Chinese Taipei into an ***"Asia Entrepreneurial Center" (AEC)***. The main objective was to build a high-quality incubation center network that would stimulate start-up and innovation activity and strengthen the competitiveness of industry as a whole (SMEA 2006).

SMEA implemented the 'Five-year Plan for Strengthening SME Incubator Functions' in 2001. As a result, the number of BIs has increased and the function has been intensified. By the end of June 2006, there were 95 incubator centers in Chinese Taipei. Over the last decade, a total of 2,331 SMEs benefited from SME incubation service, and of which 12 SMEs went on to secure a stock market or OTC listings. In addition, BIs contributed to the creation of investment totaling around NT$5.68 billion in 2005 with a cumulative total of NT$34.15 billion over the past 9 years (SMEA 2006).

The type of BIs in Chinese Taipei could be divided into five types in accordance with the foundation of BIs as shown in Figure 1. The first type of BIs was founded by universities or colleges accounting for 76.8% of the total number of BIs. The second type is public research institute-founded BIs. There are eight BIs, including the Industrial Technology Research Institute (ITRI) incubator, the first BI in Chinese Taipei. Since the significance of ITRI incubation center on technology innovation and regional economic deveopment has emerged, the government has begun to encourge public research insitutes to invest in the incubator sector. Third, there are four BIs founded by the government. Among them, three of BIs were founded by the SMEA and operated by outsourcing organizations. The forth was founded by private companies. There are five BIs in this type. Apart from two BIs, the rest ones are sponsored by the SMEA. The final type was founded by non-profit organizations, accounting for 5.3% of total BIs.



<Figure 1> Type of business incubator in Chinese Taipei

Source: compiled from SMEA 2006

9.2 Operation

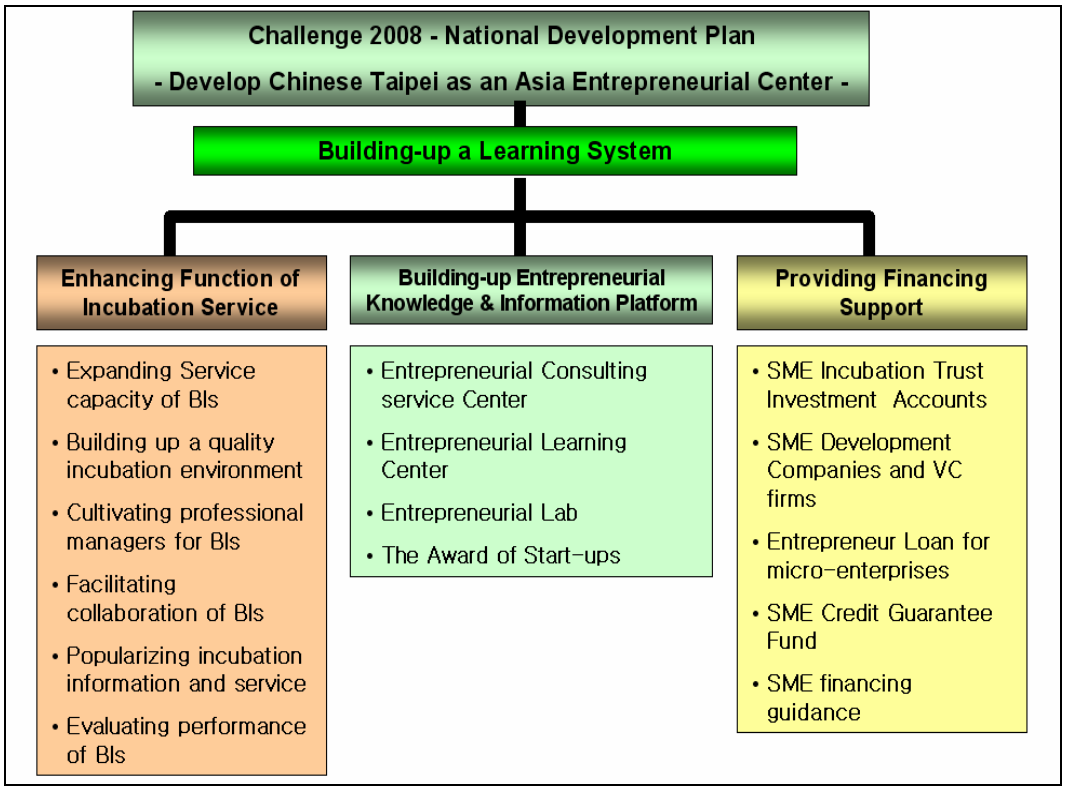
The SMEA sets three major strategic objectives for the development of BIs under the establishement of the Asia Entrepreneurial Center in Chinese Taipei. It is composed of: (1) enhancing the function of incubation service, (2) building up an entrepreneurial knowledge and information plaftform, and (3) providing financing supports for start-ups (see Figure 2).

