Innovation and SME Financing in Selected Asian Economies



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Report on APO Innovation and SME Financing in Selected Asian Economies

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FOREWORD

Recent narratives of growth and development point to the important roles of SMEs in the socioeconomic development of any country. This volume on Innovation and SME Financing in Selected Asian Economies published by the Asian Productivity Organization (APO) discusses these roles in the Republic of China, India, Indonesia, the Republic of Korea, Malaysia, the Philippines, and Thailand, highlighting the different policy measures and interventions that have been developed and implemented by the governments of these Asian economies to stimulate innovation among SMEs.

The APO research, on which this volume is based, revealed that the SME sector can be a powerful engine of economic growth in developing Asia but that SMEs must modernize and innovate. This means the development, deployment, and economic utilization of new products, processes, and services. This study also identified barriers that prevented SMEs from receiving the financial aid that would encourage them to innovate. The common problems at the enterprise level are limited financial means and resources, insufficient managerial skills that lead to poor business governance, and small-scale operations of microenterprises that constitute most of the SME sector. Compounding these problems is the unfavourable external environment including the relatively low level of development of financial markets, limited financial resources available to SMEs, and inadequate financing institutions despite the SME development-oriented policies of governments. It was concluded that traditional methods of providing financial aid to SMEs must be expanded to encourage innovation. Good examples of such innovative financing are presented in each chapter which will be helpful for other APO member countries when developing similar mechanisms for SMEs. This publication contains a useful compilation of various interventions that have been designed and applied by government agencies in collaboration with SMEs themselves, industry leaders, and other stakeholders.

The APO thanks all expert contributors from participating member countries for their commitment to the research project and publication, especially chief expert Dr. Gilberto M. Llanto, who oversaw the entire process. It is hoped that this volume will contribute to the on-going discourse on the importance of financing innovations for SMEs in making them more competitive and in providing a more conducive environment for their long-term growth.

Mari Amano Secretary-General Tokyo February, 2015

ACRONYMS

1-InnoCert	1-Innovation Certification for Enterprise Rating and Transformation
9MP	Ninth Malaysia Plan
AIT	Asian Institute of Technology
Amazon EC2	Amazon Elastic Compute Cloud
ANOVA	Analysis Of Variance
APEC	Asia-Pacific Economic Cooperation
ASCOT	Aurora State College of Technology
BAC	Business Assistance Center
BATAN	Badan Teknologi Nuklir Nasional, National Nuclear Technology Agency
BI	Business Incubator
BIOTEC	National Center for Genetic Engineering and Biotechnology
BOI	The Board of Investment of Thailand
BOK	Bank of Korea
BPPT	Badan Penerapan dan Pengkajian Teknologi, Indonesia Agency for the Assessment and Application of Technology
B2C	Business-to-Customer
B2B	Business-to-Business
CAD	Computer Aided Design
CAPE	Consultancy for Agricultural Productivity Enhancement
CFSB	Cradle Fund Sdn. Bhd.
CHED	Commission on Higher Education
CITD	Conventional Industry Technology Development
CLRI	Central Leather Research Institute
CRDF	Commercialisation of R&D
DATBED	DOST Academe Technology Based Enterprise Development
DBP	Development Bank of the Philippines
DEC	DOST Display and Exhibit Center
DGBAS	Directorate General of Budget, Accounting and Statistics
DOF	Department of Finance
DORI	De Oro Resources, Inc.
DOST	Department of Science and Technology
DTI	Department of Trade and Industry

DTTC	DOST Technology Training Center
EBESE	ECOP Big Enterprise Small Enterprise
EIF	Enterprise Innovation Fund
ERP	Enterprise Resource Planning system
FCGP	Firefly Counterpart Guarantee Program
FTP	Fast Track Programme
GDP	Gross Domestic Product
GERD	Gross Domestic Expenditure on R&D
GMP	Good Manufacturing Practices
GVA	Growth of Value Addition
IBED	Invention-Based Enterprise Development
IBID	Industry-Based Invention Development
IBOD	Investment and Business Operations Division
ICT	Information and Communications Technology
IDD	Invention Development Division
IDEA	Inter-Agency Design and Engineering Assessment Team
IDR	Indonesian Rupiah
IGF	Invention Guarantee Fund
IGOS	Indonesia Go Open Source
IMP3	Third Industrial Master Plan
INR	Indian Rupee
IP	Intellectual Property
IPB	Institut Pertanian Bogor, Bogor Institute of Agriculture
IPDM	Integrated Pest and Disease Management
IPR	Intellectual Property Rights
ISP	Invent School Program
IT	Information Technology
ITAP	Industrial Technology Assistance Program
ITAS	Innovative Technology Applications and Services
ITDP	Industrial Technology Development Program
ITE	Information Technology Enterprises
KBIZ	Korea Federation of Small and Medium Business

KEIT	Korea Institute of Industrial Technology Evaluation and Planning
KIAT	Korea Institute for Advancement of Technology
KIPO	Korean Intellectual Property Office
KISED	Korea Institute of Startup & Entrepreneurship Development
KITA	Korea Industrial Technology Association
KMPSB	Kumpulan Modal Perdana Sdn. Bhd.
KODIT	Korea Credit Guarantee Fund
KOREG	Korean Federation of Credit Guarantee Foundations
KOSBIR	Korea Small Business Innovation Research
KOSDAQ	Korea Securities Dealers Automated Quotation
KOTEC	Korea Technology Finance Corporation
KRW	South Korean Won
KUR	Kredit Usaha Rakyat, a credit guarantee scheme for SMEs, microenterprises, and cooperatives
KVIC	Korea venture Investment Corporation
LBP	Land Bank of the Philippines
LGU	Local Government Unit
LIPI	Lembaga Ilmu Pengetahuan Indonesia, Science Institute of Indonesia
M&A	Mergers and Acquisitions
MAVCAP	Malaysia Venture Capital Management Berhad
MDV	Malaysia Debt Ventures Berhad
MKE	Ministry of Knowledge Economy
MOEA	Ministry Of Economic Affairs
MOSTI	Ministry of Science, Technology and Innovation
MPEX	Manufacturing Productivity Extension
MSME	Micro Small & Medium Enterprise
MSU-GC	Mindanao State University- General Santos City
MTDC	Malaysian Technology Development Centre
MTEC	National Metal and Material Technology Center
MYR	Malaysian Ringgit
NANOTEC	National Nanotechnology Center
NDF	National Development Fund
NECTEC	National Electronics and Computer Technology Center

NGOs	Non-Governmental Organizations
NIA	National Innovation Agenda
NIC	National Innovation Council
NICE	National Invention Contest and Exhibits
NLSF	National Livelihood Support Fund
NSTDA	National Science and Technology Development Agency
ODM	Original Design Manufacturer
OEM	Original Equipment Manufacturer
OSMEP	Office of Small and Medium Enterprise Promotion
OSS	Open Source System
ОТОР	One Town One Product
PCASTRD	Philippine Council for Advanced Science and Technology Research and Development
PCIERD	Philippine Council for Industry, Energy and Emerging Technology Research and Development
РЕ	Private Equity
PHILEXIM	Philippine Export-Import Credit Agency
РНР	Philippine Peso
PLI	Primary Lending Institute
PT PNM	Permodalan Nasional Madani, an Indonesian state-owned company that provides financing to SMEs
PWC	PricewaterhouseCoopers
RCGF	Regional Credit Guarantee Foundation
RDIs	Research Development Institutions
S&T	Science and Technology
SBC	Small and Medium Business Corporation
SB Corp.	Small Business Guarantee and Finance Corporation
SBIR	Small Business Innovation Research
SEAP	SME Expert Advisory Panel
SETUP	Small Enterprise Technology Upgrading
SIDBI	Small Industries Development Board of India
SIIT	Sirindhorn International Institute of Technology
SMBA	Small and Medium Business Administration
SME	Small and Medium Enterprise

SMEA	Small and Medium Enterprise Administration
SMED	Small and Medium Enterprise Development
SMEG	Small and Medium Enterprise Credit Guarantee Fund
STEVPP	S&T Experts Volunteer Pool Program
STI	Science, Technology and Innovation
STKS	Science and Technology Knowledge Services
SULONG	SME Unified Lending Opportunities for National Growth
TAF	Technology Acquisition Fund
TAPI	Technology Application and Promotion Institute
TBI	Technology Business Incubation
TESDA	Technical Education and Skills Development Authority
THB	Thai Baht
TID	Technology Innovation Development
TIPA	Korea Technology and Information Promotion Agency for SMEs
TIPD	Technology Information and Promotion Division
TIPO	Taiwan Intellectual Property Office
TLO	Technology Licensing Offices
ТМС	Technology Management Center
TSMC	Taiwan Semiconductor Manufacturing Company Limited
TSP	Thailand Science Park
TU	Thammasat University
TWD	New Taiwan Dollar
UKM	Universiti Kebangsaan Malaysia
ULaMM	A credit unit created by PT PNM
USD	United States Dollar
UTM	Universiti Teknologi Malaysia
VC	Venture Capital
WPI	Wholesale Price Index

CHAPTER ONE: OVERVIEW OF ECONOMIC GROWTH IN ASIA

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INTRODUCTION

Future economic growth in the Asian region is being increasingly driven by technology and innovation in line with global trends and rapid changes in dynamic East Asia, which has experienced sustained growth and the continuing reduction of poverty in the last 50 years. The Asian Productivity Organization (APO) provides a clear narrative of the rise in prominence of Asia in the global economy compared to other regional economies in terms of output growth, Gross Domestic Product (GDP) per worker, total factor productivity and labor productivity (APO, 2011). Growth of GDP per worker in Asia has outstripped that in the USA, allowing catch-up. Even after the Asian financial crisis, productivity growth has been accelerating. Estimates show that over the period 1970–2008, China, the Republic of China (ROC), Hong Kong, and Thailand achieved total factor productivity growth faster than that of the USA (APO 2011, pp. 8–9). Relatively good economic performance based on APO data has been recorded by the countries included in this volume (Table 1) [2].

Table 1. GDP growth, 1995–2000, 2000–08 (average annual growth rate of GDP at constant market prices)

Country	1995–2000	2000-08
India	5.7	7.1
Indonesia	0.8	5.1
ROK	5.1	4.2
Malaysia	4.7	5.0
Philippines	3.9	4.7
ROC	5.0	3.8
Thailand	0.5	4.7

Source: APO Productivity Databook 2011 [2a]. Note: ROK, Republic of Korea. Small and Medium Enterprises (SMEs) have played an important role in the economic growth and development of these countries. Chapters 2-8 of this volume, which each cover a separate country, each provide a definition of SMEs that would typically set them apart from large enterprises and microenterprises in terms of any of the following characteristics or a combination of these characteristics: assets owned, investment in plant and machinery, paid-in capital, annual sales-turn over, and the number of full-time employees. In India, a Micro, Small and Medium Enterprise (MSME) unit is defined as an enterprise where investment in plant and machinery, whether held on ownership terms or on lease or by hire purchase, does not exceed USD2 million. In the ROK, the SME is defined as an enterprise with fewer than 300 employees in manufacturing, mining, construction, transportation and large general retail stores, 200 employees in business support service, 100 employees in wholesale and product intermediation and 50 employees in other sectors. The ROC defines SMEs as those with paid-in capital of USD2.42 million or less, or those with fewer than 200 regular employees in the manufacturing, construction, mining and quarrying sectors. SMEs in other sectors are those with a sales revenue of USD3.03 million or less in the last year, or those with fewer than 100 regular employees. In the Philippines, small enterprises are those total assets ranging from USD71.909 to USD347.947, while medium enterprises have total assets of USD350,267 to USD2.3 million. SMEs are also defined in terms of employment: small (10-99 employees) and medium (100-199 employees). Thai SMEs are enterprises with fewer than 200 employees and less than USD6.7 million in fixed capital, excluding land and property [3–7].

SMEs are reported to be the largest contributor to GDP in middle (estimated at 39%) and high-income countries (estimated at 51%) [8]. Another major contribution of SMEs is their job generation potential. In many economies of Asia and the Pacific, SMEs contribute 60% or more of jobs [9]. They are a major source of employment opportunity to an expanding labor force, thereby addressing the objective of more inclusive growth especially in developing Asian countries [10].

Recent estimates done by the Asian Development Bank (ADB) staff [8] indicate that Asia's poverty level remains high and rising inequality is a challenge. The development of Asia's labor force is projected to increase by more than 150 million from 1.828 billion in 2010 to 1.980 billion in 2020 and around 300 to 400 million are to be transferred out of the agriculture sector. Around 500 million jobs need to be created if Asia is to make significant progress in poverty reduction [8]. Sufficiently empowered, SMEs can indeed make a significant contribution to increase output and employment in developing Asia.

SMES AND GLOBAL AND REGIONAL PRODUCTION/ DISTRIBUTION NETWORKS

SMEs have shown their value-addition and employment creation potential. According to APO, they can be a powerful engine of manufactured export growth and upgrading in developing Asia. The share of SMEs' contribution to exports varies widely among economies in the Asia-Pacific region, lying between 14.2% for Malaysia and 69.2% for China. SMEs have contributed to the export sector in terms of volume, diversification of output, technology and skills development [9]. In economies with limited domestic markets, SME exports have a crucial role in supplying competitive products and services with great potential for backward and forward linkages, thereby underpinning high and sustained growth and employment [9].

To accomplish this role, SMEs need to climb up the value chain especially in East Asia where regional production networks are pronounced [8]. At present, only an estimated 22% of SMEs in four of the major Association of Southeast Asian Nations (ASEAN) economies (Malaysia, Philippines, Thailand, and Vietnam) participate in global production chains even as SMEs are perceived as second-tier or third-tier suppliers in those production chains [11].

Using firm-level data from the World Bank's *Enterprise Surveys* covering 5,900 manufacturing firms in five ASEAN economies, a recent study found that large firms are the leading players in the late 2000s but a reasonable base of SMEs exist as direct exporters or suppliers to multinational corporations [12].

These findings indicate the great potential of innovative SMEs in taking an active part in global and regional value chains. A recent paper explaining the pattern of trade and international production/distribution networks in East Asia noted the increasing detachment of activities beyond firm boundaries in East Asia where various forms of outsourcing have been developed including original equipment manufacturing, original design manufacturing, electronics manufacturing system firms, and the notable penetration of local firms into production networks, particularly in China, Malaysia, and Thailand [13]. This phenomenon creates vast opportunities for the more innovative and technologically equipped SMEs to link up with those international production/distribution networks and contribute to higher value addition and the creation of high quality jobs. Figure 1 shows the range of value-added products or services in global and regional value chains across borders that can be provided by enterprising and innovative SMEs from conception, through design, sourcing of raw materials and intermediate inputs, production, marketing, distribution, and support to the final consumers [9].



Figure 1. An example of regional and global value chains – apparel and garments sector Source: Figure 40, UNESCAP Asia-Pacific Trade and Investment Report 2011 [13a].

The experience of the ROC [4] in harnessing the potential of SMEs in value addition and participation in global and regional production networks and supply chains is illustrative of this thesis and has become a model of SME development that has been suggested for developing countries to emulate. The experience cited implies that SMEs need to develop final and intermediate goods and services in demand in global markets, pursue product and process innovations, and adopt or increase technology utilization in order to successfully link to global and regional production/distribution networks as indicated in Figure 1.

There are formidable barriers restricting SME participation in these global and regional value chains or networks. The major ones are lack of access to finance, human resource constraints, volatile business environment, inability to meet global standards, inadequate infrastructure, and size-related barriers such as inability to capture market opportunities, among others. These barriers can individually block participation in global and regional production networks, and what compounds the problem is that the interlocked nature of those barriers aggravates the negative effects of individual barriers [3, 4, 6, 14].

INNOVATION-LED STRATEGY TO GROWTH AND EXPANSION

Chapters 2–8 of this volume maintain that an innovation-led strategy is a critical path to survival, growth and expansion in a competitive global and regional environment. SMEs can climb up the global and regional value chains through innovation, which includes the utilization of modern technologies to produce new/higher value final as well as intermediate goods and services. A recent study found that SMEs which have made significant efforts to innovate are expected to have higher probabilities of engaging and performing well in production networks. Innovation efforts, along with managerial/entrepreneurial attitudes, are among the important firm characteristics that determine SME participation in production networks [15].

To fulfill their critical role in growth and development, SMEs have to embrace technology and innovation. They simply have to be innovative. Innovation can stimulate SME productivity, which shifts out the supply curve of these SMEs, permitting growth in output and employment. For developing countries, this is an advantage because it makes growth more inclusive. The growth of SMEs will have to come from innovation because it equips them with sustainable competence that enables them to survive and expand in a competitive global economy. Without innovation, SMEs face the risk of falling into a low productivity trap, which frustrates efforts to exploit their full growth potential. It is the innovative SMEs that have the advantages of flexibility and nimbleness in creating quality jobs and generating higher gross value added.

Innovation means the development, deployment, and economic utilization of new products, processes, and services (Organization for Economic Co-operation and Development (OECD) 1999). By developing and commercializing new products, processes and services, SMEs can exploit various parts of the global and regional production/distribution networks or value chains. In this sense, innovation holds the key to the survival of SMEs including long-term growth and competitiveness [6]. The innovation-led economy demands the establishment of SMEs that can foster market and technology-driven innovation and create high-skilled jobs in all economic sectors [16]. The country papers in this volume hold the common view that constant innovation fostered by use of appropriate technology and financing are the driving forces of future SME growth and expansion.

In this regard, Malaysia launched the National Innovation Agenda in 2007 with three main thrusts: (a) a research agenda that targets the areas of competitive advantage and emphasises commercialization of output, (b) the development of intellectual capital in science and technology fields, and (c) a National Innovation System [16]. Thailand has a National Innovation Agency (NIA) focused on promoting the development of innovative technologies

and commercialization of high value-added products in three areas: (1) biotechnology and natural product (2) eco-industry, comprising clean energy, bio-based materials, and organic agriculture, and (3) software & mechatronics, nano-solutions, and product design [7]. The ROK has a five-year (2009-13) SME Technology Innovation Plan that aims to foster global SMEs through enhancement of technological competitiveness and to maximize R&D investment efficiency in accordance with a "choice and concentration" strategy [5]. The Philippines' three-pronged approach to promote innovation among SMEs consists of: (a) Filipinnovation or the Philippine National Innovation Strategy, (b) technology business incubation, and (c) fostering entrepreneurship programs in the academe. The National Innovation Strategy seeks to strengthen human capital, support business incubation, innovation environment, and entrepreneurship [6]. The ROC has an interesting approach in addition to central government efforts to promote SME innovation. Under a local innovation system, local governments collaborate with industry, academia and research institutes to encourage joint ventures between local businesses and universities, strengthen local industrial clusters, and enhance communication between local innovation units through Information and Communications Technology (ICT) [4]. For SMEs in the ROC, the path consists of innovation, upgrading, transformation, brand development, close collaboration with large enterprises, integration of manufacturing and services, and improvement of the energy-saving performance of products and production equipment [4]. Indonesia established an SME Innovation Center to improve productivity, product diversification, value added and SMEs' competititveness, among others. The National Innovation Committee assists in strengthening a national innovation system and developing a national innovation culture, gives recommendations about priority programs, action plans, and others [14]. India has a package of assistance for innovative entrepreneurs such as technical education and training, research, referral and laboratory services to promote innovation, establishing incubation units and financial assistance, including domestic venture funds [3].

It is noted that chapters 2–8 highlight complementary activities or interventions that address other significant barriers to SME innovation. These are also critically important. Governments have taken a pro-active stance in providing not only a comprehensive package of financial assistance but also a broad range of technical assistance to SMEs on top of efforts to ensure a SME-friendly policy and regulatory environment. Several noteworthy interventions are discussed in chapters 2–8 and only one example is given here because of space limitation. In 2009, the Entrepreneurship Navigation Project of the Small and Medium Enterprise Administration (SMEA) of the ROC was established to create a quality business environment and boost entrepreneurship. The project established regional SME entrepreneurship and innovation service centers to expand local service volume through the following strategies: improving the start-up incubation environment, establishing start-up knowledge and information platform, and helping new start-ups to obtain funding. Other countries have created technology incubation centers (the ROC, Malaysia, Philippines)

technology-certification processes (the ROK), a credit bureau specialized in SMEs that promotes the exchanges of information about SMEs among participating institutions (the ROK), and funding for research and innovation provided in the national budget for distribution to SMEs through ministries and local government (Indonesia).

SME FINANCING POLICIES AND PROGRAMS TO SUPPORT INNOVATION

A common ground of each chapter is that the lack of access to adequate financing constitutes a serious barrier to SME innovation and growth. A recent Philippine Institute for Development Studies-Economic Research Institute for ASEAN and East Asia (PIDS-ERIA) survey of barriers of 101 Philippine SMEs from the electronics, automotive, garments, and food sectors indicated that financial constraints have remained one of the most critical barriers affecting SME growth [17]. The importance of access to finance is shown by a recent empirical study indicating that SMEs with more access to credit are more likely to join production networks [12]. Access to finance was found to be among the most critical factors determining the competitiveness of regional SMEs and their ability to fully exploit and participate in the global economy and business opportunities from regional economic integration and, in particular, participation in regional production networks [18].

Several barriers affect SMEs' access to financing depending on (a) firm-level characteristics such as lack of collateral, lack of management skills and poor governance, limited assets, low creditworthiness, low registered capital, small scale of operations, low earnings, and cash flow problems, and (b) the level of development of the country's financial markets, the high cost of finance, the limited sources of funds, and limited number of financial institutions capable of SME financing, among others [6].

Access to finance affects the SMEs' capacity to improve productivity, raise competitiveness, promote innovation, generate employment, and contribute to economic growth and development. Thus, the focus of the country papers is the whole range of SME financing policies and programs that have been designed to encourage and support SMEs to innovate. In general, all countries make use of traditional bank loans, direct financial support (loans) by the government or institutions specially created to provide financing to SMEs, and other types of financial instruments such as loan guarantees, supply chain loan guarantee, venture capital funds and project financial services and that there is a role for the government to make low-cost finance accessible to these SMEs. The details of these SME financing policies and programs are discussed in the country papers, and only a few examples are

given here due to space limitation [19]. In the ROK since the 1997 currency crisis, SME policy has focused on making finance more easily accessible to innovative SMEs. Policy funds and credit guarantees for SMEs were created. The ROC provides SMEs with several types of project financing loans: (a) SME Upgrading Loans, (b) Young Entrepreneur Loans, and (c) SME Development Fund Project. In the Philippines, a government bank provides a special financing assistance to Small and Medium Exporters endorsed by PhilExport and the Foreign Buyers Association of the Philippines (FOBAP). In Thailand, the institutions providing financial support programs to SMEs are the National Innovation Agency focusing on innovative technologies and commercialization of high value-added products, and the Small and Medium Enterprise Development Bank of Thailand for small innovation business development [4, 5, 6, 7].

CONCLUSION

It seems that future growth in Asia is underpinned by a regional economy populated by innovative SMEs, firms that can foster market- and technology-driven innovations, create high-skilled jobs and generate higher added value through linkage with larger enterprises in the global and regional value chains. To fulfill this vision, SMEs and governments have to join hands in encouraging the development of innovative SMEs. The principal challenge for policy makers is to craft policies and interventions that will address the long-standing constraints of growth and productivity faced by SMEs. Foremost among policies and interventions that are needed by SMEs are measures to assure them of access to finance and complimentary programs to foster innovation. This volume provides country papers that present detailed and comprehensive policies and programs to promote innovation. The papers also provide specific recommendations for policy makers to consider in motivating and stimulating SME innovations. The experience of the more developed economies in promoting SME growth and innovation, namely the ROC and the ROK, certainly gives guidelines and insights on what could possibly work in the developing economies in their attempt to nurture and foster SME innovations.

Based on the analysis done in chapters 2–8, several key points can be taken for future policy interventions in SME innovation. It is noted that the level of economic growth and development has to do with the level of innovation activity and the financing of SME innovation. In designing a system for promoting SME innovation, it will be important to keep in mind the significance of the following key areas that can support and stimulate SME innovations (a) enabling policy and regulatory environment, e.g., focus on SME innovations and integration of domestic SMEs into global and regional value chains, (b) the presence of an institutional framework, e.g., national innovation agenda and supporting institutions to

carry out the agenda that can effectively service the requirements of innovating SMEs, (c) supportive infrastructure, e.g., incubator policies focusing on high-tech start-up companies that can bring down the cost of innovations and experimentation, (d) business development services, and (e) access to finance, the main policy thrust of this volume, ranging from traditional bank loans and direct financing support by the government to more sophisticated (relative to the level of development of the developing economies in this volume) instruments such as loan and guarantee funds, venture capital funds and certification as a venture company to qualify for support. It goes without saying that effective coordination of government and private sector efforts is of the utmost necessity in pursuing a common goal of establishing innovative SMEs. The platform for coordination could be a knowledge infrastructure (seen in the ROC, the ROK, Malaysia and Philippines) that links the public and private sector (SMEs), academe and industry, and provides a venue for closer and more strategic collaboration toward a common goal of SME innovation.

ENDNOTES

- 1. The author gratefully acknowledges the assistance of Kristina Ortiz and Jasmine Egana in the brief review of literature.
- 2. The country papers report more updated figures. Table 1 reports the most recent APO data for comparability purposes.
- 2a. APO Productivity Databook 2011.
- 3. See Chapter 3.
- 4. See Chapter 2.
- 5. See Chapter 5.
- 6. See Chapter 7.
- 7. See Chapter 8.
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- 9. Asia-Pacific Trade and Investment Report 2011.
- 10. The country papers report the contribution to output/value added and employment of SMEs in their respective countries. Those contributions are not reported in one summary table because data and definition may differ across countries and thus, may lack comparability. The interested reader should go to the individual country papers. The data and other information reported in the country papers are taken at their face value.
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- 14. See Chapter 4.
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- 17. Aldaba R., Medalla E., del Prado F., et al. Integrating SMEs into the East Asian Region: The Philippines. Unpublished paper; 2010.
- Harvie C., Narjoko D., Oum S. Small and medium enterprises (SMEs) access to finance in selected East Asian economies. ERIA Research Project Report, No. 14. Jakarta, Indonesia, Economic Research Institute for ASEAN and East Asia, 2010.
- 19. The interested reader can get comprehensive and detailed information on SME financing policies and programs from the individual country papers.

CHAPTER TWO: REPUBLIC OF CHINA

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INTRODUCTION

The ROC's economy is driven by SMEs, which account for more than 97% of all companies and contribute to job creation. Their efficiency and flexibility enable them to compete with large enterprises, and some have even transformed into leading international companies such as Taiwan Semiconductor Manufacturing Company Limited (TSMC) and Acer Incorporated.

By innovating R&D, upgrading technology level, enhancing product design, and promoting digitalization of enterprises, the ROC's SMEs have developed high-value-added products and services. The government provides guidance and funding support to encourage innovation and R&D as well as build international competitiveness. In 2009, the Small and Medium Enterprise Administration (SMEA) promoted the "Entrepreneurship Navigation Project" to create a quality business environment and boost entrepreneurship. The Project established regional SME entrepreneurship and innovation service centers to expand local service volume through the following strategies: Improving the start-up incubation environment, establishing start-up knowledge and information platforms, and helping new start-ups obtain funding. An entrepreneurial society will inject fresh energy into the economy.

This chapter [1] discusses how to establish an appropriate financial and policy environment so that innovative SMEs may realize their potential in output and employment creation. The chapter is organized as follows: Section 2 provides an overview of the SME sector. Section 3 is a brief summary of the ROC's economic growth and the contribution of SMEs to the economy. Section 4 gives an overview of the SME financing structure and focuses on policies for the promotion of innovation among SMEs. Section 5 discusses the innovation-related activities of SMEs. Section 6 discusses the financing programs to promote innovation for SMEs. Section 7 gives recommendations for strengthening SME financing.

OVERVIEW

SMEs are the foundation of the ROC's economy. However, given on-going internationalization and globalization, their business models have to change if they are

to grow and to be sustainable. They can no longer rely on low-cost production or largevolume ODM (Original Design Manufacturer) or OEM (Original Equipment Manufacturer) production to realize reasonable profits. The ROC's SMEs currently play a specialist ODM or OEM provider role in the global supply chain. They must diligently upgrade to improve competitiveness and find new markets and business opportunities. The path to follow is led by innovation, upgrade, transformation, brand development, close collaboration with large enterprises, integration of manufacturing and services and improvement of the energysaving performance of their products and production equipment [2]. Innovation has been the key dynamic force of economic development. To facilitate innovation among SMEs, appropriate financial and policy environments are needed.

The government of the ROC has provided guidance and funding support to encourage innovation and R&D through the following programs and plans: the Industrial Technology Development Program (ITDP), the Small Business Innovation Research (SBIR) program, the Innovative Technology Applications and Services (ITAS) program, the Conventional Industry Technology Development (CITD) plan, the Leading Product program, and the Assist Service Sector Technology Development Plan. These initiatives will motivate increased spending on innovation and R&D that will build up the SMEs' R&D capabilities and raise their competitiveness.

Future SME guidance policies may focus on the SME Credit Guarantee Fund Pass the Torch Academy which helps SMEs build sound financial and accounting systems and on the expansion of the Firefly Program for encouraging large enterprises and banks to help SMEs with R&D and innovation. Integrating credit databases helps build a credit guarantee rating model that can be used to improve the efficiency of service provision. Direct credit guarantees by the government can help SMEs in emerging industries such as the cultural, digital content, and creative industries as well as for underprivileged groups and female entrepreneurs to secure much-needed financing. The industryuniversity sector collaboration and industry cluster models can be leveraged to integrate guidance policies, credit guarantees and financing into a unified approach for SME development.

Drawing from lessons learned on the impact of the global financial crisis on economies, in 2009, various government agencies initiated programs to help SMEs. The Ministry of Economic Affairs (MOEA) incorporated the local services networks of various government agencies to execute the Proactive Service for SMEs at the Local Level Plan. The SMEA implemented the Business Start-up Helmsman Plan through the SME Start-up and Innovation Service Centers to build regional service networks and provide service at the local level. The MOEA established the Local Industry Development Fund with an allocation of TWD1 billion (USD302 million) from the national treasury.

ECONOMIC GROWTH

Economic Growth and Employment

The ROC has enjoyed sustained economic growth, full employment and low inflation for many years. Based on calculations of the Cabinet-level Directorate General of Budget, Accounting and Statistics (DGBAS) from 2005–07, GDP growth ranged from 4.7% to 5.8%. In the second half of 2008, growth slumped into a recession due to a credit crunch and lower consumer spending and investment. GDP growth fell from 5.6% in 2007 to 0.73% in 2008. Table 1 shows the economic performance in 2010–11.

In 2011, the global economy slowed down as the USA and European nations experienced severe fiscal problems and high unemployment. The ROC's economic growth rate fell from 10.8% in 2010 to a still respectable 4.1% in 2011. With the upward revaluation of the New Taiwan Dollar, the Wholesale Price Index (WPI) rose by 4.32%, while the Consumer Price Index (CPI) rose by 1.42%.

The DGBAS estimates the ROC's average Gross National Product (GNP) per capita to be USD20,000, a new historical high. In 2005–11, the unemployment rate ranged from 3.9% to 5.8%, the latter being the highest rate during this period.

The current account surplus was mainly attributable to the increase in exports to neighboring Asian countries (Table 1). The growth of imports was due to increased imports of crude oil, electronic parts, and consumer goods. The services account deficit decreased over the same period mainly caused by increases in merchandise trade surplus and financial services receipts.

	2005	2006	2007	2008	2009	2010	2011
GDP	364,832	376,375	393,134	400,132	377,529	428,186	464,009
GDP Growth Rate	4.70	5.44	5.98	0.73	-1.81	10.76	4.07
GDP (nominal) Per Capita	16,051	16,491	17,154	17,399	16,359	18,503	20,006
GNP (nominal) Per Capita	16,449	16,911	17,596	17,833	16,901	19,090	20,574
Current Account	17,578	26,332	35,154	27,505	42,923	39,872	41,230
Goods Account	19,456	24,229	30,445	18,478	30,553	26,513	27,848

Table 1. Major Economic Indicators, ROC (Unit: million USD, USD, %, persons)

	2005	2006	2007	2008	2009	2010	2011
Exports	198,432	224,017	246,677	255,629	203,675	274,601	308,257
Imports	182,614	202,698	219,252	240,448	174,371	251,236	281,438
Services Account	-6,653	-3,543	-1,640	1,847	1,991	2,493	3,894
Consumer Prices	2.31	0.60	1.80	3.52	-0.86	0.96	1.42
Unemployment Rate	4.13	3.91	3.91	4.14	5.85	5.21	4.39
Exchange Rates of TWD to USD	32.18	32.53	32.84	31.54	33.06	31.65	29.47
Population	22,770,383	22,876,527	22,958,360	23,037,031	23,119,772	23,162,123	23,224,912

(...continued)

Source: APO, APO Productivity Databook, 2010. CBC Statistics, 2011, and Directorate General of Budget, Accounting and Statistics, Executive Yuan, R.O.C., last updated: 2013/February [2a].

With continued economic growth in 2011, total foreign trade rose to USD589.7 billion (a 12.14% growth rate). Exports increased to USD308.3 billion or 12.3% while imports rose by USD281.4 billion or 12.0%. The ROC's trade surplus increased by 14.8% in 2011 compared to the previous year boosted by a recovering world economy and lower base effect. Goods trade surplus increased to USD7.56 billion. The services account surplus increased to USD0.73 billion, mainly due to increases in net surplus from merchandise services and travel receipts.

In the first half of this decade, the ROC's exports grew by 60%. Export composition changed from predominantly agricultural merchandises to industrial goods. Electronics is the most essential industrial export and is the largest receiver of investment from the USA. The ROC's electronic firms, the world's largest suppliers of computer monitors, lead in PC build-up, although now, final assembly of such goods is done abroad, mostly in China. Imports are dominated by raw materials, coal, oil, gas and capital goods. China has become the biggest trading partner supplanting the USA as its largest trade partner in 2003. In 2009, China (including Hong Kong) accounted for over 28.9% of the ROC's total trade and 41.1% of exports. Japan is the second-largest trading partner with 13.4% of total trade, including 20.8% of the ROC's imports. The USA is now the third-largest trade partner, taking 11.6% of the ROC's exports and supplying 10.4% of its imports [3].

The ROC's exports to China, including Hong Kong, accounted for 40.2% of total exports increased by 8.1% in 2011 compared to 2010. Exports to six ASEAN member nations rose by 22.7% in 2011, accounting for 16.5% of total exports. Imports from Japan had the largest share of total imports at 18.5%.

Contribution of SMEs to the National Economy

Tables 2 and 3 show key statistical data for the ROC's SMEs in 2005–11.

As of 2011, there were 1,310,791 business enterprises in the ROC, of which 1,279,784 were SMEs, accounting for 97.6% of the total number of business enterprises. The number of SMEs grew steadily over the period 2005–11, rising from 1,226,095 in 2005 to 1,279,784 in 2011. 80.1% of these SMEs were in the service sector, with 51% in the wholesaling and retailing industry. 56.7% of SMEs were organized as sole proprietorships, and 46.6% were located in the northern part of the ROC.

In 2011, 36% of SME owners were women; 44.5% of female-owned SMEs have been in existence for at least 10 years and around 63.4% of female-owned SMEs were organized as sole proprietorships. In 2009, most SMEs (57.2%) were sole proprietorships, constituting the largest group of SMEs by type of ownership. 53.1% of female-owned SMEs were in the wholesaling and retailing industry.

Around 25.1% of total SMEs were 10 to 20 years old while 21% were over 20 years old. Table 2 shows the structural change in industry over the past six years. The SMEs (81%) are mostly in the service sector with 18% to 19% in the industrial sector.

Year Sector/	2005	2006	2007	2008	2009	2010	2011
Industry	1 226 005	1 244 000	1 237 270	1 234 740	1 232 025	1 247 008	1 270 784
AII SMLS	1,220,095	1,244,099	1,237,270	1,234,749	1,232,025	1,247,990	1,2/9,/04
Agricultural Sector	0.91	0.88	0.87	0.89	0.90	0.91	0.90
Industrial Sector	18.11	18.13	18.79	18.83	18.75	18.67	19.01
Service Sector	80.98	80.99	80.33	80.28	80.24	80.42	80.09
Total Sales	10,000,220	10,241,215	10,481,910	10,462,696	9,189,463	10,709,005	11,226,933
Agricultural Sector	0.14	0.14	0.15	0.16	0.18	0.17	0.16
Industrial Sector	48.20	48.85	50.04	50.09	45.85	49.41	50.13
Service Sector	51.65	51.01	49.81	49.75	53.96	50.42	49.70

Table 2. The Shares of All SMEs in the ROC Held by Individual Sectors, 2005-11

Units: enterprises; %

Year Sector/ Industry	2005	2006	2007	2008	2009	2010	2011
Domestic Sales	8,481,397	8,678,992	8,842,983	8, 817,989	7,873,111	9,088,972	9,567,948
Agricultural Sector	0.14	0.15	0.16	0.16	0.19	0.18	0.17
Industrial Sector	44.37	45.00	46.14	46.05	42.35	45.47	46.28
Service Sector	55.49	54.85	53.71	53.79	57.46	54.36	53.55
Export Sales	1,518,823	1,562,224	1,638,927	1,644,707	1,316,352	1,620,033	1,649,985
Agricultural Sector	0.14	0.10	0.11	0.11	0.15	0.14	0.12
Industrial Sector	69.61	70.25	71.09	71.77	66.82	71.52	72.50
Service Sector	30.25	29.64	28.79	28.12	33.03	28.34	27.38

(...continued)

Source: Ministry of Finance Tax Data Center, VAT data for 2005-11 [3a].

SMEs accounted for around 30% of total sales of all business enterprises in the ROC. The industrial sector accounted for less than 50% of total sales while manufacturing firms accounting for over 70% of the total exports of the ROC's SMEs. The wholesaling and retailing industry accounted for a higher share of total domestic sales than any other individual industry.

In 2011, total domestic sales of SMEs amounted to TWD9,576.9 billion (USD324.97 billion), an increase of TWD488 billion (USD16.56 billion) compared to total domestic sales in 2010. Total export sales of SMEs amounted to TWD1,650.0 billion (USD55.99 billion) in 2011, an increase of 1.85% from that of 2010. These represented 16.3% of total export sales of all business enterprises in the ROC (TWD10,126.9 billion (USD343.63 billion).

Table 3 shows the statistical indicators for the ROC's SMEs in 2011.

		l	Unit: no./million/t	housand persons
	All Enterprises	SMEs	Share of total	growth rate
No. of enterprises	1,310,791	1,279,784	97.63%	2.55%
Total sales-NT\$	37,881,681	11,226,933	29.64%	4.84%
USD	1,285,431	380,961		
Domestic sales-TWD	27,754,779	9,576,948	34.51%	5.37%
USD	941,798	324,973		
Export sales-TWD	10,126,901	1,649,985	16.29%	1.85%
USD	343,634	55,989		
No. of employed persons	10,709	8,337	77.85%	1.78%
No. of paid employees	8,328	5,958	71.54%	2.64%

Table 3. Contribution	of the ROC SMEs	to National E	Economy in 2011
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Source: Ministry of Finance Tax Data Center, VAT data for 2005–11. DGBAS, Monthly Bulletin of Manpower Statistics, 2011. White Paper on SMEs in Taiwan, 2012 [3a, 3b, 4].

Note: The figures given for the number of employed persons and number of paid employees for "all enterprises" include 1,040,000 government employees, accounting for 9.69% of employed persons and 12.48% of paid employees.

Unit: no./million/thousand pe						
Enterprise	All Ent	erprises	SMEs			
Size	2010	2010 2011		2011		
No. of enterprises	1,277,585	1,310,791	1,247,998	1,279,784		
Share of total	100.00	100.00	97.68	97.63		
Annual growth rate	1.54	2.60	1.30	2.55		
Total annual sales (TWD)	36,239,637	37,881,681	10,709,005	11,226,933		
(USD)	1,145,012	1,285,432	338,357	380,961		
Share of total	100.00	100.00	29.55	29.64		
Annual growth rate	20.87	4.53	16.54	4.84		
Domestic sales	26,216,138	27,754,779	9,088,972	9,576,948		
	828,314	941,798	287,171	324,973		
Share of total	100.00	100.00	34.67	34.51		

Table 4. Contribution of the ROC SMEs to National Economy in 2010-11

Enterprise	All Ent	erprises	SMEs		
Size	2010 2011		2010	2011	
Annual growth rate	18.20	5.87	15.44	5.37	
Export sales	10,023,499	10,126,901	1,620,033	1,649,985	
	316,698	343,634	51,186	55,989	
Share of total	100.00	100.00	16.16	16.29	
Annual growth rate	28.46	1.03	23.07	1.85	
No. of employed persons	10,493	10,709	8,191	8,337	
Share of total	100.00	100.00	78.06	77.85	
Annual growth rate	2.09	2.06	1.56	1.78	
No. of paid employees	8,104	8,328	5,805	5,958	
Share of total	100.00	100.00	71.63	71.54	
Annual growth rate	2.72	2.77	2.22	2.64	

(...continued)

Sources: Ministry of Finance Tax Data Center, VAT data for 2005–11. DGBAS, Monthly Bulletin of Manpower Statistics, 2011. White Paper on SMEs in Taiwan, 2012 [3a, 3b, 4].

Note: The figures (and percentages) given in the table for the number of employed persons and number of paid employees working in all enterprises include 1,040,000 government employees, accounting for 9.69% of all employed persons and 12.48% of all paid employees.

OVERVIEW OF SME FINANCING STRUCTURE

Definition of SME

SMEs [5] are defined as those with paid-in capital of TWD80 million (USD2.42 million) or less, or those with less than 200 regular employees in the manufacturing, construction, mining and quarrying sectors. SMEs in agriculture, forestry and fisheries, water, electricity and gas, commercial, transportation, warehousing and communications, finance, insurance and real estate, industrial and commercial services or social and personal services industries are those with sales revenue of TWD100 million (USD3.03 million) or less in the last year, or those with less than 100 regular employees.

Microenterprises refer to SMEs with fewer than five people employed on a regular basis (Table 5).

Tabla 5	Cri	torio	for	Idant	tifying	SME
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Sactors	SN	Miara Businass		
	Basic	Exception	Where Dusiness	
Manufacturing, Construction, Mining, Quarrying	Capital < USD2.42 Million	Employees < 200 persons		
Commerce, Service	Preceding year revenue < USD3.03 Million	Employees < 100 persons	Employees < 5 persons	

Source: White Paper on SMEs in Taiwan, 2010 [6].

SME Policies Focusing on Promotion of Innovation

The government provides a range of innovation and R&D guidance measures and funding to encourage SMEs to invest more in innovation and R&D for the purposes of international competitiveness.

A. The Industrial Technology Development Program (ITDP)

Content

The funding given under the ITDP established in February 1999 reduces the cost of innovation and R&D, and the level of risk that enterprises bear. Companies that qualify for ITDP funding are given guidance to help strengthen R&D management systems, ensure effective utilization of R&D talent, and promote collaboration and exchange between industry, universities and research institutes. The following are available to participating companies:

- 1. Funding: In the case of cutting-edge and key technologies vital for industry development, the subsidy is capped at 40% of total R&D outflow. For other types of projects the cap is 30%.
- 2. Vesting Individual Companies Participating with Intellectual Property Rights: The intellectual property rights derived from R&D results achieved in ITDP belong to the participating companies.
- 3. R&D Management System: Participating companies are assisted in establishing R&D management systems.

Unit: TWD/USD thousands

Results Achieved

As of 2008, 497 projects of 1,033 applications to the ITDP have been approved. A total of 809 enterprises participated in these plans. A total of TWD12,789,290 (USD394,473) subsidies were provided to 547 enterprises, of which 328 were SMEs. As of the second quarter of 2011, a cumulative total of 1,568 plan applications had been submitted of which 746 were approved. A total of 1,214 enterprises participated in these plans. A total of TWD19,023,006 (USD645,504) subsidies were provided to 740 enterprises, of which 453 were SMEs. As of May 2012, a total of 857 projects had been approved, with 1,371 participating enterprises. The ITDP plans include ICT, optoelectronics, machinery and aerospace technology, materials technology, chemical engineering technology, biotech and pharmaceuticals, etc.

Item	2005	2006	2007	2008	2009	2010	2011	1999– 2011
No. of Plans	53	61	64	60	87	103	127	814
No. of Firms Involved	83	137	117	101	136	190	178	1,312
Total Funding (TWD)	4,153,153	5,962,966	3,711,547	3,283,720	4,642,017	5,796,572	5,743,090	61,983,555
Total Funding (USD)	140,928	202,340	125,943	111,426	157,517	196,694	194,879	2,103,276
Total Government Subsidies (TWD)	1,394,555	1,749,253	1,170,426	1,087,561	1,876,370	2,269,483	2,047,167	19,023,006
Total Government Subsidies (USD)	47,321	59,357	39,716	36,904	63,671	77,010	69,466	645,504

Table 6. Cumulated Results of ITDP Plan Approvals

Source: Industrial Technology Development Program website at http://innovation1.tdp.org.tw [7].



Figure 1. Subsidies granted to SME in ITDP Plans

Source: Industrial Technology Development Program website at http://innovation1.tdp.org.tw/content/application/ tdp_itdp/generalb/guest-cnt-browse.php?cnt_id=617 [8].

B. The Small Business Innovation Research (SBIR) Program

Content

The Department of Industrial Technology, Ministry of Economic Affairs initiated the Small Business Innovation and Research (SBIR) Program in February 1999. It is expected to reduce the cost and risk of innovation and R&D for SMEs, and thus, stimulate these activities among SMEs. The SBIR plans consist of two categories: innovative technology and innovative services. The application process involves two phases: under Phase I (Preliminary Research and Preliminary Planning) participants undertake research and assessment of innovative or cutting-edge ideas that can generate real profits for industry, and under Phase II (R&D and Detailed Planning) after having completed the assessment of the innovative technology, product or service research object participants move to actual R&D work.

Applications may be individual, where a single company or business submits an application for SBIR plan funding support, or a R&D association application, where a group of at least three companies, more than half of which are SMEs, submits an application for funding support for a project to be undertaken by a R&D association in which the intra-industry vertical alliance or cross-industry alliance conducts research relating to the development of industry principles, technology specifications, a joint platform, emerging industry upgrading or transformation of a conventional industry.

The program encourages the following research: (a) developing a brand new idea, concept or new technology; (b) applying an existing technology to a new application; (c) applying a new technology or business model to an existing application; and (d) improving an existing technology or product.

In the second half of 2008, the MOEA extended the scope of the funding support provided for SBIR plans by redefining "innovative technology" so as to encourage SMEs to undertake innovative R&D and implement the technology that has been developed. Companies that have not previously received SBIR funding can apply for funding of applications for developing innovative technology.

Following the global financial crisis, the MOEA has increased funding by 30% to stimulate R&D. Greater attention is given to completion of on-going R&D activities and the cultivation of R&D talent. The R&D capabilities of 18 research institutes with over 5,500 R&D personnel were integrated to create 12 industrial technology upgrading guidance teams (known as the "Innovation Train") in a range of expert fields. The guidance teams help firms to secure financial support, cultivate and hold R&D talent, and develop capabilities to cope with the impact of the global financial crisis

Results Achieved

SBIR has raised the overall level of technology of the ROC's SMEs, enhanced the competitiveness of industry, and contributed to industrial upgrading. It has also established a model for the ROC's development as a leading global R&D center.

According to the Department of Industrial Technology, Ministry of Economic Affairs, the SBIR plans involved a significant proportion of over 23,000 SME personnel in R&D activity. As of the end of 2007, SMEs submitted a total of 3,958 applications for subsidy under the plan. A total of 2,334 innovation and R&D projects were approved with government subsidies amounting to TWD4.85 billion (USD149.59 million). For their part, SMEs invested TWD9.89 billion (USD305.05 million) in R&D. On average, 59% of applications have been approved over the past years.

In 2008, out of 867 applications, 363 projects were approved and 343 projects were signed. Since 2009, the Department of Industrial Technology has been working closely with individual municipal, county and city governments to implement the Local SBIR Plan. As of the end of 2010, a total of 647 applications have been approved by the relevant government authorities (Figure 2).



Figure 2. SBIR Plan Approvals, 2006–11

From 2007 to 2008, the largest number of approved applications (277) was from small enterprises in the machinery industry, followed by the consumer goods industry (127), the electronics industry (119), and the service sector (101). The most pronounced increase was in the number of R&D alliances (an annual growth rate of 283.33%), followed by service alliances (140%).

Source: Small and Medium Enterprise Administration, Ministry of Economic Affairs, SBIR Program website [9].
Since the inception of the SBIR program in 1999 until May 2012, a total of 4,570 cases of innovation and R&D projects have been approved and implemented with government subsidies exceeding TWD8.8 billion (USD298.61 million) and over TWD16.7 billion (USD566.68 million) in private sector investments. This has enhanced the technological capabilities of SMEs, assisted in upgrading and transforming conventional industries, and improved the industry's competitiveness.



Figure 3. Small enterprise SBIR Plan Application Approvals, as of December 31, 2012 Source: Small and Medium Enterprise Administration, Ministry of Economic Affairs, SBIR Program website [9].

C. The Innovative Technology Applications and Services (ITAS) Program

Content

The aim of Innovative Technology Applications and Services (ITAS) is to encourage business enterprises to plan and develop innovative, hi-tech applications and services and innovative business models that can help to create new business opportunities and inspire industrial development, in line with the government's positioning of high-value-added manufacturing and knowledge-intensive service industries as the two key engines to drive the ROC's economic growth.

Under this program, the MOEA provides funding support to SMEs for the following:

- 1. Basic industrial technology R&D, and
- 2. Development of innovative industrial technology, products or services.

ITAS continuously drives the ROC's businesses to aggressively engage in R&D for innovative ICT applications and services with demonstrative, commonality, or integrative

features with scientific endowments. Such diversified development of new operation models should inspire new business prospects for the industry.

Results Achieved

The government has provided funding for over 400 projects, with the companies themselves raising an additional TWD15 billion (USD508.99 million). More than TWD5.5 billion (USD186.63 million) subsidies were provided to 501 enterprises of which 124 were SMEs. More than 5,500 R&D employees have been involved in these programs, which cover the information and electronics industry and traditional industries such as the machinery manufacturing, motor vehicle and motor vehicle parts manufacturing, textile manufacturing, paper-making, and dye-making industries (Table 7).

Since 2008, the government has added new key service plans, focusing on the serviceoriented manufacturing industry and cross-industry system integration. These plans make use of software-hardware integration and the integration of varied systems to ensure that the industrial service systems are well-developed. The aim is to promote industry upgrading and encourage enterprises to engage in innovation and applications research, or to engage in the development of applications and services with technological content and implication, thus creating innovative business models.

The major themes of ITAS in 2010 included: (1) promoting cross-sector system integration; (2) manufacturing and service promotion; (3) digital content and design information application promotion; (4) device service-based policy items; and (5) healthcare innovative service policy items.

Item	2007	2008	2009	2010	2011	2012	1999–2012
No. of Plans	64	48	17	18	18	13	404
No. of Firms Involved	71	64	22	28	29	21	501
Total Funding(TWD)	1,565,815	876,024	622,975	194,490	456,460	194,420	15,598,263
Total Funding(USD)	53,133	29,726	21,139	6,600	15,489	6,597	529,293
Total Government Subsidies(TWD)	589,165	320,354	242,292	583,210	162,690	68,800	5,552,259
Total Government Subsidies(USD)	19,992	10,871	8,222	19,790	5,521	2,335	188,404

Table 7. IATS Plan Approvals

Source: Small and Medium Enterprise Administration, Ministry of Economic Affairs, IATS Program website [10].

Unit: TWD/USD thousands

D. The Conventional Industry Technology Development (CITD) Program

Content

This program is implemented under item 22-1 "incentive program for initiating new product development of the conventional industries" of the decree of promoting the upgrading of industry. The CITD program provides subsidies to encourage enterprises in traditional industries to undertake R&D activity. The CITD program is expected to raise the number of firms in traditional industries that undertake R&D, thereby developing independent R&D capabilities and achieving sustainable development. Targeted subjects are new products, new technologies, new design and development of new material. The CITD program comprises three sub-plans, outlined as follows:

1. Product Development Sub-plan

- i. R&D subsidies of up to TWD1.6 million (USD54,293) for a period of one year, or TWD3.2 million (USD108,585) for a period of two years.
- ii. Target: Subsidies are provided for new product development. In principle, the products developed should embody technology superior to that of any other firms in the ROC of the same industry.