First, the government has attempted to establish an incubation center network that would strengthen the function of incubation service for start-ups. It has been implemented through expanding capabilities of BIs, building up a quality incubation environment, cultivating

professional managers for BIs, facilitating colla boration of BIs, popul arizing the incubation information and services, and evaluating the performance of BIs.

Second, it has made much efforts to build up a start-up knowledge and information platform that would stim ulate the devel opment of a knowledge-b ased entrepr eneurial soci ety. It has been stimulated by establishing entrepreneurial consulting service center, enpreneurial learning center, entrepreneurial lab, and the award of star t-ups. In particular , the establishment of Entrepreneurial Lab has com plemented the insu fficiency of knowledge and information service function of BIs, which was the main weakness of BIs in Chinese Taipei for the last decade.

Third, it has attempted to establish sound, ef fective financing channels to stimulate investment in start-up activity by establishing SME incubation Trust I nvestment Account, S ME Development Com panies and venture captial fir ms, Entrepreneur Loan for micro-enterprises, SME Credit Guarantee Fund, and SME financing guidance.



<Figure 2> Establishing the Mechaism of SME Enrepreneurship and Innovation

Source: SMEA 2006

SMEA has also achieved impressive results in the spreading of incubation knowledge and experience. An incubation information service website has been established, and an e-paper is being published every month. The followings are various roles done by SMEA: it has provided training for incubator center managers; completed production of educational CD-ROMs; arranged training courses for incubator centers; held presentations on the achievements of companies cultivated by incubator centers; organized incubator center forums (this does not include the various presentations and symposiums organized by individual incubator centers); sent delegates to attend the NBIA annual meeting; exchanged experience with foreign incubator centers; and begun preparations for the publication of incubator center yearbooks.

Natioanl Taiwan University Innovation and Incubation Center (NTUIIC)

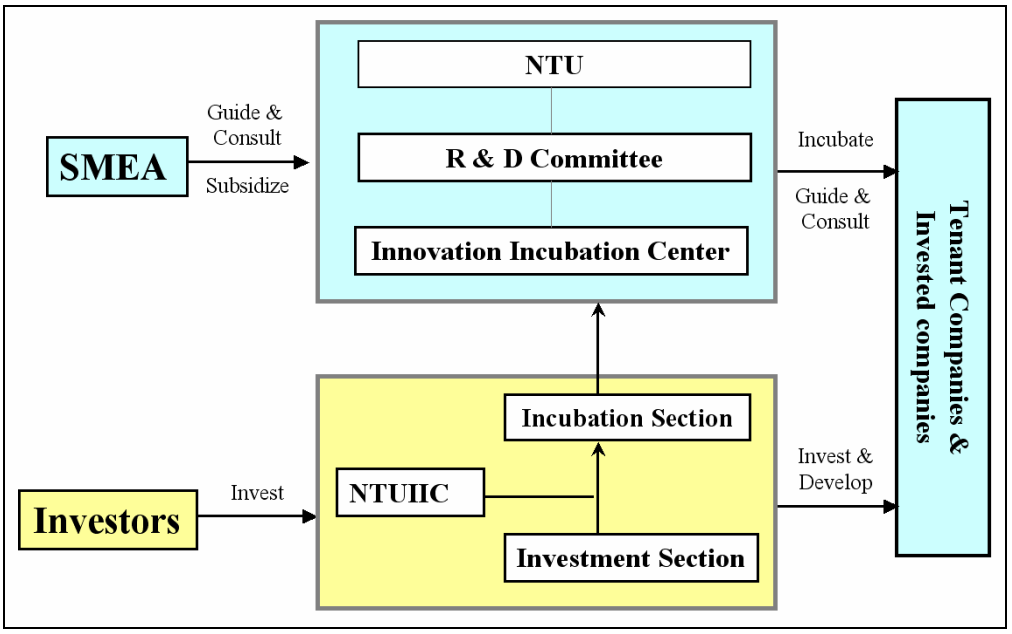
National Taiwan University Innovation and Incubation Center (NTUIIC) has been evaluated as one of the most successful incubators in Chinese Taipei. It has graduated about 54 SMEs up to now and assisted them to gain over NT $10 million research grants from SBIR. The incubation space of NTUIIC is divided into three sections: biotech, demonstration, and IT & engineering. Now, it incubates 40 SMEs, and is ranked as a first-class incubation center by the government.

The aim of the NTUIIC is to build connection between NTU and industries, commercialize available technology at NTU, and enhance the competitiveness of local industries. To do this, the center provides the tenants with comprehensive services, focusing on operation consultation, R&D, business management, market extention and enterprise development services.

It was established as an unversity-owned incubator in 1997. Originally, it was called NTU Tjing-Ling Incubation Center, and renamed it as NTUIIC in July, 1999. It features two main areas: emerging engineering techologyies and biotechnology.

In 2000, it cooperated with NTU Innovation & Incubation Co., Ltd (also in the name of NTUIIC) to provide tenant SMEs more in-depth and overall services. It was corporatized in 2002 with investments from banks, VC, NTU employees and private investors. It is the only incubator which is corporatized among BIs affiliated to universities. NTU holds a 20% share and appoints one-third of the board. It incubates firms with the concept of enterprise, and invests in local/ foreign potential companies, including those enterprises developed from NTU. It cooperated with NTU to extend and commercialize the faculties and students' R&D outcomes.

It integrates all kinds of resources such as consulting services from professors in NTU (especially from engineering department), incubation space, laboratory and equipment support, and the participation of talented NTU students in the R&D activiteis of the tenants, so as to establish an excellent environment for pioneering and innovation. Furthermore, its profits will return to the University as well as the investors to create a triple-win status for the Univerisity, incubation enteprises and the NTUIIC. It intensifies its self-reliance by providing VC services for tenant SMEs.



Corporate Incubation at NTU

Source: In-house data of NTUIIC

*Note: The contents in this box are mainly based upon the interview with Mr. Michale Liu, who is a general manager of NTUICC, in July 7, 2006.

9.3 Lessons Learned

The lessons learned in the AEC plan as a best practice of business incubation policy in Chinese Taipei could be drawn into four.

First, the role of BIs has been critical in stimulating the knowledge production and technology innovation of tenant SMEs by intermediating between all kinds of resources and the tenants, rather than providing simple financial and space supports only.

Second, the establishment of Entrepreneurial Lab service implemented under the AEC plan has played an important role in facilitating systematic knowledge production, and could keep back from the imprudent expansion of BI by providing in-depth, on-site, and individualized services for qualified start-ups.

Third, the stimulation of interaction between universities/ research institutes and tenants SMEs based on the intermediary role of BI, and the increase in the number of successful graduated SMEs would lead to critical impacts on the formation of innovative cluster as well as the technology evolution and spatial expansion of the cluster.

Forth, the cultivation of professional managers for BIs implemented under the ACE plan has made BIs possible to cope with the demand of tenant companies, and helped the success of their business. It would be the foundation of a BI self-reliance model.