2. Joint Development Sub-plan

- R&D subsidies of up to TWD10 million (USD339,328) for a period of one year. The subsidy for the leading company in the consortium is capped at TWD2.5 million (USD84,832) for one year; other participant companies may receive up to TWD2 million (USD67,866).
- ii. Target: Only companies in the textile, plastic, electric motorcycle battery and the rail transport bogie manufacturing industries.

3. Product Design Sub-plan

- i. Subsidies of up to TWD500,000 (USD16,966) for a maximum of six months.
- ii. Target: Improvement of design aesthetics of new products, including the development of new functions, new forms, new materials, and new color schemes, leveraging product design to build competitive advantage through innovation and differentiation.

E. The New Leading Product Development and Assistance Project

Content

This program has been used to enhance the competitiveness of the ROC's hi-tech sector since 1991. Its importance lies in actively promoting the growth of emerging hi-tech industries and on raising the technology level of existing industries.

Results Achieved

The New Leading Product Development and Assistance Project has had remarkable results. Since implementation, 1,516 applications for R&D subsidies have been received of which 764 were approved involving total R&D expenditure of approximately TWD76.54 billion (USD2,360.8 million). The government provided TWD12.72 billion (USD392.34 million) in subsidies and TWD9.41 billion (USD290.24 million) in additional support, with the companies concerned raising a further TWD45.41 billion (USD1,400.63 million). The total approved funding for these projects was TWD67.54 billion (USD2,083.20 billion) while the total number of employees involved was 20,835. Of the 764 approved projects, 433 (56.7% of the total) involved SMEs, with total R&D expenditure of TWD29.8 billion (USD919.15 million), including TWD5.96 billion (USD183.83 million) in government subsidies, while 331 (43.3%) involved large enterprises with total R&D expenditure of TWD37.8 billion (USD1,165.9 million), including TWD6.76 billion (USD208.51 million) in government subsidies. The beneficiaries of this project have mostly been SMEs.

Development projects that have been reviewed and approved will receive government subsidies not exceeding 50% of the total project funding so that the R&D risks faced by enterprises may be shared. Since 1 May 2011, the "Leading Product Development Guidance Project" was no longer implemented.

F. The Assist Service Sector Technology Development Plan

Content

Under the Assist Service Sector Technology Development Plan, subsidies are available for enterprises engaged in wholesaling, retailing, logistics, restaurant operation, management consulting, international trade, e-commerce, convention and exhibition management, advertising, commercial design, franchise operation, etc. Applicants must be engaged in the development of new services, new business models, new marketing models or new commercial applications technology and the services or models developed must be superior to those of other enterprises in the same industry. Subsidies are capped at TWD2.5 million (USD77,110) for a period of one year or TWD5 million (USD154,220) for a period of two years; the total subsidy received may not exceed 50% of the total expenditure required for the project.

Four categories of subsidies are available: Innovative Concept Planning Project, Corporate Innovation and R&D Project, Cross-industry Alliance Joint R&D Project, and Value-added Innovative Application Project. The subsidy period and maximum amount of subsidies vary between these subsidy categories.

Structure of SME financing

Problems of SMEs Financing

- 1. The major difficulties encountered by SMEs with respect to financing are as follows:
- 2. Limited sources of finance.
- 3. Higher cost for loans.
- 4. Failure to qualify for institutional credit.
- 5. Unfavorable terms and conditions for institutional credit.

The main problem of the ROC's SMEs has been the difficulty of securing financing. SMEs are relatively small, out of which the majority are family businesses. In many cases, they maintain simple accounting systems that make it hard to prepare financial statements or debt repayment plans. Besides, for a variety of reasons, SMEs have often failed to properly declare their revenues for tax purposes.

Most SMEs do not require substantial financing but, still, they encounter problems with accessing funds that have been made available for them. Factors that hinder access to bank loans include their limited assets, low creditworthiness, low registered capital, the small scale of operations and low earnings, and the lack of testimonial from friends, relatives or guarantors as well as cash flow problems.

Financing Supporting Measures

There are several credit guarantee schemes utilized to help SMEs secure financing (Table 8). The overall relationship among the ROC's Small and Medium Enterprise Credit Guarantee Fund (SMEG), lenders, borrowers, and other institutions is shown in Figure 4. Table 9 summarizes the performance of credit guarantee schemes.

Credit Guarantee

A credit guarantee acts as an effective collateral substitute for obtaining finance from financial institutions. The government of the ROC established the SMEs Credit Guarantee Fund (SMEG) in 1974 as a non-profit foundation under supervision of the MOEA and funded annually by government.

SMEG's main objectives are as follows:

- 1. Help SMEs overcome difficulties in providing the required collateral to secure loans
- 2. Make financial institutions more willing to provide loans to SMEs
- 3. Maximize the efficacy of projects undertaken by other SME guidance organizations. SMEG provides credit guarantees to SMEs that have a high probability of success.

Type of Credit Guarantee	Starting date	Name
Credit	October 1986	Credit Guarantees for Young Entrepreneur Loans
Guarantees for Entrepreneur Loans	May 2007	Credit Guarantees for Firefly Counterpart Guarantee Loans (merged with Micro-enterprise Start-up Loans)
	February 2008	Credit Guarantees for Firefly Counterpart Guarantee Fund Loans for People Who Have Been in Care
	February 2009	Credit Guarantees for New Taipei City Government's "Happy Start-up" Low-interest Loan Program
	August 2010	Credit Guarantees for Start-up Loans for the Jobless Based on Employment Insurance
	June 2011	Credit Guarantees for Taipei City Young Entrepreneur Financing Loans
Credit Guarantees	January 2009	Credit Guarantees for Kaohsiung City Government's "Little Giants" Business Loans
for Firefly Counterpart Loans	April 2009	Credit Guarantees for Taipei City SME Financing Loans
	June 2010	Credit Guarantees for SME Strategic and Innovative Financing Loans
	December 2009	Credit Guarantees for Travel Industry Loans
Credit	May 2006	Credit Guarantees for Disaster Recovery Loans
Guarantees for Areas Damaged in Natural	October 2008	Credit Guarantees for Loans to Repair Buildings Damaged in Natural Disasters
Disasters Loans	September 2009	Credit Guarantees for Home Repair Loans for Households Affected by Typhoon Morakot
	September 2009	Credit Guarantees for Loans for Enterprises Affected by Typhoon Morakot
	December 2009	Credit Guarantees for Loans to Tourism Industry Enterprises Affected by Typhoon Morakot
Credit Guarantees	February 2007	Credit Guarantees for Low-interest Loans for Film and TV Content Production
for Specific Industry Loans	May 2010	Credit Guarantees for Loans for Key Service Industries
	July 2010	Credit Guarantees for Loans to Help Industries Affected by Trade Liberalization to Upgrade and Transform Themselves
	November 2010	Credit Guarantees for Loans for Sports and Service Industries

Table 8. The Types of Credit Guarantees

(...continued)

Type of Credit Guarantee	Starting date	Name
	April 2011	Credit Guarantees for Low-interest Loans for Cultural and Creative Industries
Credit	May 2010	Credit Guarantees for Small Retailer Loans
Guarantees for Boosting Employment Financing Loans	July 2010	Credit Guarantees for SME New Business Start-ups
Other Credit	October 1990	Credit Guarantees for Brand Development Loans
Guarantees	July 2005	Credit Guarantees for Loans to Help Taiwanese Enterprises Fight International Patent Lawsuits
	January 2006	Credit Guarantees for Loans to Help SMEs Invest in Countries with Which Taiwan has Diplomatic Relations
	April 2011	Credit Guarantees for Innovation or R&D Loans for Industrial Upgrading

Sources: White Paper on SMEs in Taiwan, 2012 [11].

There are several types of credit guarantees services that the ROC's SMEG provides – Direct Credit Guarantees, Indirect Credit Guarantees and so on (Table 8). Large enterprises are invited to donate to SMEG for providing credit guarantees to recommended SMEs. This is known as the "Firefly Counterpart Guarantee".

1. Direct Credit Guarantee

SMEG provides credit guarantees to SMEs that have a high probability of success. SMEs engaged in knowledge-based industries can apply to SMEG for a direct guarantee. In certain cases, SMEG will issue a letter of guarantee directly to the SME, which can be used in applying for a bank loan.

From 2004 to June 2011, a total of 1,030 direct credit guarantees were provided, with a combined value of TWD17,436 million (USD591.65 million), enabling the enterprises concerned to obtain financing amounting to TWD22,308 million (USD756.97 million).

2. Indirect Credit Guarantee

Financial institutions apply regular lending procedures to screen an application for credit guarantee. The financial institution refers the application to the ROC's SMEG for credit guarantee only if the applicant is found short of collateral.

The Authorized Approach: The financial institution may extend a loan if it is below the limit set for the guarantee and meets the requirements before referring it to SMEG for post-ratification.

The Normal Approach: An application that exceeds the limit set for the guarantee and does not meet the requirements under the Authorized Approach has to be referred to SMEG for examination. It should not extend the loan until SMEG grants a guarantee.

The Package Credit Guarantee: Designed to help SMEs obtain working capital and simplify banks' processing procedures. The package credit guarantee allows financial institutions to extend loans based on a certain payment rates. There is no amount or term limit on the credit line for the applications.

3. Firefly Counterpart Guarantee

Launched in 2006, the Firefly Counterpart Guarantee Program (FCGP) encourages leading companies to make donations and provide credit guarantees to related SMEs of the donor companies. In turn, SMEG provides counterpart credit guarantees for those SMEs. As of June 2009, a total of 4,244 credit guarantees were provided under the FCGP valued at TWD3,723 million (USD114.83 million), enabling the enterprises concerned to secure loans amounting to TWD3,984 million (USD122.88 million).

As of June 2011, a total of 10,687 credit guarantees were provided valued at TWD8,868 million (USD300.913 million), securing loans amounting to TWD9,441 million (USD320.36 million).

4. Batch-type Credit Guarantees

In January 2004, the SMEG began providing batch-type credit guarantees covering 100% of loans. Bank headquarters' offices were allowed to apply for batch-type credit guarantees in line with their management viewpoint and regulations regarding loan purposes, loan size, loan repayment period, repayment method, etc. Since the initiation of this program till June 2011, a total of 123,036 credit guarantees have been approved valued at TWD498,622 million (USD169.20 million), enabling SMEs to obtain loans worth TWD498,997 million (USD169.32 million).

5. Supply Chain Financing

To strengthen the ability of SMEs (called "satellite partners") under a system of collaboration between "center firms" and "satellite partners" to secure financing, thereby strengthening the competitiveness of supply chains, a Supply Chain Loan Guarantees program began on a trial basis in March 2011. This program covered Supplier Accounts Receivable Loan Guarantees and Distributor Accounts Payable Loan Guarantees. During the trial period, the SMEG endeavored to conform to the operational requirements of collaborating banks. Currently, only Supplier Accounts Receivable Loans Guarantees are provided. Figure 4 gives the outline of the Credit Guarantee System originating from the Ministry of Economic Affairs (MOEA) and the Financial Supervisory Commission.



Figure 4. Outline of Credit Guarantee System

Sources: Small and Medium Enterprise Credit Guarantee Fund of ROC, Ministry of Economic Affairs, 2006 [12].

Table 9. The	Performance	of the SMEG	2005-11
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Item Year	No. of Credit Guarantee Applications Accepted	Combined Value of Credit Guarantees (TWD millions)	Combined Value of Credit Guarantees (USD millions)	Total Amount of Financing Secured (TWD millions)	Total Amount of Financing Secured (USD millions)
2005	271,401	333,020	11,300	538,947	18,288
2006	261,123	319,604	10,845	530459	18,000
2007	238,801	290,611	9,861	495,257	16,805
2008	237,446	330,757	11,224	523,151	17,752
2009	254,807	475,248	16,127	631,207	21,419
2010	312,593	692,598	23,502	863,787	29,311
2011	342,796	808,426	27,432	1,011,834	34,334

Source: SME Credit Guarantee Fund [13].

As of the end of May 2012, the SMEG helped 320,638 enterprises with a total of 4,665,978 credit guarantees amounting to TWD9,328.1 billion (USD316.53 million). Over the years, SMEG has stepped up in support of SMEs to help mitigate the negative impact of an economic downturn on SMEs and support them in the early stages of recovery (Figure 5).



Figure 5. Provision of Credit Guarantees by SMEG over the Past Ten Years Source: SMEG, 2012 [14].

A. SMEs Project Financing Loans

The government of the ROC provides SMEs with several types of project financing loans: (a) SME Upgrading Loans, (b) Young Entrepreneur Loans, (c) SME Development Fund Project Loans, (d) Microenterprise Start-up Loans, and (e) Phoenix Loans for Entrepreneurial Women.

On 16 February 2009, Microenterprise Start-up Loans and Phoenix Loans for Female Entrepreneurs were merged to create the Phoenix Loans for Micro-entrepreneurs, which targeted female entrepreneurs aged 20–65 and male entrepreneurs aged 45–65 who were owners or shareholders of a firm that had been operating for less than two years with individual loans capped at TWD1 million.

B. Financial Diagnosis and Consultant

SMEs are also provided with expert financial diagnosis and help from consultants to increase the efficiency of business operation, lower the capital cost of operation and improve the ability to secure loans and credit guarantees.

1. The SME Financing Services Platform The SME Financing Services Platform commenced operations on 1 April 2009, making it easier for SMEs to secure bank loans by providing clear, transparent details about SME operations that banks can use when deciding whether to lend to them.

2. *Financing Services Team* An integrated team of experts composed of government guidance teams and bank personnel provides timely consulting services on financial management, accounting systems, management structures and others to increase the likelihood of obtaining bank loans.

3. *Plan for Promoting the Use of Intellectual Property by SMEs* The Plan provides guidance on intellectual property rights and financial management to help SMEs strengthen business models and help borrower and lenders better understand intellectual property rights.

4. *SME Financial Specialist Certification* In 2008, the SMEA joined forces with the Taiwan Academy of Banking and Finance (TABF) to implement a SME financial specialist certification system that will help to improve performance and quality of SMEs' financial managers and consultants.

The SME Financial Specialist Certification is awarded in three grades linked to years of service and position held, namely: (a) SME Financial Staff Certification (low-level certification), (b) SME Financial Manager Certification (mid-level certification), and (c) SME Financial Consultant Certification (high-level). The first wave of certification was held in 2008 with a total of 5,547 individuals seeking certification, which reflected the value attached to it.

To encourage continuous upgrading of skills, SME Financial Specialist Certification awardees are required to acquire at least 18 hours of relevant training within three years of their certification.

C. Call Center and One-Stop Service Counter

SMEs Administration established the Call Center and One-Stop Service Counter in 1997 to provide quick, efficient service to SMEs. The services included on-line financial inquiries, follow-up monitoring, and assistance to SMEs experiencing temporary financial difficulties but have significant value creation potential (Figure 6).



Figure 6. Call Center and One-Stop Service Counter Sources: Small and Medium Enterprise Administration, Ministry of Economic Affairs, 2008 [15].

D. Investing SMEs Schemes

To broaden the sources of funding and help SMEs secure equity financing, the ROC has promoted the Investing SMEs Schemes, namely: (a) SME Development Corporations, (b) Incubation Trust Fund, and (c) National Development Fund.

1. SME Development Corporations In accordance with the SME Development Statute, the government set up the SME Development Fund, which, in turn, has established a number of SME Development Corporations. Besides helping SMEs to obtain funding through direct and indirect investments, these corporations also provide assistance with domestic and international technology collaboration, market and product development and management consulting services, as well as helping SMEs to formulate medium- and long-term funding plans.

To stimulate investment in the SME sector by venture capital firms and other private-sector companies, on 17 April 2007 the National Development Fund, Executive Yuan approved the Plan for Promoting Investment in SMEs; the National Development Fund allocated TWD10 billion for investment in SMEs.

There are three SME Development Corporations [16] in the ROC and SME Development Fund invested approximately 15% in each company. SME Investment Companies are a kind of Venture Capital company but they are restricted to invest only in SMEs. The distribution of the SME Development Corporations' investment by industry is as follows: optoelectronics industry, 18%; biotechnology, 10%; electronic components manufacturing, 28%; software and IC design, 15%; other (including nanotechnology), 29%.

As of the end of June 2009, the SME Development Corporations invested a cumulative total of TWD4,154.8 million (USD128.15 million) in 263 enterprises. The SME Development Fund return on its investment is as follows: stock dividends TWD68.4 million (USD2.11 million); cash dividends TWD52.42 million (USD1.62 million).

2. The Incubation Trust Investment Account Start-up businesses usually suffer from inadequate capital and difficulty in securing financing. The SME Development Fund allotted TWD2 billion (USD61.69 million) as an Incubation Trust Invest Account for investing in SMEs established within five years. Since its establishment in October 2003, the Investment Account has invested as follows: optoelectronics industry, 24%; biotechnology, 7%; electronic components manufacturing, 26%; software and IC design, 21%; other (including nanotechnology), 22%.

As of the end of June 2009, the SME Start-up Investment Trust Account has invested in 75 SMEs, of which 12 subsequently secured either a stock market or OTC listing. The total investment by the SME Development Fund came to TWD1,364,326,100 (USD4.21 million), with the asset management companies providing a further TWD1,540,255,100 (USD4.75 million). The return on investment was: cash dividends TWD54.95 million (USD1.69 million); profits from disposal of assets – just over TWD137.73 million (USD4.25 million). Losses were about TWD257.31 million (USD7.94 million).

As of the end of May 2011, the SME Start-up Investment Trust Account invested in 80 SMEs. The total investment by the SME Development Fund came to TWD1,518,300,000 (USD51.52 million), with the asset management companies providing a further TWD1,679,210,000 (USD56.98 million). The return on investment was: cash dividends – TWD83.70 million (USD2.84 million); profits from disposal of assets – just over TWD252.69 million (USD8.57 million).

3. The National Development Fund The Executive Yuan has overhauled the country's socioeconomic framework and developmental direction to respond to the rapidly changing socioeconomic domestic and overseas environment. The National Development Package

Program for 2007–15 will be implemented in three stages, each lasting three years. The National Development Fund has allotted TWD10 billion (USD304.49 million) for investment in SMEs with significant growth potential. The scheme started implementation in August 2007.

Originally, under the Plan for Strengthening Investment in the SME Sector, venture capital firms were invited to invest in SMEs with significant growth potential at a 1:1 ratio with the Executive Yuan National Development Fund (NDF). In September 2010, the capital provision ratio was adjusted upward to make it easier for SME start-ups to secure funding and support the Executive Yuan's objective of creating more job opportunities in the ROC:

- i For enterprises at the seed-capital/start-up stage, the capital provision ratio was set at TWD3 from the Executive Yuan NDF for every TWD1 provided by the venture capital firm.
- ii For enterprises in the cultural and creative industries, the capital provision ratio was set at TWD3 from the Executive Yuan NDF for every TWD1 provided by the venture capital firm.
- iii For enterprises in key service industries, the capital provision ratio was set at TWD2 from the Executive Yuan NDF for every TWD1 provided by the venture capital firm.
- iv For enterprises that have added at least 30 new employees (in the ROC) during the year prior to appraisal by the venture capital firm, the capital provision ratio was at TWD2 from the Executive Yuan NDF for every TWD1 provided by the venture capital firm.

The distribution of investment was as follows: optoelectronics industry, 40%; biotechnology, 25%; electronic components manufacturing, 10%; software and IC design industry, 5%; other (including nanotechnology), 20%.

As of the end of June 2009, a total of 24 firms had received cumulative investments of TWD73.6 million (USD2.27 million), with the asset management companies providing an additional TWD74.1 million (USD2.29 million) of investment, for a combined total of TWD1.477 billion (USD4.56 million).

As of the end of May 2011, investments in 75 enterprises amounted to TWD3,970.23 million (USD134.72 million) with the National Development Fund providing TWD2,237.28 million (USD75.92 million) and venture capital firms providing TWD1,732.95 million (USD58.80 million). The program attracted TWD487.64 million (USD16.55 million) in investments from the USA, Japan, etc., and stimulated an additional TWD15,544.3 million (USD527.46 million) in domestic private sector investment.

Financial Institutions and SME Financing

In addition to a company's own funds and borrowing from private lenders, bank loans and the issuance of securities or shares have become important funding sources for ROC's enterprises. The ROC has robust financial and capital markets that offer a wide variety of funding sources for businesses. However, more than 75% of SMEs still depend on loans from domestic banks for their operation and investments.

In 2009, business enterprises had loans as the main source of funds, with around 68.4% provided by banks, while other sources were: 21% from equity securities, 4.5% from foreign debt, 3.4% from bonds, 1.9% from short-term bills, and 0.8% from asset securitization.

In the period of 2005–11, direct financing ratios generally ranged from 21% to 26%. At the end of 2005, the ratio was 25.6%, falling to 23% in 2008 and 21.6% in 2011, respectively. Indirect financing is still the main source of financing of SMEs with indirect financing ratios increasing in six consecutive years (2003–08) (Figure 7).



Figure 7. Share of Total Financing Provided by Direct and Indirect Financing Source: Central bank of ROC. April 2012 [17].

The SME loan market in the ROC is heavily concentrated, with the top 10 banks providing 75% of all outstanding loans to SMEs (Table 10). The top 10 banks are mostly state-run banks, with a market share of up to 68.1%. This is because most state-run banks support government policies with eight state-run banks accounting for 60.5% of total loans outstanding of all banks (including the ROC branches of foreign banks).

In 2007, the Taiwan Cooperative Bank had a higher total of outstanding loans to SMEs than any other financial institution in the ROC. As of December 2008, Taiwan Cooperative Bank's outstanding loans to SMEs came up to TWD380.6 billion (USD12.08 billion), representing an increase of TWD37.4 billion (USD1,100.99 million) compared to December 2007; the Bank's share of the SME loan market rose from 11.2%% in 2007

Units: TWD millions: %

to 12.0% in 2008. However, in 2011, the First Commercial Bank's outstanding loans to SMEs came up to TWD486.6 billion (USD16.51 billion) compared to Taiwan Cooperative Bank's TWD484 billion (USD16.42 billion). In terms of market share of outstanding loans to SMEs in 2011, First Commercial Bank ranked first with almost 12% followed by Taiwan Cooperative Bank with 11.8%.

Bank	Loans Outstanding	Market Share	Loans to SMEs as % of Total Loans
Total	3,071,448	75.05	-
First Commercial Bank	486,558	11.89	40.91
Taiwan Cooperative Bank	484,002	11.83	26.35
Taiwan Business Bank	355,997	8.70	40.32
Hua Nan Commercial Bank	344,929	8.43	28.49
Chang Hwa Commercial Bank	293,474	7.17	28.56
Land Bank of Taiwan	288,143	7.04	16.72
Mega International Commercial Bank	269,363	6.58	26.94
Bank of Taiwan	266,238	6.51	13.13
E. Sun Commercial Bank	159,072	3.89	26.24
Shanghai Commercial & Savings Bank	123,672	3.02	37.31

Table 10. Top 10 Banks by Amount of Loans to SMEs in 2011

Source: Banking Bureau, Financial Supervisory Commission, Executive Yuan, Statistics of Banking Business, No. 400, 2012 [18].

As of the end of 2011, the total outstanding loans of ordinary commercial banks in the ROC (including the ROC branches of foreign banks, but excluding overseas loans) came to TWD4,092.7 billion (USD138.88 billion), representing an increase of TWD399.2 billion (USD13.55 billion) (10.81%) compared to the end of 2010. The share of total loans going to SMEs rose slightly, from 19.8% in 2010 to 20.8% in 2011 (Figure 8). Financial Supervisory Commission data gives the total volume of loans to SMEs by domestic banks as TWD4074.9 billion (USD138.27 billion), accounting for 47% of loans to all business enterprises, and representing an increase of TWD398.4 billion (USD13.52 billion) compared to the 2010 total of TWD3,676.5 billion (USD124.75 billion); the SMEs' share of all bank loans rose by 1.50 percentage points.

Both outstanding loans to SMEs (including overdue loans) by ordinary commercial banks and the share of total loans going to SMEs rose in 2011 compared to the end of 2010; the





Figure 8. Changes in Bank Loans to SMEs by Regular Banks

Source: Banking Bureau, Financial Supervisory Commission, Executive Yuan, Statistics of Banking Business, consecutive years [19].

Note: "Total loans outstanding" was calculated using the following formula: regular banks' outstanding loans to SMEs (including overdue loans) divided by loans to SMEs as a percentage of total loans.

The average interest rate on new loans extended by the five bigger banks fell steadily from 6.55% in 2000 to 2.16% in 2004. In 2006, the rate rose to 2.37%, and in 2007 further to 2.85%. The average interest rate on new loans fell to 2.35% in 2008 due to the impact of the global financial disaster, and to 1.34% in 2009. The average interest rate was higher in 2011 than in 2010 (Table 11).

Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Interest rate	6.55	4.46	3.49	2.36	2.16	2.29	2.37	2.85	2.35	1.34	1.39	1.53

Table 11. Average Interest Rate on New Loans by Five Larger Banks

Units: %

Source: Central Bank of China (ROC) [20].

Notes:

1. The interest rates given in the figure are weighted averages for the month of December in each year.

2. Up until October 2008, the five largest banks in ROC were the Bank of Taiwan, Taiwan Cooperative Bank, First Commercial Bank, Hua Nan Commercial Bank and Chang Hwa Commercial Bank; from November 2008 onwards the five largest banks were the Bank of Taiwan, Taiwan Cooperative Bank, First Commercial Bank, Hua Nan Commercial Bank and Land Bank of Taiwan.

LEVEL OF INNOVATION-RELATED ACTIVITIES

Number of Patents and Trademarks

Enterprises have been vigorous in patent applications and trademarks, to ensure their R&D results, with the number of applications recently ranging from 75,000 to 83,000 a year (Figure 9 and Table 12). Quality patents would be the trend of the future. The Taiwan Intellectual Property Office (TIPO) actively promotes the revisions of the Patent Act, Trademark Act, and Copyright Act in respond to technological advancement and the rapidly changing environment.

TIPO actively participates in bilateral and multilateral cooperation through consultative meetings, participation in international symposiums, establishment of close working relationship with other countries' patent and trademark offices, and communication with intellectual property rights holders.



Figure 9. General Statistics of Patent Cases (1984-2012)

Source: Intellectual Property Office, Ministry of Economic Affairs, 2013 [21].

Note: "Application" is the number of applications for each individual year. "Certificate Issued" is the number of certificates actually being issued.

Year	Application	Approval	Registration
2005	63,580	59,517	55,181
2006	65,457	57,860	54,597
2007	61,454	52,569	51,326
2008	59,568	52,920	49,500
2009	59,669	49,852	48,075
2010	66,496	57,719	54,292
2011	67,620	54,197	48,315
2012	74,357	62,526	61,918

Table 12. Statistics of Trademarks Cases (2005–12)

Source: Intellectual Property Office, Ministry of Economic Affairs, May 2013 [21].

Policy to Promote SME Innovation

Local Innovation Systems and SMEs

Under a local innovation system, local governments collaborate with industry, academia and research institutes to encourage joint ventures between local businesses and universities, strengthen local industrial clusters, and enhance communication between local innovation units through ICT.

The Local Industry Development Fund was established by the government in 2008 to promote the development of regional economies where local government authorities are actively involved in the planning and implementation of the Fund's activities.

Eighteen research institutes are "adopting" industry clusters, providing technology consulting services in 25 counties and cities, promoting the formation of industry cluster R&D alliances, and developing innovative mechanisms to increase R&D resources available to SMEs.

The Plan involves integrating the capabilities of 18 foundations and research institutes to leverage the division of responsibility and "industry adoption" system that links individual research institutes with particular counties and cities so as to facilitate planning for the development of high-value-added industries and industry clusters in individual counties and cities.

SME Start-up and Innovation Service Centers

Since 1996, the SME Development Fund has encouraged the establishment of SME incubation centers. Currently, they are distributed as (a) university incubator centers (the most numerous), (b) 13 incubator centers established by foundations, (c) 13 established by government agencies, and (d) private sector incubator centers (Tables 13 and 14). Since 1997, the SMEA together with other government agencies, research institutes, universities and private-sector companies have promoted the establishment of incubator centers that provide SMEs with space and facilities, technical, manpower, commercial, information and administrative support as well as funding and managerial consulting services.

A total of 109 incubator centers in the ROC, are located in 22 different counties and cities as of June 2009. The MOEA provided 91 of these centers with funding of TWD2,032 million (US\$61.46 million), e.g., Nankang Software Incubator, the Nankang Biotech Innovation Center, the Southern Taiwan Science Park Incubator Center, and the Kaohsiung Software Incubator Center.

As of 2011, there were a total of 130 incubation centers in the ROC, located in 20 different counties and cities [22]. SMEA provided subsidies amounting to TWD141 million (USD4.78 million) for 73 incubation centers.

Incubator Center Category	Total	Northern Taiwan	Central Taiwan	Southern Taiwan	Eastern Taiwan
Total	130	58	28	38	6
University incubator center	98	40	22	31	5
Foundation incubator center	13	7	4	1	1
Government-established incubator center	13	6	1	6	0
Private-sector type	6	5	1	0	0

Table 13. Incubator Center Categories and Regional Distribution

Source: Small and Medium Enterprise Administration, Ministry of Economic Affairs, 2012 [23].

Incubation Center Category	June 2009	2010	2011
University incubation center	90	96	98
Foundation-type incubation center	9	10	13
Government-run incubation center	10	14	13
Private-sector incubation center	0	2	6
Total	109	122	130

Table 14. Outline of Incubator Center Categories

Sources: White Paper on SMEs in Taiwan, 2009-12 [24].

In 2012, 22% percent of incubator centers supported the IT and electronics industry, followed by biotech and healthcare field (21.4%), electromechanical equipment (10%), tourism & recreation (8.9%), other industries (13.6%), education & culture art (6.8%), environmental protection industry (4.9%), medical industry (4.9%), and multimedia & broadcasting (4.5%). (Please refer to Table 15).

Table 15. Industrie	s of Incubation	Orientation
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					Unit:%
No.	Industry	2008	2009	2010	2012
1	IT & Electronic	27	32	28.35	22.08
2	Electric Machinery	16	18	13.44	10.09
3	Multimedia & Broadcasting	4	_	4.42	4.47
4	Biotechnology & Healthcare	22	18	18.58	21.44
5	Environmental Protection	4	4	4.66	4.90
6	Chemical & Petrifaction	6	6	3.67	4.86
7	Raw Material	5	_	4.05	2.83
8	Tourism & Recreation	2	1	_	8.91
9	Education & Culture Art	6	7	5.74	6.80
10	Others	8	14	17.09	13.62

Sources: White Paper on SMEs in Taiwan, 2009–12. Small and Medium Enterprise Administration, Ministry of Economic Affairs, website. http://www.moeasmea.gov.tw/ [24].

Incubator center performance: In 2008, with government funding of TWD176 million, incubator centers successfully cultivated 1,433 new start-ups, including 671 innovationoriented start-ups. Total employment at firms located in incubator centers was 35,345. Firms in incubator centers secured a total of 402 patents, and implemented 181 instances of technology transfer. Five firms secured stock market or OTC listing. Table 16 summarizes the cumulative performance of the ROC's incubator centers over the period 1997 to June 2009. In 2011, with funding of TWD2,324 million (USD78.86 million), incubation centers cultivated 5,024 [26] start-ups, increasing their capital by TWD70.1 billion (USD2,378.7 million).

Year Performance		2007	2008	2009	2010	Cumulative 1997–2011
Inputs	Funding support for incubator centers (TWD millions)	172	176	175.4	170	2,324
Outputs	SMEs cultivated by incubator centers	1,356	1,433	1,633	1,551	5,024
	Innovation-oriented SMEs cultivated by incubator centers	577	418	835	874	1,920
	Number of persons employed by firms located in incubator centers	27,133	35,345	28,038	27,324	89,276
	Increase in capitalization of firms located in incubator centers (TWD billions) (New venture capital investment) (TWD millions)	5.2	6.6	6.4	3.6	70.1
	Ratio of outputs to inputs (increase in capitalization divided by total funding support)	30.00	37.50	36.57	21.18	30.16
	No. of patents secured by firms located in incubator centers	416	402	484	678	3,106
	No. of instances of technology transfer implemented by firms located in incubator centers	149	181	270	357	1,475

Table 16. Results Achieved by the ROC's Incubator Centers, 2007-11

(...continued)

Performa	Year	2007	2008	2009	2010	Cumulative 1997–2011
No. inc stoo	o. of firms cultivated by subator centers that secured ck market or OTC listing	6	5	6	1	53

Source: Small and Medium Enterprise Administration, Ministry of Economic Affairs, 2009 [25]. Notes:

- 1. Ratio of outputs to inputs = increase in capitalization of firms located in incubator centers ÷ total amount of funding support provided to incubator centers.
- 2. In principle, firms will normally be located in an incubator center for a maximum of three years; the figures for the number of firms cultivated and for the number of employees are based on the number of firms located in incubator centers in the year in question.
- 3. Increase in capitalization is the sum of additional venture capital investment and capital increments due to business expansion.

Promoting Entrepreneurship and Innovation Service Centers

In 2009, the SMEA promoted the Business Start-up Helmsman Plan, working through the SME Start-up and Innovation Service Centers in northern, central, southern and eastern ROC to build regional service networks and expand its ability to provide service at the local level. The Plan embodies three strategies: improving the start-up incubation environment, developing start-up knowledge and information platforms, and helping entrepreneurs to obtain funding.

The SME start-up and innovation service network has been reorganized by establishing regional service centers that expanded the accessibility of resources and service at the local level. The regional service centers are located in the Nankang Software Incubator (Northern Region), the Central Science Park site of Fengchia University (Central Region), the Kaohsiung Software Incubator Center (Southern Region), and the Stone and Resource Industry R&D Center (Eastern ROC).

The SMEA has also established processes to identify individuals and teams with vision and potential to receive value-added guidance on creativity, innovation and start-ups. SMEA helps these individuals and teams to access venture capital funding, thereby contributing to the creation of new businesses with significant economic value. To promote new business development contests, SMEA provides services such as identifying outstanding new business projects, providing guidance to commercialization and other value-added activities and helping start-ups to secure funding.

FINANCING PROGRAMS TO PROMOTE INNOVATION FOR SMES

At present, most venture capital focuses on high-tech firms and this has forced SMEs holding elite technology or innovative products to rely on loans from friends, relatives or "unofficial" lenders. The relatively small size of loans from these sources create a direct, negative impact on the growth of SMEs.

Future SME guidance policy may focus on the on-going promotion of the SME Credit Guarantee Fund Pass the Torch Academy to help SMEs build sound financial and accounting systems, and on the expansion of the Firefly Program for encouraging large enterprises and banks to assist SMEs with R&D and innovation. By integrating credit databases, it should be possible to build a credit guarantee rating model that can be used to enhance the efficiency of service provisions. There should be efforts to make it easier for disadvantaged groups and female entrepreneurs to secure loans.

The provision of direct credit guarantees to SMEs in emerging industries [27] should be considered to secure necessary financing. Industry-university collaboration and industry cluster models can be leveraged to integrate guidance, credit guarantees and financing into a unified system of assistance to SMEs [28] (Figure 10).

SMEA projected that in 2009, guidance will be provided to 1,200 enterprises (including 400 innovation-oriented start-ups) that will protect 30,000 jobs, create 2,000 new jobs, and inspire additional private-sector investment and capital increments to the tune of TWD5 billion (USD1.51 billion).

In 2010, the SMEA began to promote the SME Innovative Service Certification Plan to encourage SMEs and were in receipt of funding from the SMEA. Those firms that secure approval can obtain innovative service certification subsidies (or grants) of TWD300,000 (USD9,478.67) to access customized, innovative services from the knowledge-intensive service organization.



Figure 10. Investing SMEs Schemes

Sources: Small and Medium Enterprise Administration, Ministry of Economic Affairs, 2008 [15].

CONCLUSION

Summary

Globalization, regional economic integration, the rise of the emerging economies and low-cost competition have brought increased environmental awareness, rising oil and raw materials prices, and the impact of the global business cycle to the attention of SMEs. The growing importance of high-tech innovation, the growth of franchise operations, chain stores and online businesses have all challenged traditional SME business and employment models.



Figure 11 shows the measures to help SMEs secure funding and other services.

Figure 11. Taiwan's SMEs Funding Support Mechanism

Sources: Small and Medium Enterprise Administration, Ministry of Economic Affairs, 2008 [15].

Policy Recommendations for Strengthening SME Financing

Strengthening Financial and Accounting Systems to Improve SMEs' Ability to Secure Financing

Effective integration of resources from different organizations to provide guidance and support to SMEs is recommended [29].

Expanding the Capabilities of the SME Credit Guarantee Fund to Make a Wider Range of Financing Channels Available to SMEs

The SME Credit Guarantee Fund Pass the Torch Academy that helps SMEs build sound financial and accounting systems, and the Firefly Program for encouraging large enterprises and banks to assist SMEs with R&D and innovation should be promoted.

Allocating TWD10 billion (USD308.44 million) from the National Development Fund to Invest in SMEs with Significant Growth Potential

There is a need to increase support for the National Development Fund which provides funding to SMEs with impressive growth potential and to those investing in countries with which the ROC has particularly close relations [30].

Establishment of Restructuring Guidance Mechanisms to Help SMEs with Potential to Get Back on Their Feet

The government should establish a restructuring mechanism to help SMEs experiencing temporary financial difficulties but significant value creation potential.

Establishment of the Local Industry Development Fund

The Local Industry Development Fund that engages local government authorities and various stakeholders to support SMEs should be strengthened [31].

ENDNOTES

- The considerable portion of this paper is based on the website of the Small and Medium Business Administration (SMBA), Small and Medium Enterprise Credit Guarantee Fund (SMEG), SME Entrepreneurship and Innovation Service Centers, Taiwan Small Business Integrated Assistance Center (ABIAC), Department of Industrial Technology (DoIT), Nankang Software Incubator (NSI), Central Bank of the Republic of China (CBC), Bureau of Monetary Affairs (BOMA), Directorate General of Budget, Accounting and Statistics, (DGBAS), Taiwan External Trade Development Council (TAITRA), and others. I would like to thank the chief expert, Dr. Gilberto M. Llanto, and the national experts for helpful comments and suggestions in coordination meetings.
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- 3a. Ministry of Finance Tax Data Center, VAT data for 2005–11.
- 3b. DGBAS, Monthly Bulletin of Manpower Statistics, 2011.
- 4. White Paper on SMEs in ROC, 2012
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- There are: (1) Taiwan SME Development Corporation Ltd. (SME Development Fund investment totaling TWD87 million) (USD2.68 million); (2) Sunstar Ltd. (TWD69.934 million) (USD2.16 million); (3) Trinity Investment Corporation (TWD55 million) (USD1.7 million).
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- 21. Intellectual Property Office, Ministry of Economic Affairs, 2013.
- 22. Northern ROC with 58 has the largest concentration of incubator centers, followed by Southern ROC with 38.
- 23. Small and Medium Enterprise Administration, Ministry of Economic Affairs, 2012.

- White Paper on SMEs in Taiwan, 2009–12. Small and Medium Enterprise Administration, Ministry of Economic Affairs, website. http://www.moeasmea.gov.tw/accessed on April 17, 2014.
- 25. Small and Medium Enterprise Administration, Ministry of Economic Affairs, 2009.
- 26. Including 1,920 innovation-oriented start-ups.
- 27. Such as the cultural and creative industries and the digital content industry.
- 28. The government provides SMEs with various types of policy loans, either directly or through collaboration with banks. The loans are granted for specific purposes, and are granted with preferential interest rates. Seven different types of loan are available in two categories: business start-up loans and R&D loans.
- 29. For instance, the Torchbearer Fund of Guidance and Assistance which enables SMEs to obtain specialist guidance organizations, helps strengthen their financial and accounting systems, improve their operational capabilities and enhance their competitiveness, reduces risk that banks and the SME Credit Guarantee Fund bear.
- 30. As of the end of May 2011, it helped the business enterprises concerned to secure 418 intellectual property rights and 42 domestic and international awards, and helped protect 8,693 jobs. Overall, the program has had a significant positive impact on both the development of the ROC's SMEs and job creation in the ROC.
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CHAPTER THREE: INDIA

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INTRODUCTION

In India, an MSME unit is defined as an enterprise where investment in plant and machinery, whether held on ownership terms, on lease or by hire purchase, does not exceed USD2 million. Under a popular definition, microenterprises are also known as "Tiny Units" where investment in plant and machinery does not exceed USD0.5 million. Despite two centuries of colonial rule and a total lack of external support, the Indian small-scale sector has been fortunate to build upon a heritage of enterprise, dynamism and renewal. It has re-established itself and consolidated over the last 50 years from about 80,000 units in the late 1940s to over 34 million units today, proving its mettle time and again. The last decade of the 20th century saw steady growth for the MSME sector, with a GDP contribution of 17% in 2011. MSMEs had a 22% share of GDP in 2012. In 2011, the sector currently employed 60 million people and an additional 12 million people were expected to join the MSME sector in 2012–14 [1]. This chapter has the following objectives:

- 1. To ascertain the growth rates of sales turnover, investment, and employment of innovative MSMEs.
- 2. To study the level of innovative activities oriented to meet market and technological challenges.
- 3. To study the present financing programs and analyse financing policy to promote innovation among MSMEs.

During data collection from government sources, publications, journals and reports, the author found out that product and process innovations are independent yet closely linked. Irrespective of technology innovation, MSMEs intend to achieve cost effectiveness, improve quality, improve product shapes/dimensions, and increase the range of products and as a result increase the share of innovative products in their total sales. This chapter observes that innovations directly contribute to improve MSME performance.

OVERVIEW

Profile of MSMEs in India

Indian MSMEs contribute 45% of manufacturing output, 40% of total export with projected employment of 73.2 million during the period 2012–14. There are 34 million MSMEs producing more than 6,000 products having a 17% share of GDP in 2011, and 22% in 2012. In 2004–05, public sector banks provided the sector with loans amounting to USD13,000 million, with USD27,000 million in 2009–10, and USD40,000 million in 2011–12.

This chapter is about finding out the following:

- 1. Economic growth relating to per capita GDP (measured in Power Purchasing Parity) and also finding out how MSMEs contribute to the national economy by providing more employment opportunities and innovative growth.
- 2. Present MSME financing policies, policy-related funds and the different institutions dealing with MSME financing.
- 3. Level of innovation-related activities and level of commercialization of patents. State/union-wise break up of patent applications and trends of invention in different areas are also noted. Revenues generated in 2009–10 and the number of applications and commercializations of patents show that MSMEs are successful in the chemical, mechanical, and auto component/electronics areas of manufacturing.

Detailed studies were carried out on the auto components, electronics and machine tool sectors which were considered to be the most innovative areas of MSMEs in India during 2005–09. These were for the district of Bangalore and the state of Karnataka.

The data collection instrument was a semi-structured questionnaire of about 60 questions per item covering achievements, outcomes of technological innovation, own recognition, and proportion of innovative products in total sales.

Data on economic variables such as employment, investment, and sales turnover were also collected. Detailed findings concerning innovation and the relationship between the percentage Growth of Value Addition (GVA) of MSMEs and the share of total sales taken by innovative products and services are provided in the Annex.

Finally, a review of research studies was conducted to discover ways in which to promote innovative MSMEs through the design of financial policies relating to venture capital, the private equity system and entrepreneurial education business models relating to creative work. The resulting recommendations are noted at the end of the chapter.

The chapter finds that to promote innovative MSMEs in India, policy makers should focus on the problems faced by MSMEs and their mitigation. The problems faced by MSMEs, particularly in accessing technology and maintaining competitiveness, have been formidable for several reasons: poor financial situations and low levels of R&D, poor adaptability to changing trade trends, aversion to risk, non-availability of technically trained human resources, emphasis on production and not on production costs, lack of management skills, lack of access to technological information and consultancy services, and isolation from technology hubs.

To enable MSMEs to mitigate these problems and enhance their access to new technologies in order to increase their competitiveness in the international market, it is imperative to give them a conducive environment which includes the following: formulation of appropriate national policies and programs, building up technological capacity, knowledge flows and technology databases as well as R&D and inter-firm linkages.

ECONOMIC GROWTH OF MEMBER COUNTRIES

Economic Scale and Growth of the MSME Sector

The MSME sector contributes significantly to manufacturing output (45%), employment (60 million people), and exports (40%) with over 30 million units producing more than 6,000 different types of products (Figure 1).



Figure 1. Products of MSMEs

Source: Fourth All India Census of MSME (2009) [2].

Performance of MSMEs

Tables 1, 2, and 3 provide data on the performance of MSMEs [3].

	2005	2006	2007	2008	2009	2010	2011	2012
Real GDP	6.2	8.4	9.2	9.0	7.4	7.4	_	_
Private consumption	_	_	_	6.8	5.6	6.6	_	_
Fixed investment (USD bn)	_	_	_	6.9	4.0	5.4	7.0	8.0
Exports (USD bn)	100.35	121.20	145.89	181.86	200.0	215.0	250.00	
Import (USD bn)	140.86	78.21	218.64	315.71	312.0	290.0	_	
Consumer Price Index	4.246	5.796	6.37	8.2	2.0	4.0	_	_
Unemployment rate	9.2%	8.9%	7.8%	7.3%	7.5%	7.5%	_	_
Current account balance	-10.37	-9.51	-10.67	-37.23	_	_	_	_
No. of MSMEs (million)	-	_	27	28	29	30	31	34

Table 1. Major Economic Indicators in the Indian Economy

Source: Citi Investment Research[4].

Table 2. MSME Performance: Units, Investment, Production, Employment and Exports

Sl. No.	Year	Total MSMEs (USD million)	Fixed Investment (USD billion)	Employment (million persons)	Exports (USD million)
1	2004–05	12	2000	49	-
2	2005–06	16	3500	53	100.35
3	2006–07	27	4500	59.5	121.20
4	2007–08	28	5008	62.6	145.89
5	2008–09	29	5582	65.9	181.86
6	2009–10	30	6218	69.5	200.0
7	2010-11	31	6938	73.2	215.0
8	2011-12	34	7735	_	250.0

Source: Ministry of Micro, Small and Medium Enterprise, Aranca Research [5].

Contribution of Indian MSMEs to the National Economy

The MSMEs have maintained a higher rate of growth vis-à-vis the overall industrial sector during last five years as seen in the table given below.

Year	Growth Rate of MSME Sector (%)	Overall Industrial Sector (%)
2002–03	8.68	5.70
2003–04	9.64	6.90
2004–05	10.88	8.40
2005–06	12.32	8.10
2006–07	12.60	11.5
2007–08*	13.00*	8.00
2008–09	15.00	8.40
2009–10	15.50	9.00
2010–11	17.00	9.40

Table 3. Comparative Growth Rates

Source: Ministry of MSME and Central Statistical Organization, Government of India [6].

Table 4. Contr	ribution of the	MSMEs to	the Gross	Domestic Product
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	Contribution of MSMEs (%) at 1999–2000 prices to					
Year	Total Industrial Production	Gross Domestic Product (GDP)				
2004–05	38.62	5.84				
2005–06	38.56	6.20				
2006–07	38.57	8.40				
2007–08	39.00	9.20				
2008–09	39.00	9.00				
2009–10	40.00	7.40				
2010–11	39.00	7.40				

Source: Ministry of MSME and Central Statistical Organization, Government of India [6].
Today, the Indian economy is the world's second fastest growing economy after China. In terms of Purchasing Power Parity (PPP) GDP, India is the world's fourth largest economy after the USA, China and Japan. India's share of world GDP (PPP basis) has increased from 4.3% in 1991 to almost 6.0% in 2005 (Figure 2).



Figure 2. India's Share of World GDP Source: International Monetary Fund. Note: Data for 2006 and 2007 are IMF projections.

OVERVIEW OF MSME FINANCING STRUCTURE

Definition of Indian MSMEs

In India, MSMEs contribute significantly to manufacturing output, employment, and exports. Recognizing the contribution and potential of the sector, the definition and coverage of MSMEs has been broadened to include the manufacturing, mining and construction, retail and IT sectors. These sectors are defined by different parameters such as the number of workers, capital employed, and sales. The office of the MSME provides the parameters for defining sectors and micro sectors in which plant and machinery do not exceed USD0.2 million, the number of people engaged does not exceed 7–20, and sales are not more than USD0.5 million. In the mining, construction, retail and IT sectors there is hardly any difference in the number of people engaged, with a maximum of 20 and maximum of sales of USD8 million. It is also observed that there are direct incentives given to the retail and IT sectors which are rapidly advancing in India. The India International Trade Center has worked extensively in the area of lending and extending financial sources for MSMEs, particularly in medium R&D sectors.

	Medium			Small			Micro		
Sector	No. of workers	Capital	Sale	No. of workers	Capital	Sale	No. of workers	Capital	Sale
Manufacturing	51-150	between \$1mn and \$2mn	between \$2mn and \$8mn	21–50	between \$0.2mn and \$1mn	between \$0.5mn and \$2mn	7–20	> \$0.5mn	> \$0.5mn
Mining, Construction	51-150	between \$1mn and \$2mn	between \$2mn and \$8mn	21–50	between \$0.2mn and \$1mn	between \$0.5mn and \$2mn	7–20	> \$0.2mn	> \$0.5mn
Retail stores & IT industry	51-150	between \$10mn and \$15mn	between \$10mn and \$15mn	21-50	between \$5mn and \$8mn	between \$5mn and \$8mn	5-20	> \$0.1mn	> \$0.5mn
R&D	> 100	> \$3mn	between \$2mn and \$3mn	> 10	> \$1mn	between \$0.5mn and \$1mn	> 5	> \$0.1mn	> \$0.2mn
Others	> 50	> \$5mn	> \$8mn	> 20	> \$2.5mn	> \$4mn	> 5	> \$0.1mn	> \$0.3mn

Table 5. Criteria for MSMEs: Figures are in USD million

Source: TSJ Media, IVCA Publication [7].

Table 6. Non-Farm	Unorganized	Enterprises	by	Activity	(2006 -	-07)	
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Sectors	(USD million)
Microenterprises under DC-MSME	12.6
PMRY	2.8
SGSY	7.5
KVI/REGP	0.5
SJSSY	0.6
Agro-related	8.2
Handloom	6.5
Residency including Handicraft, Sericulture, Coir, Wool Manufacturing, Retail Trade, Small Business etc.	19.3
Total	58.00

Source: NSS 55th Round 06-07, NCEUS 2007 [8].

Note: DC-MSME, Development Commissioner-Micro, Small and Medium Enterprises; PMRY, Prime Minister's RojgarYojana; SGSY, Swarnjayanti Gram SwarojgarYojana; SJSSY, SwarnjayantiSahariSwarojgarYojana.

Structure of MSME Financing: Policies, Policy-Related Funds and Institutions

MSME Financing: Developing India

For India to sustain its economic development, the manufacturing sector must be strengthened through existing rural systems while at the same time making them self-sufficient. This will take place only by making SMEs and rural artisans (people with innate skills and talents) effective and competitive enough to face the future. Indian MSMEs can learn from a number of issues and business practices of global players and markets and adapt good practices to ensure competitiveness.

The following are the issues affecting MSME financing:

- Inability to capture market opportunities which require large production facilities and thus cannot achieve economies of scale, homogenous standards, and regular supply.
- Difficulties in purchase of inputs such as raw material, machinery and equipment, finance, consulting services, new technology, highly skilled labor etc.
- Small size that hinders the internalization of functions such as market research, market intelligence, supply chain, technology innovation, training, and division of labour and impedes productivity.
- Emphasis on narrow profit margins that make MSMEs myopic about the innovations of products and processes, and capturing new markets.
- Inability to compete with big players in terms of product quality, range of products, marketing abilities and cost.
- Most importantly, absence of a wide range of financing and other services to raise money and sustain the business.
- Absence of infrastructure, quality labor, business acumen and limited options/ opportunities to widen the business.
- Poor IT and infrastructure knowledge.

Policies for Promoting MSME Innovation

Role of Financial Institutions

Providing venture capital will help supply MSMEs with access to new technologies for indigenous development. Financial institutions such as the Industrial Development Bank of India (IDBI), Industrial Credit and Investment Corporation of India (ICICI), Industrial Finance Corporation of India (IFCI), and banks provide assistance for commercialization of indigenously developed technologies and adoption of imported technologies for wider domestic applications through venture capital companies. A large number of small

innovations is also supported by the Society for Research and Initiatives for Sustainable Technologies and Institutions (SRISTI) Venture Capital Fund. For example, one of the main factors behind the success of the knitwear cluster at Tiruppur is the state's intervention in terms of the provision of short-term credit to facilitate networked production.