10. Thailand: Building Indigenous Technology Capability - ITAP

10.1 Overview

During the last three decades, the main economic development policies in Thailand did not much consider the development of indigenous technological capability as an integral factor in the process of industrialization. For example, the promotion policy of foreign direct investment (FDI) as one of main economic development policies was aimed mainly at generating inward foreign capital flow and employment. It led Thailand to rely significantly on the foreign capital and technology. In other words, the industrial and investment policy of Thailand overshadowed the need to develop local initiatives and indigenous technological capability development. In particular, inadequate technology, outmoded production processes and low management capabilities are recognized as constraints for Thailand to take advantages of the linkage with foreign firms. It resulted from the governmental protection and promotion without strengthening absorptive capability of Thai suppliers, which led to a profound impact on the weak technology and suppliers' network of industries (Intarakumnerd 2005).

In terms of building indigenous technology capability development, one of the main policies in Thailand is likely to be the role of the government and public Research Technology Organizations (RTOs) as the centric platform to make collaboration on research works from the universities and RTOs to the industrialized SMEs, and to commercialize them.

In this respect, the role of public RTOs is emphasized in initiating and undertaking various projects related to upgrading technology absorptive capabilities of SMEs. In the last decade, public RTOs gave great efforts to strengthen the technology capabilities of SMEs, but the performance has not so far reached expected goals. In other words, RTOs and relevant governmental agencies are ineffective at encouraging and helping firms to strengthen their technological capabilities. With regard to this ineffectiveness, RTOs have initiated and undertaken various projects according to the key characteristics of a knowledge-based economy. The project includes performing as an innovation process intermediary, promoting new learning approach of HRD, strengthening innovative infrastructure, and facilitating the business environment. One of the key activities to build SMEs' indigenous technology capability in Thailand is the *Industrial Technical Assistance Program* (ITAP) launched by the National Science and Technology Development Agency (NSTDA), affiliated to the Ministry of Science and Technology.

Before initiating the ITAP, NSTDA has implemented a pilot project, so-called Industrial Consultancy Services (ICS), to upgrade the technology capabilities of SMEs. ICS is based on the 'demand-driven' and 'sharing responsibility' concept, in which each firm must pay at least 25% of the expenses of the technical experts. The experts can be from within or outside Thailand to help participating SMEs while the government pays the remaining 75% (which, however, must not exceed 500,000 Bhat). The reason behind this concept is to induce the SMEs to upgrade their technology capability in manufacturing and improve their products and process innovation to ensure whether a participating company has a real need and commitment. During the nine years of operation, ICS provided technical advice to 176 out of around 3,460 applying companies. Some of the firms increased their sales by 400% and improved their production lines. Based on this success of ICS program, a larger and more intensive program titled as ITAP was initiated in 2000.

The ITAP, a program of the Technology Management Center (TMC), is one of the most successful programs in helping growing SMEs climb up the technology ladder. It has successfully diagnosed and found solutions to the problems and needs of SMEs by sourcing qualified experts in the field, either from Thailand and overseas.

The main aim of the ITAP is (1) to promote and support the development of SME technological capability, (2) to provide knowledge-based innovation assistance to SMEs, (3) to provide national network access to strategic resources for the support of SME innovation activities, (4) to promote the use of Thai expertise to address the technology needs of SMEs, and (5) to further develop international linkages that offer technology-based opportunities for SMEs.

Based upon these objectives, the program has successfully helped SMEs increase their productivity, cut down waste, boost quality to help them penetrate international markets, introduce quality management system and more. As a result, the ITAP provided technical advice to 1,920 out of around 4,190 applying SMEs by providing experts from 10 overseas countries during the years 2002-2006[12]. This program also assisted technology acquisitions to 496 SMEs

[12] It includes Austria Senior Experts Pool (ASEP), Australian Executive Service Overseas Program (AESOP), British Executive Service Overseas (BESO), Business Advisory Center, USA.(BAC), Canadian Executive Services Organization (CESO), Echanges Et Consultations Techniques Internationaux, France (ECTI), Industrial Research Assistance Program, Canada (IRAP), International Executive Service Corps., USA (IESC), Japan Overseas Development Corporation (JODC), Netherlands Management Consultancy Program (NMCP), Senior Expert Services, Germany (SES), Steinbeis Foundation, Germany (StW).

with 42 technology trips involved in visiting technology sources in 13 host countries. It implies that many SMEs were able to improve their products and/or processes or produce new products and/or processes through technology consulting given by experienced technical experts.