Institutional Arrangements for Technology Support to Unorganized Sector Enterprises

A large number of organizations at the central and state government level as well as private institutions and agencies, including Non-Governmental Organizations (NGOs), provide technological support to enterprises in India. Table 7 provides a brief overview of such institutions and their assistance to MSMEs.

Name of the Institution	Allocation of Funds (USD million)	Remarks
Ministry of Micro, Small & Medium Enterprises (MSME)	190	Scheme to techno local support to enterprise
MSME Tool Rooms	10	25,000 people to train 7000 units to cover
MSME-Technology Development Center (MSME-TDC)	5	20,000 persons to train about 6500 MSME units in upgrading technology
MSME Testing Centers	1	4 metro cities for quality upgrading, process upgrading. 40,000 testing jobs will be generated
Credit linked capital subsidy scheme for Technology upgraded (CLCSS Scheme)	25	2000 units are expected to cover ceiling of loan USD0.2 million at a 15% subsidy
Khadi and Village Industries Commission (KVIC)	200	For design development promoting research
Prime Minister's Employment Generation Programme	200	Providing capital subsidy USD0.09 million
Product Development, Design Intervention and Packaging Scheme	4	To increase value addition for khadi (handloom) products
Mahatma Gandhi Institute for Rural Industrialisation (set up 10 December 2006)	327	To undertake PhD training and education in rural industries (MSMEs)

Table 7. Features and Characteristics of MSME Policy: Institutional Arrangements for Tech-Support and Policy Related Funds to High-Tech MSMEs (2010–11)

Central Government Initiatives: Ministry of Micro, Small and Medium Enterprises (MSMEs)

The Micro, Small and Medium Enterprise-Development Organization (MSME-DO) has allocated 500–700 crores under the Plan Budget Outlay of 2011–2012 for implementation of various schemes under it. The schemes being implemented by MSME-DO related to technological support for the enterprises in the MSME sector are described below:

MSME Tool Rooms

To date, the MSME-DO has established 13 tool rooms in different parts of the country namely in Ludhiana, Ahmedabad, Indore, Aurangabad, Kolkata, Bhubaneswar, Jamshedpur, Jalandhar, and Guwahati with Indo-German and Indo-Danish collaborations for the last two years additionally undertaken in Bhubaneswar and Jalandhar. The total outlay for tool rooms during the years 2008–09 was found to be USD6.4 million, and in 2011–12 the outlay was USD7.5 million. During this period, a total of 25,000 people were trained .

MSME-Technology Development Centers (MSME-TDCs)

These centers look into product-specific problems and render technical services, develop and upgrade technologies, assist in appropriate technology transfer, and develop trained manpower in the specific product groups. The overall outlay for these TDCs during 2008–09 is approximately USD4 million and it was expected that 12,000 people would be trained and about 6,500 units assisted during the period of 2008–09. Data for MSMEs is not available after 2009.

MSME Testing Centers/ MSME Testing Stations

MSME-DO operates four MSME Testing Centers in Chennai, Kolkata, Delhi, and Mumbai for upgrading quality, training/consultancy in testing, quality control, quality management, process quality control systems, etc., in the disciplines of chemical, mechanical, metallurgical, and electrical engineering. USD0.6 million was provided in 2008–09 and about 90 new machines installed. The data available shows that 40,000 testing jobs were generated during 2009–10.

Credit Linked Capital Subsidy Scheme for Technology Upgrading (CLCSS)

The CLCSS scheme launched during 2000–01 aims to facilitate technology upgrading by providing capital subsidies to MSME units, including tiny, khadi and village, and coir industrial units for modernization of production equipment and techniques. Loans under

this scheme are capped at USD0.2 million and the rate of subsidy is 15% of tax benefit. An amount of USD24 million was kept under Budgetary Estimate (BE) for 2008–09 and about 1,200 units were covered under this scheme during the years 2008–09. No data is available after 2009.

Micro and Small Enterprises-Cluster Development Programme (MSME-CDP)

Reimbursement of Expenses for Acquiring Quality Certification

This scheme seeks to create awareness among MSMEs about the importance of quality management systems like ISO-9000, ISO-14001 and Hazard Analysis Critical Control Point (HACCP) and commitment towards quality product manufacturing. The scheme reimburses up to 75% of expenses for acquiring quality certifications subject to a maximum of USD0.2 million for any one MSME.

Khadi and Village Industries Commission (KVIC)

The KVIC is entrusted with the planning, promotion, organization, and implementation of programs for the development of khadi and other village industries known as Khadi and Village Industries (KVIs) in rural areas in coordination with other agencies. KVIC assists in supply of designs, prototypes and other technical information and in encouraging and promoting research in production techniques and equipment employed by the KVIs. In 2010–11, under the 11th Plan, an average outlay of USD270 million was allocated to each of several schemes introduced for technical support under KVIC. The various KVIC schemes providing technological support to KVI enterprises are given below:

Prime Minister's Employment Generation Programmes (PMEGP)

The PMEGP [9] provides a capital subsidy amounting to USD0.05 million to entrepreneurs to set up micro and small enterprises. In 2008–09, the PMEGP was allocated USD164 million and it is expected that during this period around 100,000 micro and small enterprises would be set up with an additional employment generation for 600,000 people.

Khadi and Village Industries (Science and Technology (S&T))

KVIC provides grants to institutions and individuals to improve the quality of KVI products and introduces newer equipment and technology to the sector. USD0.4 million each for the KVI sector, respectively, was provided in 2008–09. Present data shows that 50% of the fund allotted in 2008–09 was utilized and further funds amounting to USD0.2 million were allotted in the years 2010–11.

Product Development, Design Intervention and Packaging (PRODIP) Scheme

Launched in November 2002, PRODIP is a small intervention scheme to improve the quality and diversity of khadi products, introduce new designs and better product packaging. The support of professional designers approved by the National Institute of Design (NID) enhances the marketability of khadi products.

Scheme for Enhancing Productivity and Competitiveness of Artisans and Khadi Industry This scheme provides financial assistance to 200 of the "A plus" and "A" category khadi institutions of which 50 institutions would be those managed exclusively by beneficiaries belonging to the Scheduled Castes (SCs)/ Scheduled Tribes (STs) in a public private partnership mode to replace old/obsolete charkas (hand spinning wheels) and looms to increase value addition for khadi products, ready-made garments, muslin khadi, and to set up common need-based dyeing and printing facilities. The scheme was fully operationalized in 2008–09.

Mahatma Gandhi Institute for Rural Industrialization (MGIRI)10

Set up in December 2006, MGIRI, an autonomous body registered under Societies Registration Act undertakes R&D, extension, training and education in rural industrialization to help with upgrading technology in the KVIC sector. It started functioning regularly during 2009–10. MGIRI acts as a nodal agency for monitoring and coordinating with national level institutes, the Indian Institute of Technology (IIT) and the National Institute of Technology (NIT), to function as technical interfaces for KVIC. It also undertakes R&D projects in the KVI sector, besides disseminating the technology that it develops as well as that developed by Technical Interface institutes. An amount of USD3 million has been earmarked for this.

- Scheme of Fund for Regeneration of Traditional Industries (SFURTI)
- National Small Industries Corporation
- Ministry of Science and Technology, Department of Science and Technology (DST)
- Science Technology Programme for Socio-Economic Development
- Department of Scientific and Industrial Research (DSIR) 14
- National Research Development Corporation (NRDC) 15
- Ministry of Textiles
- Technology Upgrading Fund Scheme and Other Agencies of Ministry of Textiles
- Ministry of Food Processing Industries
- Ministry of Rural Development
- Small Industries Development Bank of India (SIDBI) 17
- Ministry of Commerce and Industry- Department of Industrial Policy and Promotion
- Central Leather Research Institute (CLRI) (providing research assistance).

Some of the schemes involve improvement of technology in the form of tool rooms and product development centers, incentives for adoptions of higher technology through financial institutions like SIDBI and National Bank of Agriculture and Rural Development (NABARD).

Sanctions and Disbursements

Figure 3 shows the increase in sanctions (37.2% in 2003) and disbursements (40.7% in 2004) which shows that target MSMEs are able to access credit.



Figure 3. Sanctions and Disbursements for Bills Financing Source: Adapted from Chapter 35, Monitory and Banking Development Economic Survey, 2004–05 [10].

Project financing is another area where SIDBI finances the whole project in terms of innovation, economic and financial feasibility and uniqueness leading to the birth of an industry in the near future. From Figure 4, it is noted that in 2005, disbursement increased. The reason for low sanctions was that stringent risk-management practices were adopted by banks.

From Figure 4, the progress from 2005, 2007, 2008, and 2009 indicates that sanction and disbursements have increased. In 2009, they doubled compared to 2007. SIDBI is still a premier financing institute for promotion and development of MSMEs. In 2009, the sanctions were USD5,800 million and disbursements were USD5,600 million, while in 2007, they had been USD2,200 million and USD2,020 million, respectively.



Figure 4. Sanctions and Disbursements (Project Financing) Source: Adapted from Chapter 35, Monitory and Banking Development Economic Survey, 2004–05 [10].

Table 8 shows a comparison of 2007–08 and 2008–09 in terms of indirect and direct credit. A comparison of the total figures for 2005–09 is shown in Figure 4. It can be seen that total credit doubled in one year. This is a direct reflection of the development of innovative MSMEs.

(USD million)								
Schemes	20	07–08	2008–09					
	Sanction	Disbursement	Sanction	Disbursement				
A. Indirect Credit								
Refinance	2,022.8	1,830.7	3,853.0	3,706.8				
Equity assistance (Indirect)	5.0	5.2	1.7	1.8				
Micro Finance (including Promotional and Developmental (P&D)	154.4	143.2	384.0	349.2				
Assistance)	165.0	130.2	244.0	239.4				
Resource support to institutions / agencies	_	_	_	_				
Sub-total	2,347.2	2,109.3	4,482.7	4,297.2				

Table 8. Overall Operations

(...continued)

(USD million)								
Schemes	20	07–08	2008–09					
	Sanction	Disbursement	Sanction	Disbursement				
B. Direct Credit								
Term Loan under Direct Credit Scheme	285.2	257.6	464.6	499.6				
MSME Receivable Finance	590.6	578.6	835.4	806.0				
Other Credit Facility (Bulk Credit and Venture Capital)	9.0	71.4	54.2	52.2				
Sub-total	884.8	907.6	1,354.2	1,357.8				
Total Credit (A + B)	3,232.0	3,016.9	5,836.9	5,654.0				

Source: www.sidbi.com [11].

LEVEL OF INNOVATION-RELATED ACTIVITIES

A recent survey on innovation in India covering 79 MSMEs in both the manufacturing and service sectors across the country reported that the major innovations of MSMEs ranged from new products, new processes, new services, and new methods of production to new ways of organizing administration. More than half of the increase in market share, competitiveness, profitability, and reduction in costs due to innovation occurred due to three types of innovation: new products, new process and new services [12].

Innovation - Country Concept

This chapter uses the following theoretical framework to meet the study objectives. Four primary issues concerning innovation and growth of MSMEs are: (i) driving factors, (ii) dimensions, (iii) achievements, and (iv) outcomes. Driving factors are internal and external. Internal factors could be self-motivation, technical education background, work experience, and innovative ideas of entrepreneurs. External factors driving innovation are customer requirements, information given by suppliers of equipment/materials, market opportunities, availability and accessibility of institutional support, economic incentives, and competition. Successful innovation may require a combination of both internal and external factors.

What kind of innovations do MSMEs undertake? Are they exclusively product-focused or process-focused or do they necessarily have to undertake both together? Firms might focus on the development of new products with either old or new technology, or on the improvement of existing products by changing shapes/designs, or on quality improvement and cost reduction through substitution of raw materials, etc. What are the achievements of innovation by MSMEs? If innovation is successful, whether new products or improved products emerge due to product or process innovations, the share of such innovative products is likely to increase in the total sales of the firm. If this happens, such firms would be able to achieve growth in their sales turnover, investment and employment resulting in the growth of firm size.

Table 9 shows the number of applications submitted in the Chemical and Drug industries from 2004–05 to 2010–11. In India, patent applications for drugs nearly doubled in 2011 compared to 2005, with a sharp rise in 2006–07.

Year	Chemical	Drug	Total
2004–05	3,916	2,316	6,232
2005–06	5,810	2,211	8,021
2006–07	6,354	3,239	9,593
2007–08	6,375	4,267	10,642
2008–09	5,884	3,672	9,556
2009–10	6,212	5,200	11,412
2010–11	5,700	6,100	11,800

Table 9. Intellectual Property Rights (IPR) applications by year (2004–05 to 2010–11) (Patents)

Source: Annual Report – Patents, Designs, Trademarks and Geographical Indications – Office of the Development Commission, MSME, Government of India [13].

Overall, Table 10 shows the total number of IPR applications of various industries from 2004–05 to 2010–11. It can be seen that computer and electronics have the most thrust.

Year	Electrical	Mechanical	Computer/ Electronics	Bio-technology	Total
2004–05	1,079	3,304	2,787	1,214	8,384
2005-06	1,274	4,734	5,700	1,525	13,233
2006-07	2,371	5,536	5,822	2,774	16,503

Table 10. IPR applications by year (2004–05 to 2010–11) (Utility Models)

Year	Electrical	Mechanical	Computer/ Electronics	Bio-technology	Total
2007–08	2,210	6,424	4,842	1,950	15,426
2008–09	2,319	6,360	7,063	1,844	17,586
2009–10	2,412	6,250	8,012	1,712	18,386
2010–11	2,300	5,840	9,516	1,915	19,571

(...continued)

Source: Annual Report – Patents, Designs, Trademarks and Geographical Indications – Office of the Development Commission, MSME, Government of India [13].

Table 11 shows the number of IPR applications per year (Design and Trademarks).

Table 11. IPR applications by year (2004–05 to 2008–09) (Design and Trademarks)

Year	Design and Trademarks
2004–05	2,659
2005–06	3,150
2006–07	1,621
2007–08	7,110
2008–09	6,384

Source: Annual Report – Patents, Designs, Trademarks and Geographical Indications – Office of the Development Commission, MSME, Government of India [13].

Table 12 shows the number of IPR applications filed, examined and ultimately granted. The table shows that the number of patents granted is much lower than the number of applications filed. The problem here is commercialization. In most cases, lack of management strategies and commercial expertise lowers the final commercial application of the patents.

Table 12. Patent Applications (2004–05 to 2010–11) (combined table)

Year	2004–05	2005-06	2006-07	2007–08	2008–09	2009–10	2010-11
Filed	17,466	24,505	28,940	35,218	36,812	40,112	50,221
Examined	19,001	21,926	20,625	22,146	30,551	32,152	42,120
Granted	1,911	4,320	7,539	15,316	16,061	15,750	10,940

Source: Office of the CGPDTM Annual Report, 2008-09 [14].

It can seen that in design and trademark applications, the filed and granted figures are closer to each other. Registered figures are 75%–80% of the number of applications filed.

Year	2004–05	2005–06	2006–07	2007–08	2008–09	2009–10	2010–11
Filed	4,017	4,949	5,521	6,402	6,557	6,500	6,700
Examined	4,017	4,719	4,976	6,183	6,446	6,100	6,150
Registered	3,728	4,175	4,250	4,928	4,772	4,712	4,800

Table 13. Design Applications (2004–05 to 2010–11)

Source: Office of the CGPDTM Annual Report, 2008-09 [14].

Table 14. Trademark Applications (2004–05 to 2010–11)

Year	2004–05	2005–06	2006–07	2007–08	2008–09	2009–10	2010–11
Filed	4,017	4,949	5,521	6,402	6,557	6,700	6,650
Examined	4,017	4,719	4,976	6,183	6,446	6,100	5,950
Registered	3,728	4,175	4,250	4,928	4,772	4,110	4,212

Source: Office of the CGPDTM Annual Report, 2008-09 [14].

FINANCING PROGRAMS TO PROMOTE INNOVATION FOR MSMEs

Financial programs promote innovation through the following ways: Firstly, the government has encouraged technological education and training instruction for innovative entrepreneurs. Secondly, universities and research have promoted referral and laboratory services to MSMEs to promote innovation. Thirdly, financial institutions, through government funding, have encouraged innovative MSMEs by tax exemption. Fourthly, steps have been set to establish incubation units will help to promote innovative MSMEs. Fifthly, financial policy has mobilized risk finance and government relaxation on institutional investment in domestic venture fund. Sixthly, the government has taken early steps to venture funds for seed stage venture (USD50 million). Seventhly, the government has taken steps to exempt capital gains on exit from unlisted to registered venture funds. Lastly, the government has taken the decision to remove minimum capitalization to channel flow of funds to innovative MSMEs. SIDBI and NABARD have implanted the above schemes.

Table 15 shows how the PE finances are funded phase-wise.

	(All figures are in USD million)			
	2009	2010	2011	
Primary stages and sectors	Growth, maturity, diversified	Growth, maturity, diversified	Growth, maturity, diversified	
Primary sources of funds	Government / Overseas institutions	Government / Overseas institutions	Government / Overseas institutions	
Seed, early stage	300	450	600	
Development	4,000	5,300	5,900	
Growth maturity	2,000	1,800	2,100	
Total funds	5,100	5,600	6,700	

Table 15. Start-ups based on Technology and Innovation

Source: Evaluation Report of Private Equity (PE) Finance, Ministry of Finance, Government of India [15].

Under phase 1, the primary source of funds is the World Bank and the government while for phase 3 and phase 4, it is overseas institutions. The funding also varies at the different stages of the growth and the number of transactions is quite high in phases 3 and 4. Development funds at stage 3 and 4 are also high with an increased number of transactions.

Year	No. of Deals	Value of Deals (USD million)
2000	280	1.160
2001	110	937
2002	78	591
2003	56	470
2004	71	1.650
2005	146	2.200
2006	299	7.500
2007	439	14.234
2008	399	10.793

Table 16. Performance of MSME Technology Innovation Development

Source: Office of CGPDTM, Annual Report 2008-09 [14].

According to Venture Capital Intelligence, PE firms invested USD10.793 million through 399 deals in India in 2008. However, this was less than the previous year with PE investments through 439 deals, which was the highest during the period 2000–08.

Table 17 shows the ranking of various parameters. India has carved out a niche for itself in the global private equity market. Its compound growth rate is 79%. In terms of ranking based on high technological investment, India was ranked third after the USA and UK while expansion investment trends in India ranked second after the USA.

Parameters	Rank
Ranking based on growth of PE investments (CAGR for 1998–2007) (79%)	1
Ranking based on investment value (USD17.51 billion)	3
Ranking based on high tech investment Trends (USD5.17 billion)	3
Ranking based on expansion investment (USD7.18 billion)	2
Ranking based on buyout investment (USD0.97 billion)	19

Source: Global Private Equity Report. PricewaterhouseCoopers, 2008 [16]. Note: CARG, Compound Average Rate of Growth.

Creation of Venture Business (Position of Venture Capital (VC) in India to promote innovative MSMEs)

Venture Capital in India

The Securities and Exchange Board of India (SEBI) regulates venture capital by both Domestic Venture Capital Funds (DVCF) and Foreign Venture Capital Investors (FVCIs). SEBI registration offers benefits subject to certain restrictions:

- Income is passed to investors without tax in the case of trust registered under the Indian Trust Act and Venture Capital Companies.
- FVCIS can freely remit funds to India for investment in Indian Venture Capital Undertakings (VCUs) and SEBI registered DVCFs.

- FVCIs are exempt from both the entry and exit pricing regulations that otherwise apply to foreign investors such as market-related pricing on divestment.
- The sale of shares by VCFs to company insiders post-listing is exempt from the SEBI takeover code.
- VCFs automatically obtain Qualified Institutional Buyers (QIB) status, which is useful for participating in new security placements.
- Exemption from one year lock-in for divestment post-IPO for shares purchased prior to the IPO.
- VCFs do not get treated as promoters for purpose of IPOs.

Sectoral caps for industries as prescribed in the FDI regulations are applicable to FVCIs. The other restrictions common to all VCFS include:

- At least 66.67% of the investible funds shall be invested in unlisted equity shares or equity linked instruments of VCUs.
- Not more than 33.33% of the investible funds may be invested by way of subscription to IPO of a VCU whose shares are proposed to be listed or in debt instrument of a VCU in which the VCF has already made an investment by way of equity or in preferential allotment of equity shares of a listed company subject to lock-in period of one year.
- SPVs (Special Purpose Vehicles) created for facilitating investments in accordance with SEBI guidelines.
- Minimum capitalization requirement.

Year	No. of deals	Value (USD million)
2005	146	2,200
2006	299	7,500
2007	439	14,234
2008	399	10,793
2009	450	15,275
2010	420	13,680
2011	401	12,820

Table 18. No. of deals – VC and PE – in India (2005–11)

Figure 5 illustrates the VC and PE deals in India from 2000 to 2008. It is seen that VC and PE finance firms have invested USD32 million in 2000 and USD200 million in 2006 while in 2007 investment reached the highest figure of USD370 million into Indian companies. The volume of PE deals decreased by 24% during the year 2008 due to economic downturn.





In India, it is observed that strategic steps to take advantage of economic globalization started in 1999. The effect of globalization on Indian MSMEs has created the need to focus on high technological innovative products development to compete in the market. The government financing policy to strengthen fund flows to innovative MSMEs was invested by PE and VC firms which is reflected in Figure 5. From 2004–08 it increased from USD80 million to USD300 million, an improvement of 73%.

Table 19 shows the percentage of deals in different sectors of MSMEs. The maximum percentage is in the IT sector whereas the percentage is very low in the hotels and resorts and shipping and and logistics sectors. At present, there is a huge potential in the health care and energy sectors. There is also a future in the shipping and logistics sectors.

Industry	No. of Deals (%)
IT and IT-based enterprises (ITEs)	27
Manufacturing	12
Banking and financial services	11
Others	11
Healthcare and life sciences	8
Energy	7
Media and entertainment	6
Engineering and construction	6
Other services	4
Shipping and logistics	3
Hotels and resorts	3
Telecom	2

Table 19. Number of Deals (by sector)

Source: Venture Intelligence; press release from www.indiainfoline.com [17, 18].

Table 20. Outstanding Bank Credit to Micro and Small Enterprises
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USD(Million)

As on last reporting Friday of March	Public Sector Banks	Private Sector Banks	Foreign Banks	All Scheduled Commercial Banks	Percentage of MSME Credit to Net Bank Credit
1	2	3	4	5	6
2005	1,670	1,840	1,479	17,878	8.8
2006	1,765 (21.6)	2,231 (21.3)	1,835 (22.1)	21,686 (21.3)	7.5
2007	2,957 (24.4)	2,813 (26.1)	2,492 (38.0)	27,261 (25.7)	7.2
2008	32,360 (47.4)	10,044 (257.1)	3,316 (33.1)	45,720 (67.7)	11.6
2009 (Provisional)	40,961 (26.6)	10,259 (2.1)	3,884 (17.1)	55,103 (20.5)	11.4

Source: Reserve Bank of India [19].

Note: Figures in parentheses indicate year on year growth.

CONCLUSION AND RECOMMENDATIONS

Indian MSMEs are playing a major role in the economy. The Indian economy is today the world's second fastest growing economy after China in terms of PPP/GDP.

In the short term, R&D budget for promoting innovative MSMEs should be increased. At present, there are 2,900 R&D institutions in India, out of which 1,350 are in the private sector. Out of these, over 1,250 are in-house R&D units, employing over 45,000 scientific and technical personnel and incurring an expenditure of the order of USD140 million per annum. However, the small-scale sector is largely devoid of such facilities and is mainly supported by public R&D for acquisition of new technologies.

In India, an important technology information data bank is the National Research and Development Corporation (NRDC), which serves as an important link between research and MSMEs. NRDC acquires, evaluates, develops and transfers all worthwhile technologies generated at the various national laboratories.

In India there have been a large number of "spatial clusters" of small firms engaged in specialized industries such as: locks in Aligarh, leather footwear in Agra and Kanpur; cotton hosiery in Kolkata and Delhi; blankets in Panipat; power looms at Bhiwadi; diamond polishing in Surat. Space-bound "dense clusters" related to a specialized industry are even more pronounced in Punjab with woollen garments, bicycle and bicycle parts, sewing machine parts and machine tools in Ludhiana; printing and printing goods, water pipes and bathroom fixtures in Jallandhar; foundries in Batala, etc. Ludhiana clusters make 95% of the country's woollen knitwear; 85% of the sewing machines and 60% of the bicycle and bicycle parts. The Agra cluster makes 15 million pairs of shoes per day with a production value of USD1.3 million and exports shoes worth USD57.14 million per year. The knitwear cluster in Tiruppur, Tamil Nadu is responsible for 85% of the Indian market and its export earnings have expanded from USD25 million in 1986 to USD636 million in 1997. The innovative atmosphere and entrepreneurial dynamism are part of the secret of success of these districts, which need to be studied in detail.

In India, the above schemes are being implemented by SIDBI and NABARD. In the long term, the following policy framework for supporting innovative MSMEs is recommended. In India, the traditional sector which has shown a remarkable ability to adapt to technological change is leather. The Central Leather Research Institute (CLRI), Chennai, has successfully introduced microprocessor control tannery wet operations at the industrial level and promoted cleaner processing, quality consistency and international equivalence. Anticipating the potential impact of computer-aided techniques in footwear and garment

design, CLRI alerted and prepared the industry so well that CAD is today widely employed by export manufacturers of footwear and garments.

FINAL RECOMMENDATIONS

In the medium term, promoting new technology ventures is recommended. The following suggestions are made for revitalizing technology financing (the outcome of the study):

- Government encouragement in technical education and training institutions must include entrepreneurship programs.
- University and research institutions should promote referral services and laboratory services to the MSMEs to promote innovation.
- Financial institutions, through government funding, should encourage innovative MSMEs by tax exemptions, reducing the tax burden for a minimum starting period of five years.
- Setting up of incubation units will help to promote innovative MSMEs.
- Mobilization of risk finance is to be included in financial policy.
- Government relax constraints on institutional investment in domestic venture funds.
- Venture funds are a main source of capital for seed-stage ventures with a minimum funding of USD50 million.
- Central government must establish early-stage venture fund through public-private partnership.
- Capital gains must be exempted on exit from unlisted companies for registered venture funds.
- At present, foreign venture capital investors (FVCI) who desire to set up Indian subsidiaries need to capitalize with USD500,000.
- Removal of minimum capitalization needed to encourage small funds to supply risk capital.

ANNEX NOTES AND TABLES

The core objective of this chapter is to ascertain the relationship between innovation and firm growth in the identified MSME sectors. The central hypothesis underlying the analysis is that innovations are positively associated with firm performance in the form of growth of sales turnover. If innovation helps a MSME to improve sales performance, the following may hold true:

- 1. There is a positive relationship between the percentage of innovative products in total sales and the rate of growth of sales of innovative MSMEs;
- 2. Higher-growth MSMEs will have higher share of innovative products in their total sales relative to medium-growth MSMEs which, in turn, will have a higher share of innovative products in their total sales compared to low-growth MSMEs;
- 3. The share of innovative products in total sales, along with rate of growth of capital as well as that of labor, has a significant influence on the rate of growth of sales turnover of innovative MSMEs.

At the outset, we would like to explore whether there is any relationship between shares of innovative products in total sales, innovation sales, and sales growth of innovative MSMEs. To ascertain the answer, the author probed whether there is any statistically significant positive correlation between the CARG of sales and percentage of innovative products in total sales. The results of the correlation analysis are presented. The results indicate that there is indeed a statistically significant positive correlation (at 0.01 level) between sales growth and percentage of innovation sales in total sales.

Given the relationship between the share of innovative products in total sales and sales growth, we would like to know whether the former has any influence on enterprise growth. To ascertain the influence, we have carried out a regression analysis with the following equation:

$$Sg = Kg + Lg + ISp + Ds + Ds1 + Ds2$$

Where Sg is the CARG of gross value added (GVA) of individual MSMEs of all the three sectors during 2001/02–2005/06. Similarly, Kg and Lg are the CARG of capital and labor, respectively, during 2001/02–2005/06 and ISp is the average percentage of innovative products in total sales of individual MSMEs during 2001/02 to 2005/06. We have used deflated values for both GVA and capital (at 2001/02 prices). The analysis covers both innovative and non-innovative MSMEs. For non-innovative MSMEs, ISp is taken as zero. To ascertain the influence of initial firm size, we have used a size dummy (Ds) which assumes a value of 0 for all MSMEs which had investment in plant and machinery up to USD0.2

million and 1 for the rest (since the investment limit for an enterprise to be considered small was USD0.2 million, as per the law of the Government of India, at the time). Since we have grouped all the three sectors together for the analysis, we have used two sector dummies, namely Ds1, representing auto components, and Ds2 representing machine tools. Since we did not find any statistically significant interaction effects of industries/sectors with the explanatory variables of labor and capital, we have not used any interaction term for the present analysis.

The results of the regression analysis are given. The regression model is statistically significant as indicated by the F-value and the explanatory variables together (adjusted R2) explain about 45% of the variation in the rate of growth of GVA. We have ensured that all the assumptions of the multiple regression models held true. Both the sector dummies (Ds1 and Ds2) are not statistically significant. Even the firm size dummy (Ds) is significant only at the 0.20 level implying that the initial firm size did not make much of a difference to the growth of GVA in the three MSME sectors.

The results clearly indicate that the percentage share of innovative products in total sales has a significant influence on the average rate of growth of GVA in innovative MSMEs in all the three sectors. With a 1% improvement of innovative products in total sales, the rate of growth of GVA is likely to improve by 0.50%. However, equally important is the increase in capital as well as labor. Thus, if an innovative MSME could expand the scale of production in terms of capital and labor and achieve an increase in innovation sales, it would be able to experience a significant improvement in the growth of GVA. This enables us to conclude that innovation sales do contribute to firm growth in terms of GVA.

CONCLUSION

This chapter has ascertained the driving factors, dimensions, achievements, and outcomes of technological innovations carried out by MSMEs in the auto, electronics, and machine tool sectors in Bangalore. It has further probed how far the growth rates of innovative MSMEs are different from those of non-innovative MSMEs. Finally, it has explored and analyzed the relationship between innovation and growth with respect to innovative MSMEs of the three sectors.

A substantial proportion of MSMEs in all three sectors are innovative, mostly informally. Most of the innovative MSMEs attributed the origin of their innovations to a combination of (a) firm level technological capability owing to internal factors such as self-motivation, technical qualification, knowledge, experience, and innovative ideas of entrepreneurs, and (b) market pressure due to external factors like customer requirements and demand, information provided by suppliers of equipment and materials, market opportunities, and competition. Thus, both "technology push" and "demand pull" have contributed to the emergence of innovations.

The major objective of MSME innovations was enhancement of competitiveness in the form of quality improvement, cost reduction, extension of product range, and replacement of phased out products, apart from penetrating the international market. Accordingly, they have primarily focused on both product and process innovations in the auto and electronics sectors and process innovations in the machine tool sector. What is significant is that a substantial majority of the innovative MSMEs could convert their innovative efforts into sales as they realized varying proportions of innovative products in their total sales. This has enabled the majority of them to achieve sales growth more than anything else. However, hardly any of them could obtain international patents and the recognitions are largely confined to winning of awards from large enterprise customers and financial institutions.

Group	Auto components	Number of MSMEs Electronics	Machine tools
Innovative	69 (95.8)	61 (91.0)	57 (76.0)
Non-innovative	3 (4.2)	6 (9.0)	18 (24.0)
Total	72 (100.0)	67 (100.0)	75 (100.0)

Annex Table 1. Innovative MSMEs and non-Innovative MSMEs

Note: * Figures in parenthesis are percentages.

Annex Table 2. Drivers of Innovations

Drivers of innovation	Auto components	Number of MSMEs Electronics	Machine tools
Internal factors	6	10	2
External factors	18	13	25
Internal and external factors	45	38	30
Total	69	61	57

Dimensions of innovations	Auto components	Number of MSMEs Electronics	Machine tools
Product innovations only	2	7	3
Process innovations only	21	6	29
Product and process innovations	46	48	25
Total	69	61	57

Annex Table 3. Dimensions of MSME Innovations

Annex Table 4. Share of Innovative Products in Total Sales (2005/06)

Range of share	Auto components	Electronics	Machine tools
Nil	6	9	15
Up to 5 %	15	17	12
>5 % up to 10 %	14	8	9
>10 % up to 25 %	29	21	15
>25 % up to 50 %	5	6	6
Total number of MSMEs	69	61	57

Annex Table 5. Recognition Achieved due to Innovations

Recognition		Auto components	Electronics	Machine tools
Product patents	National	0	2	3
	International	0	0	0
Process patents	National	0	0	0
	International	0	0	0
Citations	National	2	3	5
	International	0	1	1
Awards	National	16	6	28
	International	0	0	1
Total innovative MSMEs		69	61	57

Outcomes]	Rank	1]	Rank	2]	Rank	3	Com	posite	rank
	A*	E*	M*	A*	E*	M*	A*	E*	M*	A*	E*	M*
Sales turnover	33	34	31	7	6	3	6	5	3	1.4	1.4	1.2
Exports	1	5	2	6	6	4	1	2	2	2.0	1.8	2.0
P and M utilization	11	4	9	12	12	9	23	10	17	2.3	2.2	2.2
Material utilization	9	11	12	23	14	23	13	15	6	2.1	2.1	1.8
Energy utilization Manpower	2	2	1	5	3	6	9	5	13	2.4	2.3	2.6
Utilization Inventory	7	7	4	15	14	11	12	12	11	2.1	1.8	2.3
Management	5	1	0	0	3	2	5	4	3	2.0	2.4	2.6

Annex Table 6. Innovation Outcomes

Note: * A = auto components, E = electronics, and M = machine tools.

Annex Table 7. Growth of Innovative MSMEs and Non-Innovative MSMEs in %

Sector	Auto		Electronics		Machine tools	
Variable	Innovative MSMEs (65)*	Non- Innovative MSMEs (2)*	Innovative MSMEs (57)*	Non- Innovative MSMEs (3)*	Innovative MSMEs (51)*	Non- Innovative MSMEs (17)*
Sales	18.86	7.89	20.16	10.64	26.93	17.01
Investment	25.66	12.91	15.53	-1.81	22.17	8.75
Employment	14.43	-14.63	7.06	-20.34	6.87	3.27

Note: *Number of MSMEs.

Annex Table 8. Growth of Innovative MSMEs: New vs. Improved Products and Processes as percentages

Sector	Auto		Elect	ronics	Machine tools	
Variable	NP & P (51)*	IP & P (16)**	NP & P (51)*	IP & P (6)*	NP & P (26)*	IP & P (25)*
Sales	15.91	32.24	14.48	23.09	22.44	17.71
Investment	28.60	19.98	16.07	9.49	20.17	24.39
Employment	13.95	16.79	7.04	4.05	3.55	11.3

Note: NP&P, new product and processes; IP&P, improved products and processes; * number of MSMEs.

Annex Table 9. Correlation between Sal	es Growth and Innovation Sales
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Sector	Auto components	Electronics	Machine tools	
Correlation coefficient 0.45*		0.41*	0.44*	
Ν	54	52	47	

Note: *Significant at 0.01 level.

Annex Table 10. Shares of Innovative Products in Total Sales

Sector	Auto components		Elect	ronics	Machine tools		
Variable	No of MSMEs	% of IPs* in sales	No of MSMEs	% of IPs* in sales	No of MSMEs	% of IPs* in sales	
High growth	12	25.00	10	20.50	10	16.30	
Medium growth	20	18.15	18	14.50	28	9.00	
Low growth	22	10.23	24	9.21	9	4.89	

Note: *IPs = innovative products.

Annex Table 11. ANOVA Results for Percentage Share of Innovative Products in Sales

Auto components sector							
Sources of variation	Sum of squares	Degrees of freedom	Mean squares	F-ratio			
Between groups	1212.48	2	606.2407	3.57*			
Within groups	8645	51	169.5098				
Total	9857.481	53					
Electronics sector							
Sources of variation	of variation Sum of squares De		Mean squares	F-ratio			
Between groups	1023.35	2	511.6748	5.93*			
Within groups	4229.324	49	86.31273				
Total	5252.673	51					
Machine tool sector							
Sources of variation	Sum of squares	Degrees of freedom	Mean squares	F-ratio			
Between groups	490.151	2	245.0755	2.35**			
Within groups	4580.275	44	104.0971				
Total	5070.426	46					

Note: *Significant at 0.05 level, ** significant at 0.10 level.

Dependent variable: GVA growth						
Variables	Coefficients					
K _g	0.30 (4.39)*					
L _g *	0.49 (6.79)*					
IS _p	0.50 (4.02)*					
D _s	4.11 (1.30)**					
Sector D ₁	-2.38 (-0.83)					
Sector D ₂	-3.16 (-1.11)					
Intercept	2.96 (1.22)					
Adj R ²	0.45					
F	27.43*					
N	195					

Annex Table 12. Influence of Innovation Sales on Enterprise Growth

Note: figures in brackets are t-values. F-value is significant at 0.05 level. *Significant at 0.05 level, ** significant at 0.20 level.

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CHAPTER FOUR: INDONESIA

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INTRODUCTION

Indonesia has formulated a long-term development plan spanning 2005–25. It is segmented into five-year medium-term plans, each with different development priorities. The current medium-term development plan covering 2009–14 is the second phase, and focuses on (i) promoting the quality of human resources, (ii) development of science and technology, (iii) and strengthening economic competitiveness. In the development of people's welfare, the targets are as follows: (i) economic growth rate averaging 6.3–6.8% per year and growth of 7% before 2014, (ii) an average inflation rate of 4–6% per year, (iii) an open unemployment rate of 5–6% by end of 2014, and (iv) a poverty rate of 8–10% by the end of 2014.

In the last five years, Indonesia has gradually and steadfastly been able to redevelop itself in all these aspects. The economy has recovered and has reached a high economic growth rate accompanied by equity (growth with equity), and the degraded natural environment has been restored.

The implementation of development in the 2004–09 period has produced encouraging results but there is still much work to be done. Looking forward, Indonesia possesses a great opportunity to become an even more advanced nation but its various challenges and trials are not trivial. The global population will continue to increase even as nature is increasingly taxed in meeting the needs of mankind. There will be scarcity of energy, food, and water which have to be secured and managed in the framework of environmental harmony. Technological progress and globalization will provide opportunities but will also pose challenges and problems for Indonesia's human resources.

To speed up the economy, in 2011, Indonesia promoted the Masterplan of Acceleration and Expansion of Indonesia's Economic Development 2011–25 (MP3EI) which is an integrated part of the National Long-Term Development Plan 2005–25. Accelerating economic transformation through "Not Business as Usual" is managed with a new mindset that economic development needs collaboration among central/local governments, state-owned enterprises, local government enterprises, and the private sector in the spirit of "Indonesia

Incorporated". To achieve this goal, the MP3EI has three strategies, namely: (i) improving economic potential through economic corridors, (ii) strengthening national connectivity, and (iii) strengthening the national capability of human resources, and S&T.

A year before publishing the MP3EI, the government issued Presidential Regulation number 15/2010 regarding Acceleration of Poverty Eradication with one of its strategies being to develop and ensure SME sustainability.

Empowering the SMEs and cooperatives is a strategy to improve the life quality of most Indonesians. Empowerment of SMEs and cooperatives comprises the development of SMEs, empowering microenterprises and intensifying cooperatives' institutions [1]. The development of SMEs and cooperatives is expected and directed to be professional as well as S&T based.

The development of SMEs should be done in a strategic and integrated manner considering that, as of 2012, SMEs comprise 56,539,560 units or 99.9% of all enterprises in the country and employ 107,657,509 workers or 97.2% of all workers from various sectors and regions. The contribution of SMEs to GDP is 59%, while for the large companies, it is 41%. The SME contribution to employment is 97% compared to 3% from the large companies.

SMEs and cooperatives face problems in developing their products and market such as: lack of access to technology and research, less concern about quality requirements, design and consumer needs.

The following sections explain how SMEs and cooperatives [2] get support from line ministries in the form of financing, producing, marketing, and improving human resource capabilities.

OVERVIEW

There is no doubt that SMEs and cooperatives play a large role in the Indonesian economy, especially in reducing unemployment. Table 1 shows that in 2012 there were 56,534,592 SME units that gave work to 107,657,509 people. Therefore, the government supported them by giving interest subsidies in several particular programs via state owned enterprises and line ministries, or gave part credit guarantees.

N Y	Items		Year					
No.			2008	2009	2010	2011	2012	
		SMEs	51,409,612	52,764,603	58,823,732	55,206,444	56,534,592	
1	UNIT	Large	4,650	4,677	4,838	4,952	4,968	
	Cooperatives	154,964	170,411	175,102	188,181	194,295		
		SMEs	94,024,278	96,211,332	99,401,775	101,722,458	107,657,509	
2	2 Workers	Large	2,756,205	2,674,671	2,839,711	2,891,224	3,150,645	
	Cooperatives	357,005	357,330	351,504	377,238	429,678		

Table 1. The number of SMEs,	Cooperatives, a	and Large Enterprises
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Source: Ministry of Cooperative and SME [3].

Some innovative SMEs which have the basic capability to use innovative technology, such as increasing technological utilization and technological implementation, find it difficult to access financial institutions. However, there are several schemes for financing innovative SMEs provided by government ministries, colleges, and agencies, and programs from the private sector or private financial institutions.

The innovative SME is an SME which develops technology or combines existing technology leading to a new process, new product, or new services related to developing new markets or a breakthrough in an existing market. To develop SMEs, the government has issued policy packages since 2007, as follows:

- Presidential Instruction number 6/2007 regarding Real Sector Acceleration and Empowerment of Cooperatives and SMEs which consists of: improving SMEs' and cooperatives' access to financial resources, developing enterpreneurship and human resources, improving SMEs' products' market, and regulatory reform;
- Presidential Instruction number 5/2008 regarding Economic Program Focus 2008–09; and
- Presidential Instruction number 6/2009 regarding Creative Economy Development 2009–15 which states that the development of economy is based on creativity, skill, and talent to produce economic value for individual creation.

To implement these Instructions, the government established a SME Innovation Center (*Pusat Inovasi UMKM*) [4], which is expected to integrate various services in order to develop innovative SMEs.

The goals of the SME Innovation Center are to (i) improve productivity, product diversification, value added and SMEs' competitiveness, (ii) provide consultancy services on property rights issues, (iii) evaluate, formulate, develop, and provide solutions for organization problems, policies, programs, and funding for development of SMEs that use innovative technology, (iv) evaluate and renew the roadmap and action plan (blueprint) of the center's development and operation, and (v) perform such other tasks as directed by the Coordinating Minister of Economic Affairs.

The government also established the National Innovation Committee by Presidential Regulation number 31/2010 which covers food and energy security, biotechnology, the manufacturing industry, transportation and the national defense industry, agriculture and fisheries processing technology, and natural disaster management.

The National Innovation Committee assists the president in strengthening a national innovation system and developing a national innovation culture, gives recommendations and consideration about priority programs and action plans, allocates budget and facilities to government and private institutions that innovate or produce innovative products as well as monitors and evaluates SME policy implementation.

In the long run, the expected outcome of the committee is educated people who are creative, innovative, and have environmentally friendly lifestyles while, in the medium term, it functions to create eco-innovation in the economy and business in the fields of energy, food and water, education, health, national defense, and weapon technology.

At its core, the program to be implemented is on culture, creativity, and technological innovation comprising development of national capacity for conducting research, creation and innovation, and facilitating access and its utilization by the public at large.

Indonesia Needs 4.07 million Entrepreneurs

To support economic growth optimally, Indonesia needs at least 4.07 million entrepreneurs. This is according to the deputy minister of cooperatives and SMEs who quoted a theory which says that the economy of a country can grow positively if 2% of its population are entrepreneurs. Unfortunately, the total number of Indonesian entrepreneurs is very far from that ideal number.

He counted that among its 250 million population, Indonesia has only about 700,000 units (0.24%) of entrepreneurial businesses.

To support the problems, the Ministry of Cooperatives and SMEs instituted a program that will create and develop approximately 1,000 newly graduated entrepreneurs.

(Source:Infobanknews.com, May 2013) [5].
To help SMEs develop, the Central Bank, Bank Indonesia (BI), initiated several collaborations on research, capacity buildings, and information with related institutions [6].

Bank Indonesia has also created a program to empower SMEs through cluster models. A cluster group interrelates industry services, infrastructure, research, training and education, technology and information, or natural resources to benefit SMEs in pursuing innovation.

To support the idea, BI gives technical assistances to 35 clusters in 18 BI branches. The commodities to be supported are in the highest priority areas such as: agriculture, forestry, animal husbandry, fishery, and the processing industry [7].

ECONOMIC GROWTH OF INDONESIA

In 2009, economic growth was about to reach 4.5%. From Table 2, it is evident that economic growth is also reflected in the increase in income per capita. Indonesia's income per capita reached USD2,237 at the end of 2008, and increased slightly in 2009 to USD2,329. This economic growth went up further the following year by an average of about 6% in 2010–12. Because of the increasing income per capita, to USD3,563 in 2012, Indonesia became classified as a lower middle income country.

Against a backdrop of weak global economic growth, Indonesia's economy in 2012 grew strongly at 6.1%, buoyed mainly by domestic demand. This sustainable economic growth was underpinned by a favorable macroeconomic environment and stable financial system. Economic expansion in 2012 was boosted by the growing contribution of domestic demand, amid slower export performance due to weaker external demand [6].

N	Indicator List	Year						
INU.		2008	2009	2010	2011	2012		
1	GDP Growth, %	6.01	4.55	6.1	6.5	6.1		
2	GDP (current price), USD billions	511.489	539.377	690.634	798.613	886.226		
3	GDP per Capita (current price), USD	2,237	2,329	2,977	3,498	3,563		
6	Inflation (average consumer price change), %	9.77	4.81	5.98	3.4	4.3		

Table 2. Macroeconomic Indicators

(...continued)

No.	Tu dia dan Tind	Year						
	Indicator List	2008	2009	2010	2011	2012		
7	Exchange rate (IDR/USD)	9,710	10,399	9,010	9,068	9,384		
8	Unemployment, %	8.39	7.87	7.14	6.56	6.14		
9	Labor force participation rate, %	68.33	68.87	67.7	68.3	67.9		
10	Debt to GDP Ratio, %	33.04	28.32	26.0	24.4	23.3		

Source: Coordinating Ministry of Economic Affairs 2012, Bank Indonesia: Indonesia Economic Report 2012 [8,6].

Economic growth has led to poverty reduction. Various intervention programs which form part of efforts to meet the basic rights of the people contributed to poverty reduction. These efforts are continually being implemented to provide low income communities with wider access to the benefits of economic growth. It can be seen in the decline of the unemployment rate from 8.39% in 2008 to 6.14% in 2012 [9]. Also, Figure 1 below shows the overall income per capita from 2002–12 in USD.



Figure 1. Income per Capita in USD Source: National Statistics (BPS) [10].

The Annual Economic Report published by BI describes the following state of the Indonesian economy: "Domestic economic performance improved during 2010 amid a multi speed global economic recovery. This was reflected by robust GDP growth, a large balance of

payment surplus and improved financial sector performance. Underpinned by such strong fundamentals and positive perceptions concerning the Indonesian economy, the rupiah exchange rate strengthened with low volatility. In terms of prices, up to the middle of 2010, inflation was well-controlled. However, the intensity of supply-side disruptions during the second half of the reporting year, in particular food items, heightened inflationary pressures that pushed inflation above its target." [6]

The same BI stated that "In 2011, the Indonesian economy demonstrated considerable resilience in the face of mounting uncertainties in the global economy, reflected in even stronger growth performance and steady, prudently managed macroeconomic stability. Economic growth reached 6.5%, an all-time high for the past ten years, while inflation was a mild 3.79%. With strong economic resilience and low external debt risk supported by prudent macroeconomic policies and a range of on-going structural policy measures, Indonesia was again rewarded with an upgrade that took the sovereign rating to investment grade."

BI reported that "In 2012, Indonesia's economy performed well amid a slowdown and uncertainty in the global economy. Economic growth was maintained at the robust level of 6.2%, with inflation remaining low (4.3%) and controlled within its target range of $4.5\pm1\%$. Full-year GDP growth for 2012 was 6.2%, down slightly from 6.5% in 2011. The World Bank projects 6.2% growth in 2013, a notch below the previous forecast of 6.3%." [6]

OVERVIEW OF SME FINANCING STRUCTURE

According to Law number 20/2008, which relates to SMEs:

- A micro business/enterprise is a business owned by an individual or an individual legal body which has assets of a maximum of IDR50 million (USD5,376) excluding land and buildings, or has annual maximum sales of IDR300 million (USD 32,258);
- A small business/enterprise is a productive economic business which has assets of a maximum of IDR50 million (USD5,376)–IDR500 million (USD53,763) excluding land and buildings, or annual sales of IDR300 million (USD32,258)–IDR2,500 million (USD268,817);
- A medium business/enterprise is a productive economic business, which has assets of a maximum of IDR500 million (USD53,763)–IDR10 billion (USD1,075,268) excluding land and buildings, or annual sales of IDR2.5 billion (USD268,817)–IDR50 billion (USD5,376,344).

Generally, SMEs have difficulties accessing information and quick and easy financing. The SME Innovation Center tried to find possibilities of financing the innovative SMEs even though requirements from financial institutions do not fully meet SMEs' expectations.

Business will continuously survive when run properly, productively, and innovatively. Unfortunately, the MSMEs and cooperatives have less information and lack management skills in financing and marketing no matter whether they run their business according to traditional or modern ways.

BI recorded that although credit for SMEs increased from IDR 479.885 billion (USD51.60 million) in 2011 to IDR552.226 billion (USD59.38 million) in 2012, it covered only a small number of SMEs with an average credit of IDR50 million (USD5,376). The greater part of SME credit (66.6%) was provided to the following sectors: trade, manufacturing, agriculture, food estate, and forestry. Overall, credit growth achieved 15.1% (year on year) which was less impressive than the 18.4% (year on year) recorded the previous year.

Figure 2 shows that the biggest portion of SME credit in 2012 came from the state banks (44.0%) followed consecutively by the foreign exchange commercial banks (37.2%), the the local development banks (8.2%), the rural banks (4.7%), the non-foreign exchange commercial banks (4.2%), joint and foreign banks (1.7%). The growth of SME credit reached its maximum level in 2008 because of strong fiscal and banking fundamentals that enabled the country to face the 2008 global crisis, and declined at the end 2009 due to a reduction in goods and services export, as well as working capital credit. After that, the economy slowly increased with the recovery of the global economy [6].



Figure 2. SME Credit Portion, 2012 Source: Bank Indonesia Report 2012 [6].



Figure 3. SMEs' Credit Growth

Source: Bank Indonesia, Economic Report on Indonesia, 2012 [6].

In terms of productivity, MSMEs contributed almost 60% to national GDP and had a 97% contribution to employment but contributed less in non-oil and gas export and investment compared to large companies which comprise only less than 1% of total enterprises, but had a 79.7% contribution to non-oil and gas export (Table 3) [11].

Enterprise	Total Unit	GDP Contribution	Employment Contribution	Non oil and Gas Export *2010	Investment (current price) *2011
SMEs	99.9%	59.08%	97.16%	20.3%	50.04%
Large Companies	0.01%	40.92%	2.84%	79.7%	49.96%

Table 3. The Level of SMEs' Productivity 2012

Source: Ministry of Cooperative and SMEs Statistics 2012 [11].

Indonesia's labor productivity (GDP per worker) increased from USD8,600 in 2008 to USD9,000 in 2010. Meanwhile in the same period, other countries increased their labor productivity from USD9,100–USD89,900 (Table 4) [12].

No	Country	2008*	2009*	2010*
1	Singapore	84.3	82.0	89.9
2	Hong Kong	83.2	81.9	87.3
3	ROC	67.9	67.4	73.2
4	Japan	63.5	60.9	63.9
5	Korea	54.6	55.1	57.7
6	Malaysia	34.6	33.3	35.0
7	Thailand	15.0	14.5	15.3
8	China	10.3	11.3	12.4
9	Mongolia	9.4	9.6	10.0
10	Philippines	9.1	9.0	9.4
11	Indonesia	8.6	8.8	9.0
12	Pakistan	8.3	8.3	8.4
13	India	7.1	7.7	8.3
14	Vietnam	4.9	5.1	5.3
15	Cambodia	3.3	3.3	3.4
16	USA	89.5	90.0	93.3
17	EU 15	69.9	68.0	69.7

Table 4. Labor Productivity Level per Worker GDP

Source: APO Productivity Databook 2012 [12].