10.2 Operation

For any private firm to be eligible for ITAP services, it must meet five requirements. First, it should be registered and do manufacturing in Thailand. Second, it must have at least 51% Thai ownership. Third, it has to be SME. Forth, it must demonstrate a strong interest in and potential for technological innovation capacity. Fifth, it must have potential in personnel, financial, and management in a particular level.

The main contents of the program are composed of two: industrial consultancy and technology acquisition services.

Firstly, *industrial consultancy* is served through the diagnosis of preliminary technical problems by experts, both local and overseas, to solve technical problems as well as assist in production research and development which may include technology management but excluding administration and marketing. In particular, the ITAP provides SMEs with financial supports for industrial consultancy. For example, it supports up to 100% of preliminary problem diagnosis expenses, and up to 50% of the cost of consultancy projects to a maximum of 500,000 Bhat for problem-solving or technology development. It also supports up to two projects per SME in annual (http://www3.easywebtime.com/itap_eng/industrial_consul. html).

Secondly, the ITAP facilitates the process of searching for, and acquiring, appropriate technology. The ITAP provides SMEs with the opportunity to obtain first-hand information on technological advancements and innovations. It also provides them with visions for tomorrow for their future technological and business development. This has been done by arranging overseas technology trips and organizing in-bound and out-bound matchmaking events. These activities offer SMEs the opportunity to find new and appropriate technology and to establish technological and business partnerships with foreign companies. The trips normally involve visiting sources of technology in particular fields, such as research organizations, companies and production plants, meeting with potential partners according to pre-arranged schedules, and visiting industrial trade fairs to obtain the latest technology information and market trends. The

ITAP can also contribute towards the cost of overseas travel for eligible SMEs (http://www3.easywebtime.com/itap_eng/techology_acquisition.html). These traveling expenses are supported in accordance with the distance of destination[13].

10.3 Lessons Learned

The main lessons learned from the ITAP in Thailand could be drawn into two.

The first lesson from the program is that the role of government research institutes in Thailand has gone through paradigm shift from knowledge source to knowledge broker between academia/ technology specialist and SMEs. The main mechanism of this program is based on the role of NSTDA as a technology intermediary by providing SMEs with indirect services that enable them to enhance their technology capability.

However, the effectiveness and performance of the program have not been clearly revealed yet due to the lack of awareness of this program, rather than technical assistance itself. It could be found in interviews with M.C.Udomthrap Co. Ltd. and M.D. Synergy Co. Ltd done in Bangkok.

> "I have no help or relate by any mean with the ITAP because I developed my own technology. I was researcher at the University and conduct research on wood composite. During that research time I have never heard about the ITAP and until now I still don't really understand of what ITAP is for. …. In my opinion, ITAP has no technology that can help my business and also they are only matching SME with technology that available around the globe. Finally, I already have the latest technology in my field of factory, thus, they are not very helpful with me." (Mr. Sattabongkot, T., deputy managing director, July 13. 2006)

> "… the program itself was not designed to help our company on the technical area. The assistance of the program is focused on supporting cash, finding market for the products and services, and making sure our company is doing a transparent accounting work. Especially, what the government wants to see is the accounting, how we spend money, how we calculate our cost and how we sell the products to who m and at what price." (Mr. Luangaramsre, S., deputy managing director, July 13. 2006)

[13] For example, the ITAP supports up to 35,000 Bhat for North American region, up to 30,000 Bhat for European region, up 25,000 Bhat for Japan, Australia, China, and up to 20,000 Bhat for South-east Asia region.

Nonetheless, it is likely to show that the main direction of the program is to link SMEs with technology specialists to generate an environment which enables them to develop technology capability, and to control SMEs' business activities related to accounting works and marketing.

The second is that it is likely to result in the great performance in that the program provides differentiated business and technical services and diagnosis in accordance with the technology and market information level of SMEs.

Note: You can find more at http://www3.easywebtime.com/itap_eng/