* in thousands of USD.

Several measures have been taken to develop SMEs, such as expanding their access to capital, including the expansion of Smallholder Business Credit or Kredit Usaha Rakyat (KUR), increasing technical assistance for the development of products and marketing, implementing policies for expanding business opportunities, and preserving the functions, existence and efficiency of traditional markets.

Because SMEs need manageable business, good cash flow, and capable human resources to improve productivity, the government provides them with various financial schemes.

One of the programs the government provides for the SMEs is the Program Nasional Pemberdayaan Masyarakat (PNPM) or National Program for Community Empowerment

which comprises all sub-districts (kecamatan) which are expected to increase the involvement of the people in development activities at the village (*desa*) and sub-district (*kecamatan*) levels. This program seeks to improve the distribution of income in the action program for strengthening MSMEs. In 2013, the government allocated IDR9.703 trillion (USD990 million) to be distributed to 496 districts and 6,752 sub-districts [13].

In order to be secure in food and energy security programs, which are government responsibilities, the capability of SMEs under this program is enhanced through the following schemes:

Credit for Food and Energy Security Program (KKPE)

The government subsidizes the difference between commercial interest rates and those given to SMEs. This credit program covers the following: rice, corn, soy, cassava, peanuts, sorgum, horticulture, sugarcane, fisheries, seaweed, animal husbandry, ducks, chickens, cows, and cattle. The government also guarantees a part of the credit risk. Twenty-two banks (state, commercial, and regional) are committed to give SMEs credit up to IDR37.8 trillion (USD4.06 billion) [6].

Credit for Renewable Energy and Plantation Revitalisation Program

The banks give this credit to cooperatives, business partners, and SMEs including microenterprises engaged in palm oil, cocoa, and rubber farms. The subsidy given to them is the difference between commercial interest rates and interest rates given to SMEs including microenterprises;

In 2009, IDR863.77 billion (USD92.9 million) has been disbursed to about 56,192 farmers, 91 cooperatives, and 42 business partners (SMEs). Meanwhile the banks are committed to disbursing IDR38.6 trillion (USD4,150 million) as loans to them [6].

Special Credit for Micro, Small Businesses, and Cooperatives Development

The government allocated IDR3.1 trillion (USD333.3 million) for the development of micro and small businesses and cooperatives. Total credit is a maximum of IDR50 million (USD5,376) per micro business, and a maximum of IDR500 million (USD53,763) per small business. Interest rates were lower than for commercial credit.

Since 2009, a total of 383,191 SMEs including microenterprises, cooperative and rural banks have received around IDR2.9 trillion (USD301 million) from this special credit facility [6].

Credit Guarantee for MSME

KUR is available to microenterprises for loans up to a maximum of IDR20 million (USD2,150), and also to SMEs and cooperatives for loans up to a maximum of IDR500 million (USD53,764). KUR was launched by the government at the end of 2007.

The government bears a 70% share of the credit risk while banks have 30%. The SMEs and microenterprises do not pay guarantee fees, which are entirely subsidized by the government. KUR can be utilized by six state banks and 13 local development banks to guarantee loans to SMEs, microenterprises, and cooperatives.

Until December 2012, credit value was IDR96.44 trillion (USD10.37 billion) with an outstanding amount of IDR40.33 trillion (USD4.33 billion). The debt involved from SMEs, microenterprises, and cooperatives is IDR7.66 million [8].

According to the Coordinating Ministry of Economic Affairs, KUR has disbursed a total sum of IDR100.26 trillion (USD10.23 billion) while the outstanding amount of KUR based on monthly reports was IDR40.67 trillion (USD4.15 billion) given to more than seven million debtors by December 2012.

Geographically, most KUR was allocated to the islands of Java (48.7%), Sumatra (22.6%), Kalimantan (10.1%), Sulawesi (11.2%), Bali (4.6%), and Papua-Maluku (2.8%). By sector, most small business loans through KUR were allocated to the trade sectors with 51.19%, while 19.21% were made to the agriculture sector, including fisheries [6].

		KUR Disbursement*						
No.	Bank	Credit	Outstanding	Debtor	Credit Average	NPL (%)		
		(Rp million)	(Rp million)		(Rp mill/debtor)	(, .)		
1	BNI	10,953,485	5,139,773	161,719	67.7	8.1		
2	BRI (KUR Ritel)	12,838,469	5,324,420	80,093	160.3	3.4		
3	BRI (KUR Mikro)	48,258,336	14,772,810	7,211,143	6.7	2.0		
4	BANK MANDIRI	10,860,741	5,952,949	210,789	51.5	2.7		
5	BTN	3,327,051	1,945,781	19,470	170.9	7.1		

Table 5. Credit Guarantee for MSMEs

		KUR Disbursement*						
No.	Bank	Credit	Outstanding	Debtor	Credit Average	NPL (%)		
		(Rp million)	(Rp million)		(Rp mill/debtor)			
6	BUKOPIN	1,522,806	623,859	10,403	146.4	5.9		
7	BANK SYARIAH MANDIRI	2,832,870	1,721,922	36,725	77.1	5.0		
8	BNI SYARIAH	44,562	33,304	151	295.1	0.0		
9	BPD	9,624,705	5,153,244	123,762	77.8	6.9		
	TOTAL	100,263,025	40,668,061	7,854,255	12.8	4.1		

(...continued)

Source: Policy Committee, Coordinating Ministry for Economic Affairs, monthly report January 2013 [14]. *Note: Exchange rate of approximately IDR9,800/USD.

Cooperatives

These take deposists and lend money only to their members. A cooperative functions as a financial entity which belongs to its members who are the owners as well as the customers of the entity. Members of primary cooperatives are individuals while those of secondary cooperatives are groups, SMEs or microenterprises. Both types of cooperative make loans to their members. Cooperatives are controlled and supervised directly by the Ministry of Cooperative and SME. Cooperatives operate conventionally or under the syariah system (Islamic banking).

In 2010, cooperatives had a business volume of IDR77.51 trillion (USD8.33 billion) [15].

PT PNM (Perseroan Terbatas Permodalan Nasional Madani)

PT PNM is one of three companies that have a significant role in providing financing to SMEs [16] and assisting in managing SME businesses. Given the company's strong commitment to help SMEs, what has been done by PT PNM could be a model for other financial institutions to follow.

Financing is channeled through the Unit Layanan Modal Mikro (ULaMM), a credit service unit created by PT PNM in 2008. From 12 service units initially installed in Java, ULaMM grew to 259 units throughout the country of which about 184 units are active in providing

loans at an interest rate lower than the prevailing commercial rate. ULaMM consists of "One Stop Shopping" outlets for SME financing, and related technical assistance for SMEs. ULaMM has been funded by commercial banks, including foreign banks, the capital market, and collective investment funds issued by PT PNM Investment Management, a subsidiary company.

During January to June 2010, IDR841.2 billion (USD91.4 million) was disbursed through 261 credit service units. In detail: IDR85 billion (USD9.2 million) through syariah micro credit units, IDR666 billion (USD72.4 million) through non-syariah micro credit units, and IDR110.2 billion (USD11.98 million) through rural banks/syariah rural banks/syariah financial institutions. In 2012 the company disbursed IDR2.3 trillion (USD2,473 million) in new loans.

Credit from Rural Banks

Since SMEs do not have access to commercial bank loans, they borrow from rural banks. These have simple lending procedures but charge high interest rates.

From the Rural Bank Union, it is known that rural banks had disbursed about IDR50 trillion (USD5.37 billion) by the end of September 2012, an increase of 22% compared to 21% the year before. The number of debtors increased by 1.35%, 7.67% and 8.53% in 2010, 2011, and 2012 respectively.

Credit from Large Companies and State-Owned Companies

Under Indonesian private company or Perusahaan Terbatas (PT) law, large companies should support SMEs in their neighborhood by way of corporate social responsibility. Meanwhile, state-owned enterprises by law have to share a portion of their profits to support SMEs in the form of partnership programs. These programs can vary from loans with very low interest rate to consultancy in terms of management and training. Requirements to obtain a loan are simple and installments can be arranged based on the debtor's capability. The partnership program is not only concerned with the economic aspect but also with building local infrastructure which SMEs can take advantage of, including social welfare activities.

In 2009, the partnership program with the state-owned enterprises (SOEs) disbursed about IDR1.6 trillion (USD163 billion) to about 650,000 SMEs in the agriculture sector (65%), trade sector (20%), and others.

LEVEL OF INNOVATION-RELATED ACTIVITIES (MARKET-DRIVEN AND TECHNOLOGY-DRIVEN)

In Indonesia, S&T policy is integrated with economic policy to improve national competitiveness. The development of S&T has been the foundation of the national innovation system that seeks to develop national competitiveness [17].

The state of the S&T sector is indicated by the number of doctoral degree holders among civil servants. In 2011, there were 8,095 doctorate degree holders (0.17%) on average out of 4,646,351 civil servants compared to 105,375 master's degree holders (2.27%) [18].

In 2007, there were 24,260 lecturers in state universities divided into 7,731 faculty members, 8,820 researchers, 6,979 persons working for community organizations, and 730 persons in a polytechnic academy. Of 40 million job seekers in 2010 only 4.8% graduated from college, the rest had lower-level education: 2.8% reaching diploma, 23.4% senior high school, 19.1% junior high school, and 50% basic elementary school.

One output of research activities is publication in a scientific journal. Based on data from the Essential Science Indicator published by Institute for Scientific Information 2007, there were only 2,193 scientific publications by Indonesians in 2000–04. This figure was much lower than that by Malaysians, Thais, Singaporeans, Koreans, and Chinese.

The SME Innovation Center established in 2009 has been developed in several provinces/ cities to serve the local innovative SMEs and to serve as a bridge for innovative SMEs to industry or financial institutions. The SME Innovation Center in each local area assists SMEs to interact with the research center as well as in business/non business interactions. A similar institution called the Center for Innovation established by Lembaga Ilmu Pengetahuan Indonesia (LIPI) or the Science Institute of Indonesia in June 2001 seeks to accelerate its research to business based on technology. It is also available in provinces/cities.

For example, in Surakarta, a city in Central Java, SME Innovation Centers have been developed such as I-Cell Biz Tech Incubator, Entrepreneurship Development Center, Research and Community Service Institution in universities.

I-Cell Biz Tech Incubator trains young people to be technocrats and new business-minded people. During training they receive initiation into new businesses, business incubation, technical assistance, training, and business plans. They also meet and discuss knowledge and experience with the chairmen of successful companies. In a group, they are assisted to get investors for their businesses, e.g., for processing bio-ethanol derived from sugarcane

into bio-gel, processed seaweed waste to become livestock food, and cassava into processed cassava chips.

The Entrepreneurship Development Center was built by the University of Sebelas Maret to help new technology-based entrepreneurs from academia develop and apply research findings through productive business for self-financing, and to assist SMEs to be independent, professional, and competitive. SMEs that have been empowered by this center include "Jaya Art", a handy craft home industry and "Rimpang Jaya" a sweet ginger production, etc.

Business Development Services is a research and community service institution built by the University of Muhammadiyah Surakarta to provide consultancy services in business development for SMEs, training, and business connectivity.

A Research and Community Service Institution in University Slamet Riyadi Surakarta assists and empowers 12 SMEs in the fields of agro-industry, creative industry, agriculture, fishery, and food. It assists the SMEs with business-gathering, financial access, and start-up company initiation.

Some achievements of the Badan Penerapan dan Pengkajian Teknologi (BPPT) or the Agency for the Assessment and Application of Technology are ready to be applied such as: floating pipe, weather modification technology, food for disaster condition, etc. [19].

Patents are the special rights given by Indonesia to inventors over their technological innovation to execute their inventions for a certain time or grant those rights to another party to implement.

Inventions such as new products or tools that have practical value because of their form, configuration, construction, or components can have legal protection in the form of a simple patent. A simple patent expires in 10 years and cannot be extended [20].

The Ministry of Research and Technology created a decree number 312/M/Kp/XI/2011 in relation to the establishment of a research incentive program for the national innovation system.

More than just innovation, another important intellectual activity is to protect property rights with patents. From 1998 to 2008, 65 centers for managing property rights in universities and research organizations were established. The World Intellectual and Property Organization reports that the number of registered patents from Indonesia puts it in 5th position behind other ASEAN countries (Malaysia, Philippines, Singapore, and Thailand). The Ministry of Law and Human Rights via the Directorate General of Intellectual Property claimed that

from 1993 to 2008 patent applications from Indonesians in Indonesia was still low. The data tells that patent applications from industry and individuals dominated patent registration, as opposed to universities and research organizations who received funds from the government yet did not register their innovations intensively (Table 6).

Table 6. Total Registered Patents at the Directorate General of Intellectual Property, Ministry of Law and Human Rights

No	Ouronization	Year							
190.	Organization	2005	2006	2007	2008	2009			
1	Universities	11	10	14	5	_			
2	Research Organizations	12	13	9	4	_			
3	Industry	26	23	29	28	36			
4	Individual	53	55	46	62	64			
5	Others	_	1	2	_	_			

Source: Directorate General of Intellectual Property, Ministry of Law and Human Rights [21].

The Ministry of Law and Human Rights provides a Property Right Information System which is integrated and easy to access. With this system the registration of innovations/ inventions will increase significantly, and will also reduce the hijacking of property rights. This can be seen in Figure 4 where the trend of patent proposals increased from 235 in 2005 to 415 in 2009, while grants of patents increased from 84 in 2005 to 183 patents in 2009. In 2008, 525 proposals were rejected and 991 in 2009.



Figure 4. Patent Source: Ministry of Law and Human Rights [21].

In general, in the Directorate General of Intellectual Property the number of applications for patent registration in 2011 (6130 applications) was slightly higher than those in 2010 (5830 applications), an increase of approximately 5%. Those of foreign origin were more numerous than domestic applications under the Patent Cooperation Treaty (PCT) system, while otherwise domestic applicants dominated the applications. Compared to the high number of applications, the number of patents granted was only half (Table 7).

Year	Patent			Simple Patent		Total	Granted	
	PCT*		Non I	Non PCT				Patent
	Domestic	Foreign	Domestic	Foreign	Domestic	Foreign		
2009	24	3761	413	342	247	42	4829	2490
2010	19	4721	497	401	279	363	5830	2561
2011	8	4839	533	458	236	56	6130	2466

Table 7. Patent Application Based on Origin

Source: Directorate General of Intellectual Property Rights, Ministry of Law and Human Rights [21]. *PCT = Patent Cooperation Treaty system.

Figure 5 shows that patents, at only 16.85%, form a relatively small proportion of IP rights compared to brands (63.36%) in particular. This tells us that brands are much more actively registered due to their relation with business or commercial affairs than patents which commonly come from research activities (Figure 5.2).





Source: Directorate General of Intellectual Property, Ministry of Law and Human Rights [21].

The development of S&T has achieved quite good results, and has been arranged into six priorities in the National Research Agenda. These are food security, new and renewable energy, transportation and technology management, ICT, defense and security technology, and medical and medication technology.

The 2012 Annual Report of the Ministry of Research and Technology refers to R&D in several areas. For the food program, it lists the development of several varieties of hybrid rice, and superior quality corn and soy bean. To support food diversification programs, black radish and cassava have been revitalized, and superior genetically engineered seeds have been found for banana, soy bean, green bean, pineapple, and papaya. A large number of technical methods have also been developed to obtain superior quality products from cattle, several vaccines for disease prevention, artificial insemination, and other multi-nutrition food supplements for animals.

In order to create a new source of renewable energy, palm oil has been used to operate machines while high-grade ethanol fuel for energy in transportation has been developed and has been certified. A consortium consisting of the Technology Institute of Sepuluh November (ITS), BPPT, LIPI, and PT Gelombang Energy coordinated by the Ministry of Research and Technology has succeeded in producing a sea-wave power plant prototype.

In ICT, the Indonesia Go Open Source (IGOS) application has been developed and can be used for administration needs. This open-source-based application is also being developed for research such as DNA synthesis machines and protein formulas. Besides that, a modern communication system with 2.3 GHz and 3.3 GHz frequencies, and an e-government technical assistance system have also been developed. This application has been used and modified by several local governments.

In the field of aerospace, the Ministry of Research and Technology established a consortium on rockets to produce and develop a D-230 RX 1220 rocket with a diameter of 122 mm and a flying speed of 2.7 Mach, and a D-230 RX 2020 rocket with a diameter of 200 mm.

The same report also noted the research conducted by the Business Innovation Center/ Business Technology Center (BIC/BTC) in cooperation with Institut Pertanian Bogor (IPB) or Bogor Institute of Agriculture and PT IFA that innovated cajuput candy, with PT Teevia which developed herbal tea, with LIPI and Badan Teknologi Nuklir Nasional (BATAN) or National Nuclear Technology Agency and two other companies which developed red iron oxide, and with LIPI and PT IFA which developed a milk processing plant.

BPPT has registered several achievements, such as an automatic fingerprint identification system (AFIS) and biometric information system for e-identity card application, and the development of a slow release fertilizer.

LIPI's achievements, among others, are the development of superior seeds named LIPI GO 01 and LIPI GO 02 (these two have been implemented by farmers in Sukabumi, Lampung, and Ngawi), and organic fertilizer to reduce chemical fertilizer usage.

The Indonesian Competitiveness Index, based on the Global Competitiveness Index (GCI), as reported in The Global Competitiveness Report 2011–12 published by the World Economic Forum in 2012 showed that in general Indonesia ranked 46th out of some 140 countries worldwide. The report states that "because it is now close to entering the efficiency-driven stage of development, Indonesia's competitiveness increasingly depends on more complex elements, such as market efficiency". Innovation in Indonesia can be sped up by minimizing problems such as: (i) low national innovation capacity; (ii) weak collaboration among universities, research organizations, and industry; and (iii) unutilized patents as a property right for innovators and as technological dissemination tools. However, the most important reason is low government procurement of advanced technology products [22].

Enterpreneurship

According to Dr. Ciputra (an entrepreneur, formerly a developer of several real estates, and a founder of an entrepreneurship education institution), enterpreneurship is a process to maximize added value in a way that innovates every single piece of the business. An enterpreneur converts the trash into gold.

Edward de Bono, the originator of the concept of lateral thinking who has written 70 books which have been translated into 38 languages, says that "creativity involves breaking out of established patterns in order to look at things in a different way."

Dr. Ciputra also says that creativity becomes innovation when it is accepted by the market. Business innovation that belongs to the enterpreneurship component are design, production, marketing, finance, human resource development and organization, connectivity, strategic alliance, and environment and social responsibility. Enterpreneurship is not only applied in business but also by government, academics, and society [23].

The National Entrepreneurship Movement (Gerakan Kewirausahaan Nasional) was launched in 2011 in order to reduce unemployment and poverty. It is aimed to encourage youths, especially those who have graduated from college, to develop the most advantageous business in their area. With support from the government, these people are selected to be entrepreneurs, and provided with technical and managerial training as well as access to capital to develop their business. The movement takes place each year, with a competition among start-up entrepreneurs to come up with good proposals.

Technology-Driven Business

Innovative technology has created a production process to make coffee more delicious (such as Starbucks), and when the innovative technology is combined with other innovative

components in business, the result is entrepreneurship. With an entrepreneurial approach, a product of technology can be developed into an amazing and successful business which might be different from the first time it is created.

Batik Application Development (2008)

PT Mustika Ratu started using open-source software to design modern batik based on traditional batik by utilizing a basic fractal mathematical formula. This activity was supported by Ministry of Research and Technology to develop an open source system (OSS)-based application and facilitating software application for the batik worker community, and is now in the process of obtaining copyright protection.

Herbal Medicine

One of the herbal medicine manufacturers, PT Mustika Ratu, used nanotechnology in its production process to increase its competitiveness in the industry. The development of this innovation was undertaken in cooperation with BPPT. This innovation has created a new product called Kitosan, which is a natural non-toxic biopolymer obtained from the chitin of crustacea.

There is a strong tradition of women's entrepreneurship in Indonesia, particularly in micro and small enterprises. In Indonesia, women are less likely than men to be owners. Despite their small numbers, women entrepreneurs in Indonesia have good reputations, just like the examples above [5].

To encourage women to become entrepreneurs, the Ministry of Cooperatives and SMEs created a technical guidance that the ministry will give technical and financial support to small businesses of women [24].

Strengthening the application innovation of Online Nusantara Game (2009)

This is an online game developed by young people based on Indonesian culture including panorama, architecture, and fashion. The Ministry of Research and Technology supported the development of an OSS-based core game engine which can also be used by other local game designers for free.

Telescopic 3D animation films which focuses on local culture presents Betawi/Jakarta culture in the "Si Pitung Story." This film has high ratings and will be completed in the next two years. This is an example of developing multimedia technology and improving human resource capacity [25].

According to a study mapping the creative industry conducted by the Ministry of Trade, there are 14 groups defined as belonging to the creative industry which, in turn, comprise the creative economy, namely advertising, architecture, artwork and antiques, crafts, design (graphics, interior, product, and packaging), fashion, film, video, photography, interactive games, music, theatre, publishing, IT, radio and television, and R&D.

By pushing these creative industries, and rewarding creative works yearly or through "Indonesian Creative Products Week" conducted by the Ministry of Tourism and Creative Economy, it is expected that Indonesia's relative position for creativity among developing countries can be improved in all categories. Table 8 shows that Indonesia's highest position is only seventh, in the arts and crafts, and visual art categories.

Category	Rank
All creative products	10
Arts and Crafts	7
Audio Visual	>10
Design	8
Music	>10
New Media (video games)	>10 (8)
Publishing	8
Software	>10
Visual Arts	7

Table 8. Indonesia's Relative Position for Creativity (against developing countries)

Source: Ministry of National Education [26].

A survey conducted by BPPT on SMEs found that there were only few innovative activities done by the enterprises even though there were changes in technical products and processes. The enterprises are not motivated to innovate because of (i) low technical ability including limited knowledge of personnel who cannot support innovative activity, (ii) the high cost of undertaking innovative activity, and (iii) low demand for innovative products.

All of these reasons enhanced the perception that new technology innovated by research organizations has not yet been connected to and implemented by industry. It is illustrated by the story of individual innovation experienced by Sugani and a group of people from Temanggung:

"Sugani, a citizen from Medan, North Sumatra who has a bicycle workshop, created an underwater mill to produce electrical power. His innovation was tested in Simalingkar River and resulted in lighting a lamp after turning on a dynamo. When he took advantage of the water power to produce energy, he had the idea that if the power of the sea could be used to produce electrical power, then the cost in electricity in Indonesia could be lowered significantly.

Unfortunately, Sugani's innovation has not yet been implemented. He waits for anybody, a company, or even the local government which has capital to make his innovation come true." (Waspada Daily, 2009)[27].

"A group of people from Temanggung, Central Java, converted the waste from a tofu factory into biogas and used it as fuel for their stoves. Mr Bambang, the chairman of the group said that this biogas had been used since December 2008, taking advantage of the waste of eight tofu factories in the neighborhood. He said that instead of pollution, the waste could be useful when converted into fuel."

Up to now, because of limited capacity there are 29 households which take advantage of this innovation. Economically, using this biogas is cheaper and safer than LPG and, in addition, those people can use it without limit for only IDR30,000 per month (for operational and maintenance expenses).

Mrs Asmirah, who uses this fuel, feels satisfied because it's less expensive and can be used all day long. She can save her money."

(Source: Article in Kompas Daily, 5 July 2010) [28].

FINANCING PROGRAMS TO PROMOTE INNOVATION FOR SMES

The S&T community defines the competitive and technologically capable SME as the innovative SME which develops technology or combines various existing technologies to processes, products, or new services related to developing a new market or as a breakthrough in existing markets.

An innovative SME always has strong basic characters to improve innovative technology, such as increasing technological utilization, and technological implementation in a better way [29].

The relationship between S&T and industry does not operate well through market mechanisms since it is a profit-oriented business. The government should take care of this relationship especially if the innovation conducted by SMEs occurs in the very early stage of business. The existing policy like giving a very small amount of subsidy is not sufficient to support this relationship. It needs more government intervention in terms of modality,

network, and regulation to increase transaction between research organization/science and technology and the industry.

Financing SMEs to innovate, firstly, can come from the national budget through related ministries, SOE banks, venture capital, and business information centers, not to mention the revolving funds from the Ministry of Cooperatives and SMEs, NGOs, foreign sources, and others (Table 9).

Table 9. Research funding 2006

Organization	National Budget	Private	Ministries Budget	Non Profit Org	Foreign	Others	Total
Non Ministries	308.3	13.0	13.6	0.5	38.4	1.6	375.3
Local Government	835.1	48.5	6.5	1.6	22.4	4.3	918.3
Local Research Agency	20.1	0.0	0.8	0.0	0.0	0.0	20.9

Source: Ministry of Research and Technology [30].

* in IDR billions.

Funding from National Budget

Funding for research and innovation from the national budget is distributed via ministries and local governments through their related programs.

The 2006 data showed that more than 90% of research funding comes from the national budget, with only 4% from the private sector, 4% from government institutions, and 6% from foreign sources (Table 6.1).

Based on that, the Ministry of Research and Technology in 2011 created a research incentive program for the national innovative system through decree no. 312/M/Kp/XI/2011 which consists of four optional schemes: basic research, applied research, production system research for S&T improvement, and diffusion and benefit of science & technology research. The first three options can join in a consortium, and can get IDR500 million (USD51,020) per proposal per year, while the fourth one can get more than IDR500 million (USD51,020) per proposal per year.

Lately, the government, through Presidential Regulation number 32/2011, concerning economic development and acceleration master-plan, plans to give incentives for the

innovation program of 1% of GDP in 2014 through seven steps of innovation ecosystem rehabilitation, four steps of economic growth acceleration, and seven steps of innovation targeting 2025. The regulation includes incentive packages providing hard technology support to research engineering and support in terms of method, instrumentation, tools and strategic applications for social engineering [31].

In its Annual Report for 2012 of the Ministry of Research and Technology stated that it had allocated IDR136.45 billion (USD13.92 million) for the improvement of S&T in order to strengthen the national innovation system.

SMEs, including microenterprises that have a high spirit of innovation, must be able to calculate the prospects of the innovative business, and repay the credit as scheduled expectedly. Innovative SME financing schemes should have the following features: (i) a credit scheme that is suitable to the needs of SMEs e.g., limited credit, simple procedures, short maturity, (ii) group loans without collateral with loan repayment responsibility resting on the group, (iii) the presence of an advisor to solve SMEs' loan repayment problems, (iv) flexibility in debt collection, and (v) higher interest rates on small loans to cover the operational costs and low margin for the lender.

There are many financial resources available to finance SMEs provided by banking or nonbank financial institutions, but the main problem is that SMEs have little information or access to the financial institutions. In addition, start-up SMEs including microenterprises cannot meet the criteria required by the banks. Another problem is that financial schemes do not match the characteristics of the business stages of innovative SMEs, which are seed, start-up, and growth. Meanwhile, during these stages the appropriate financial resources, if available, are: family, friends, private investors, business angels, and risk capital.

Despite the availability of many financial schemes from bank and non-bank institutions, the innovative and new technology-based SMEs are not "credit friendly" because of many requirements to be fulfilled from legal aspects up to maturity of the credit. From among the financial schemes, there are:

Private sector program

College and universities such as Bandung Institute for Technology, Bogor Institute for Agriculture, the University of Indonesia, and private colleges host incubators who get finance and assistance from the institution and then assist the innovative SMEs with financing, training, marketing, and facilitating links to industry. According to BPPT in 2011, there were about 50 business incubators, mostly developed by universities and by R&D units of government institutions

Large enterprises in the private sector also operate programs financing innovative SMEs but merely for their own businesses. The relationship between these two parties is interdependent.

From Figure 6 it can be seen that due to the high risk of business at the very early stages of an innovative enterprise, funding is not available because there is no guarantee whether the business is feasible or not [30]. The only ones who can be trusted and may give support (financially) are family or friends.



Figure 6. Business Financing and Staging Cycle

Source: Dharmawan, Chairman of the SME Innovation Center; the Agency of Assessments and Applications Technology – BPPT [32].

Then, when the business develops and becomes a start-up, the risk is still high. At this stage, a business angel or angel capital [31] that supports the innovation is needed to finance and help the SME business.

Next, the business of innovative SMEs is established and reaches the stage of growing. At this stage, the risk is quite manageable and the level of business is quite feasible to be funded by risk or angel capital [33].

If the innovative SMEs can go through this level, the business can be run as an ordinary business, and may find the appropriate funding available in the market.

Venture Capital

There are some professional venture capitalists which finance innovative activities, for example:

- PT Sarana Jabar Ventura, which has disbursed about IDR98.26 billion to 344 recipients;
- PT Jatim Ventura which has 250 recipients and has allocated IDR111 billion for SMEs;
- PT HAKEA, and other PT Sarana Ventura located in many provinces who care about innovative SMEs.

State-owned and private banks

In 2007, the government issued Government Regulation number 35/2007 regarding the allocation of part of a company's revenue for improving capability in engineering, innovation, and technological diffusion. Companies or SOEs which allocate part of their revenue can get incentives in the form of tax incentives or technical assistance such as simplification of procedures, etc.

Financing from state or private banks certainly has to be in line with the bank's regulation, such as the SMEs' business has to be feasible and have the 5 Cs (character, capacity, capital, condition of economy, and collateral). Many innovative SMEs, including microenterprises, are feasible but not bankable (have no collateral, and have bad financial and management systems). Therefore, they have difficulty accessing funding from banks. To make the provision of credit more attractive, the creditors minimize credit risks, and reduce management/administration fees.

According to BI's Report on SME Credit Development 2012, state banks, non-foreign exchange private banks, regional development banks, joint venture banks, foreign, and conventional/Islamic rural banks in the country have disbursed to SMEs and microenterprises loans amounting to IDR85,587 trillion (USD8,733billion) and IDR72,339 trillion (USD7,381 billion) in 2010 and 2011 respectively.

Revolving Fund Program from Ministry of Cooperatives and SMEs

There is a unit in Ministry of Cooperatives and SMEs that functions as a public service through several activities, such as financing SMEs and cooperatives through venture capital; giving loans to cooperative and SME incubator tenants; giving loan to SMEs via cooperatives or cooperative units. This unit implements the principle of the four Cs (customer focus, clean, confidence, and capability) to enhance quality of services.

The Ministry of Cooperatives and SME Annual Report 2012 stated that from 2008 to 2012 nearly IDR2.44 trillion (USD248.98 million) had been distributed to 1,516 prospective and qualified SMEs and cooperatives throughout the country, and IDR830.11 billion (USD84.70 million) in 2012 alone.

Corporate Social Responsibility or Partnership Program

As an economic player in a national economic system, SOEs take part in developing small industries in the country. Also, to realize the SOE's strategic mission to develop small-scale cooperative and SMEs, Government Regulation number 3/1983 was issued in order to support SMEs development by SOEs. The SOEs' role is implemented along with the government program to develop small industries to be strong, competitive, and synergistic with medium and large businesses.

According to the Decree of the Minister of SOE number KEP-236/MBU/2003 regarding the SOE Partnership Program and Environmental Building, the program is to improve SME capacity to be strong and independent, and to empower community and social conditions around the SOE's locations. The company has to have certain regulations to use its fund to support specific innovative SMEs' needs, otherwise the business will be treated regularly [34].

Business Innovation Center (BIC)

Established in 2008 by the Ministry of Research and Technology, in order to synergize academicians, businesses, and government in terms of innovation acivities, BIC is designed to bridge the gap between business ecosystem and the technology/innovation centers by analyzing market and product trends.

The ministry, through the SME Innovation Center and BIC, distributed grants to organizations and institutions that did research and innovation in many economic sectors. A total of 16 institutions from several cities in Indonesia received grants for their R&D programs. Most of the institutions came from universities, with only a small number from private institutions (Table 10).

No	Intermediation Institution	Proposed Program	Location
1	PIBI IKOPIN Bandung	Training of Waste Aluminum Management	Bandung
2	Hasanudin University	Beautiful and adorable sea fish products' improvement, through an incubator technology package	Makasar
3	Surabaya Institute of Technology Design Center	Development of product design based on integrated digital design	Surabaya
4	Business Innovation Center	Development of new business model toward access and marketing system to be accepted by the modern market	Jakarta
5	I-Cell	Training of Innovation and Entrepreneurship Empowerment	Solo
6	Yayasan Asgar Muda	Program of Creative SMEs' Development	Garut
7	Indonesian Islamic University	Empowering SMEs in Bamboo Industry in terms of Production and Marketing System	Yogyakarta
8	Lembaga Pengembangan Inovasi (Innovation Development Institution)	Building and Assisting New SMEs Program	Serpong
9	BDS LPPM	Superior SMEs Development Program, Furniture Center - Bulakan	Solo
10	PUPUK (Group for Small Enterprise Improvement)	Local Competitiveness Improvement Program through Strengthening Innovative Capacity	Bandung
11	Bogor Institute of Agriculture's Incubator	Increasing SMEs' Productivity and Capacity through Innovative Technology Implementation and Halal Certification	Bogor
12	KADIN Semarang	MSMEs Empowerment, a Joint Operation with Senior Vocation School	Semarang
13	PPKWU - UNS	Assistance in Milk-Cow Worker based on Integrated Quality Management	Solo
14	Innovation Center – LIPI	Improvement of HKI's Capacity and Development of Creative Agro & Industry's SMEs	Jakarta
15	FPESD	Batik Development	Semarang
16	UNHALU	Seaweed Development	Kendari

Table 10. List of Grant Receivers from the SME Innovation Center

Source: The SME Innovation Center [35].

In 2012 the grants went to 24 young techno-entrepreneurship activities which come from Sumatra (four proposals), Java (nine proposals), Kalimantan, South Sulawesi, West Nusa Tenggara (two proposals each), and Papua (five proposals).

BIC, supported by the Ministry of Research and Technology, promotes the innovative works and activities by publication of selected proposals every year and connects them to investors and markets.

In 2008, 100 prospective innovations were selected in the fields of food security (25), new and renewable energy (5), technology and transportation management (6), communication and IT (6), security and defense technology (3), health and medication technology (13), and others (42). These participants came from BPPT, Bogor Institute of Agriculture, Innovation Center of Indonesia Science Institute, universities, individuals, private companies, and others.

Selection continued the following year with 101 proposals (2009), 102 proposals in 2010, 103 proposals in 2011, and 104 proposals in 2012. These were selected on the basis that they were the innovations with the best prospects and were published as well. So far, more than 20 Memoranda of Understanding (MOUs) have been signed with the investors.

CONCLUSION AND RECOMMENDATIONS

Conclusion

Based on the second phase of the Medium-Term Development Program 2009–14, the development of Indonesia focuses on promoting the quality of human resources, development of S&T, and strengthening economic competitiveness.

More than 56 million SMEs in Indonesia provide work to 107,657,509 people. There is no doubt that they play a big role in the Indonesian economy. Empowering SMEs and cooperatives is a strategy to improve the quality of life of most Indonesians. Unfortunately, they face problems in running their businesses because of the lack of capital. Financial institutions reluctantly give loans to them due to uncertainty. Also, SMEs find it difficult to fulfill bank requirements because they do not manage their businesses professionally, and have less knowledge and access to banks.

To cope with these problems, the government created several program and credit schemes such as Credit for Food and Energy Security Program (KKPE), Credit for Renewable Energy and Plantation Revitalisation Program, Special Credit for Micro, Small Businesses and Cooperatives Development, and KUR. In addition, financial institutions have credit schemes for SMEs, namely credit from rural banks, credit from PT PNM and corporate social responsibility from state-owned and private companies, etc.

Despite the provision of many credit schemes, a large number of SMEs still have difficulty in accessing banks since most SMEs have little knowledge of finance, management, and information.

Business will continue to survive when run properly, productively, and innovatively. The government provides regulations and facilities that give a chance to people or SMEs to innovate in the research institutes or elsewhere with assistance from innovation centers. Financing for research comes mostly from the government budget followed by the private sector, foreign sources, and NGOs. In contrast, funding for an early innovative SME, which is very risky business, comes from family or friends who trust and support the innovation until it grows and can find finance in the market.

Recommendations

Despite continued efforts, much more needs to be done in order to finance innovative SMEs appropriately, namely generating accurate data on SMEs, the kinds of business conducted by of SMEs, easy access to information, assistance in research and innovation, and appropriate access to funds.

The first thing required to support SMEs is available accurate data. It is important to avoid overlapping of facility or no facility for certain SMEs. If the government or any institution wants to support the SMEs, there should be some kind of matching of the business with the facility supporting SMEs. Since Indonesia is a big country geographically, easy access to information becomes very important, and information technology can be a solution.

To sustain the business of SMEs, innovation is a must and this can be achieved by research with assistance from the experts. Finally, access to financing has to be made simple, flexible, and affordable since not all SMEs are familiar with the financial institution.

However, it will be a good thing to facilitate the introduction of innovative SMEs to financial institutions and to link them to industry as well as push them to register their inventions. With government intervention and direction, the process of innovation can be carried out quickly. If these activities work well, it can be predicted that the desired creative economy can be established appropriately.

ENDNOTES

- 1. Based on the National Long-Term Development Plan 2005–25. Law number 17/2007 relating to the National Long-Term Development Plan.
- 2. A cooperative is a business organization whose membership is individuals or a cooperative's legal body, and it runs its business based on the cooperative's principles as well as people economy movement based on family-likeness. A cooperative is classified by: primary cooperative (established by at least 20 individuals and as members), and secondary cooperative (established by at least three cooperatives). Cooperative's members are the owners as well as the beneficiaries. The cooperative's principles are:
 - The membership is voluntary and open to all people,
 - The management is democratic,
 - The profit or margin share is fair and distributed in accordance with each member's share,
 - Independence.

The capital comes from its own capital and loan. Owned capitals are from members' savings (members' liabilities), reserved fund, and grants. Meanwhile loans can be found from its members, other cooperatives, banks, financial institutions, obligations, securities, or other legal sources. The government gives support in terms of advice, facilities, and protection to cooperatives in order to empower them. (The Law number 17/2012 regarding the Cooperative).

- 3. Ministry of Cooperatives and SMEs.
- 4. Under the Decree of the Coordinating Minister for Economic Affairs number KEP-47/M.EKON/07/2008.
- 5. Infobanknews.com, May 2013.
- 6. BI: Indonesia Economy Report 2010–2012.
- 7. Ministry of Cooperatives and SMEs, Ministry of Agriculture, Ministry of Marine Affairs and Fisheries and private sector companies.
- 8. Policy Committee, Coordinating Ministry of Economic Affairs, 2012.
- 9. Presidential Regulation 5/2010 National Medium Term Development Plan 2010–2014.

- 10. National Statistics (BPS) 2012 Report.
- 11. Ministry of Cooperatives and SMEs, Annual Report 2012.
- 12. APO Productivity Databook 2012.
- 13. PNPM Mandiri, Ministry of Public Works 2012.
- Policy Committee, Coordinating Ministry of Economic Affairs, Monthly Report January 2013.
- 15. Ministry of Cooperatives and SMEs 2012.
- 16. PT Permodalan Nasional Madani (PNM), Perum Pegadaian, and Bank Bukopin.
- 17. One of the National Missions of 2005–25 is realizing a nation that is competitive that places a high importance on: the development of quality and competitive human resources; increasing the mastery and utilization of S&T through research, development, and application towards sustainable innovation; development of advanced infrastructure and reforming the law and state apparatus; strengthening the domestic economy by developing the inter-linkages among the systems of production, distribution, and services provision, including the provision of domestic services.
- 18. Civil servants conduct research mostly for the Ministry of Agriculture, Indonesian Science Institute (LIPI), the Agency for the Assessment and Application of Technology (BPPT), the Agency of National Atomic Energy (BATAN), and Ministry of Energy and Mineral Resources, while only few of them are found in line ministries. (Source: Ministry of Civil Servants Empowerment).
- 19. The Development of the SME Innovation Center in Local Innovation Framework, by Ignatius Subagyo, BPPT.
- 20. Law number 14/2001 regarding Patents.
- 21. Directorate General of Intellectual Property, Ministry of Law and Human Rights.
- 22. Bappenas, Appendices Regulation of the President of the Republic of Indonesia number 5/2010: National Medium Term Development Plan 2010–2014.

- 23. Dr. Ciputra. Creative, Innovative, and Enterpreneurship, paper presented at the Convention of Indonesian Creative Products Weeks, 2010.
- 24. Sudibyo M. PT Mustika Ratu, a paper presented in the Convention of Indonesian Creative Products Weeks, 2010.
- 25. Minister of Industry: Paper presented at the Convention of Indonesian Creative Products Week, June 2010.
- 26. Ministry of National Education, Developing Human Resources in Supporting Creative Industrial Development, paper presented at the Convention of Indonesian Creative Products Week, 2010.
- 27. Waspada Daily, 2009.
- 28. Kompas Daily, Regional News. Tofu Waste Can Replace LPG. July 5, 2010.
- 29. Taufik T.A. Financial Characteristics for New Technology Based Companies, the Agency for Assessment and Application of Technology, 2009.
- 30. Ministry of Research and Technology, Annual Report 2012.
- 31. Masterplan of Economic Development and Acceleration.
- 32. Dharmawan, Chairman of the SME Innovation Center, the Agency of Assessments and Applications Technology BPPT.
- 33. Angel investors are investors who provide financial backing for small start-ups or entrepreneurs. They are usually found in an entrepreneur's family. The capital they provide can be a one-time injection of seed money or of on-going support to carry the company through difficult times (www.investopedia.com).
- 34. The Agency of Assessment and Application of Technology: An Alternative for Innovative SME's Financial Scheme, 1st Edition, 2009.
- 35. The SME Innovation Center Report 2010–2012.

CHAPTER FIVE: REPUBLIC OF KOREA

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INTRODUCTION

Innovative SMEs can be defined as SMEs that become the driving force of future growth and high-quality employment with constant innovation. It is well known that innovative SMEs perform better than general SMEs in job creation, sales, R&D investment, etc. There is no legal definition for innovative SMEs but the Korean government classifies venture enterprises, Inno-Biz (technology-innovative SMEs), and business-innovative SMEs as SMEs.

SME policy in the ROK began with steps to protect SMEs from large enterprises. Since the 1997 currency crisis, SME policy has largely shifted to promoting innovative SMEs for enhancing growth potential of the national economy. However, innovative SMEs are highly constrained in accessing financial services. Believing that enhancing access to finance for innovative SMEs needs the government's active role, the government has devised various policies to make finance more easily accessible to innovative SMEs.

This chapter discusses the various government policies that promote innovative SMEs, and suggests the reforms in financial policies and the market environment that will increase innovative SMEs' access to finance [1]. This chapter is organized as follows: Section 2 summarizes the results of the study. Section 3 offers cross-country comparisons of economic growth and explanations of major economic indicators of the Korean economy. Section 4 provides an overview of the features and characteristics of SME policies focusing on promotion of innovation and the SME financing structure in the Korean economy. Section 5 discusses innovation-related activities and systems. Section 6 introduces financing programs to promote innovation for SMEs. Section 7 recommends policy directions for the revitalization of technology financing and alternative proposals for promoting SME financing.

OVERVIEW

As the backbone of the Korean economy, SMEs represent about 3.2 million enterprises, that is, 99.9% of total enterprises, and about 12.6 million employees comprising 86.9% of total employment as of 2011. In the ROK, innovative SMEs are divided into three types: venture business, Inno-Biz and management-innovative business by certification criteria. The Korean government has focused on enhancing the innovation capacity of SMEs according to their business type and growth stage.

Most bank loans are secured by real estate collateral. SMEs which lack such collateral or are unable to obtain credit guarantees thus have difficulty raising funds. The Korean government therefore supports SMEs through credit guarantee services and policy fund programs.

There are various activities and systems that promote innovation of SMEs in the Korean economy. Institutions such as the Small and Medium Business Administration (SMBA), Small and Medium Business Corporation (SBC), Korea Institute of Industrial Technology Evaluation and Planning (KEIT), Korea Institute for Advancement of Technology (KIAT), Korean Intellectual Property Office (KIPO), Korea Institute of Startup and Entrepreneurship Development (KISED), Korea Venture Investment Corporation (KVIC), Korea Technology and Information Promotion Agency for SMEs (TIPA), and other government-related organizations provide support of various kinds for promoting innovations such as technology development, technology evaluation, technology transfer and technology commercialization services, funding and consulting services.

The Technology Transfer and Commercialization Promotion Act of 2006 has led to the increase of intellectual property and technology commercialization by promoting competition among public research institutes and universities. SMBA has disseminated the research results of public research institutes and universities to technological start-up SMEs. The Korean government created the Fund of Funds to promote the establishment of investment funds for innovative SMEs. As of 2012, there are 47,142 innovative SMEs comprised of 28,193 venture firms, 17,298 Inno-Biz firms, and 14,867 management-innovative firms. There is an overlap between venture firms and Inno-Biz firms. The overlapping firms are excluded from the total number of innovative SMEs.

The Technology Development Promotion Law of 1991 promoted the establishment of the industrial R&D Institutes in companies. The Korean government has also conducted the Korea Small Business Innovation Research (KOSBIR) program since 1998 to offer government wide support for SME technology innovation activities, and the SME Technology Innovation Development (TID) Program to enhance technological competitiveness of SMEs by supporting costs for developing new products.

SMBA has supported business incubators operated by universities and research institutes, strengthened the commercialization of ideas to activate start-ups by young people, created new jobs, and promoted activation of one-person creative enterprises.

The future policy directions for fostering innovative SMEs are as follows: In the short term, the setting up of the policy framework for supporting innovative SMEs in order to revitalize firm stagnation and lay the foundation for productivity growth. In the medium term, to establish and, later on, expand the innovative system for SMEs. In the long term, create a growth ecosystem for market-friendly innovative SMEs. Consequently, it is necessary to strengthen the financial market and the innovation system to ensure SMEs' access to newly developed technology. In sum, policy support for SMEs can be effective with continuous effort and focus on innovation even amidst difficult conditions for enhancing technology.

Suggestions for improving the financial support system and the revitalization of technology financing for innovative SMEs are as follows: First, to revitalize Mergers and Acquisitions (M&As) to expand the financial market for private technology. This will expand the inflow of private investment. Second, to create and operate a new technology investment fund. This will address market failure and stimulate private investment in technology. Third, to ease the requirements for listing Inno-Biz on the Korean Securities Dealers Automated Quotation (KOSDAQ). Venture companies among the innovative SMEs receive benefits when listed on KOSDAQ.

Alternative proposals for promoting innovative SME financing are as follows: First, to activate investments of venture capital funds to innovative SMEs in the early stage. Second, to activate bank loans to SMEs in the growth stage. Third, to activate regional SME financing by nurturing regional financial institutions. Fourth, to activate investments by private equity funds to innovative SMEs. Fifth, to activate SME financing from abroad.

Alternative proposals for promoting Asian SME financing are as follows: First, to establish a credit bureau specialized in SMEs in each Asian country and share credit information about SMEs across Asian countries. Second, to establish an international organization that collects information about innovative SMEs in Asia and provides information to investors and financial institutions in Asian countries. Third, to enhance the transparency of SMEs by introducing international-standard accounting systems in each Asian country. Fourth, to establish a common Asian credit guarantee institution, which can reduce the risks of investments and loans to innovative SMEs.

ECONOMIC GROWTH AND CONTRIBUTION OF SMES IN MEMBER COUNTRIES

Economic Scale and Growth

The USA and the EU went through deep recession in 2009 following the global financial storm. Consequently, for the second half of the decade, they managed a growth rate of only 0.7% and 0.9%, respectively. In contrast, South Asia grew at an annual average growth rate of 7.2% in 2005–10 while it was 6.4% for East Asia. The ASEAN economies, which were most impacted by the Asian financial crisis of 1997–98 had not vet fully recovered their pre-crisis growth vitality when the global financial crisis took place. Table 1 indicates that, overall, Asia was not seriously affected by the global financial crisis and its growth rate accelerated from 5.4% in 2000-05 to 6.2% in 2005-10. However, it is noted that Asia29's growth slowed significantly from a peak performance of 7.9% in 2007, to 4.6% in 2008 and then to 3.7% in 2009, before rebounding strongly to 7.6% in 2010, partly due to fiscal stimulation. Since the global financial crisis of 2008, Asian governments and central banks have taken firm steps to cope with the crisis. Nevertheless, eight Asian economies experienced negative growth in 2009, with the deepest contraction of -5.5% taking place in Japan. China posted a high growth rate of 9.2%. Of the four Asian Tigers, only the ROK managed a narrow escape from recession with a growth rate of 0.3%. In the same period, the USA and the EU had negative growth rates of -3.1% and -4.4%, respectively [2].

Since the recent eurozone fiscal crisis, most advanced countries other than the USA have witnessed a slowdown in their economies, in turn influencing emerging economies. In 2012, the overall growth rate of the global economy fell to 3.2% from 3.9% in 2011. The growth rate of the USA economy rose from 1.8% to 2.2% as personal consumption and housing investment expanded. The EU growth rate turned negative (-0.6%), for the first time in three years since 2009, due to shrinking of consumption and investment influenced by the eurozone fiscal crisis and increased fiscal retrenchment. The Japanese economy shifted from its negative growth rate of the previous year to a positive rate of growth (2.0%), bolstered by an expansion of public investment following the Great East Japan Earthquake in combination with measures to encourage consumption. Sluggish exports to Europe and a slowdown in consumption and investment held the Chinese economy to a 7.8% growth rate, its lowest level since 1999. The emerging economies saw their growth rate decline to an average of 5.1% due to the deteriorating external environment resulting from the EU's prolonged fiscal crisis and a slowdown in domestic demand [3].

					(Unit: %)
	2005–10	2009	2010	2011	2012
World	-	-0.6	5.1	3.9	3.2
USA	0.7	-3.1	2.4	1.8	2.2
EU	0.9	-4.4	2.0	1.4	-0.6
Asia29	6.2	3.7	7.6	-	-
Asia ¹	6.3	7.0	9.5	8.0	6.6
APO20	4.0	_	_	_	_
Japan	0.3	-5.5	4.7	-0.6	2.0
China	10.6	9.2	10.4	9.3	7.8
ROK	3.7	0.3	6.2	3.7	2.0

Table 1. Comparisons of GDP Growth Rates

Sources: APO, APO Productivity Databook 2010–12; Bank of Korea (BOK), Annual Reports 2012, 2013 [3a, 3b]. Note: 1, excludes Middle East.

The Korean economy grew 3.9% as the export growth rate slowed in 2005 but recovered its robust pace in 2006–07 (Table 2). However, in 2008, GDP growth slowed down to 2.2% due to the impact of the global financial crisis. In 2009, bold fiscal and monetary policies led to stability in the financial market and the economy managed to maintain positive, albeit lower, GDP growth at 0.3%. GDP growth accelerated at a rapid pace to reach 6.2% in 2010 due to favorable exports and recovery of domestic demand. In 2011, the GDP growth rate declined to 3.6% from 6.3% a year earlier due to sluggish domestic demand despite a solid upward trend in exports. In 2012, with slow export growth and a continued reduction in investment, the GDP growth rate declined to 2%.

Per capita Gross National Income (GNI) rose from less than USD10,000 in 1997 to USD17,531 in 2005. Per capita GNI rose to USD21,695 in 2007 but declined to USD19,296 in 2008 and USD17,175 in 2009 due to the global financial crisis and the depreciation of the Korean KRW against the US dollar. In 2011, per capita GNI rose to USD22,451 from USD20,562 in 2010. In 2012, per capita GNI was USD22,708, an increase of just 1.1% from the 2011 level owing to a rise in the KRW/dollar exchange rate.

	2005	2007	2009	2010	2011	2012
GDP Growth Rate %	3.9	5.0	0.3	6.3	3.6	2.0
Per Capita GNI USD	17,531	21,695	17,175	20,562	22,451	22,708
Current Account USD billion	15.0	5.9	32.8	29.4	26.1	43.1
Good Account USD billion	32.7	28.2	37.9	40.1	31.7	38.3
Exports USD billion	284.4	371.5	358.2	461.4	551.8	552.6
Imports USD billion	261.2	356.9	320.3	421.4	520.1	514.2
Services Account USD billion	-13.7	19.8	-6.6	-8.6	-5.8	2.7
Consumer Prices %	2.8	2.5	2.8	2.9	4.0	2.2
Unemployment Rate %	3.7	3.2	3.6	3.7	3.4	3.2

Table 2. Major Economic Indicators of the Korean Economy

Sources: APO, APO Productivity Databook 2010–12; BOK, Annual Reports 2005–12; Korean Economy 2005–12 [3a, 3c, 3d].

The current account registered a surplus of USD15.0 billion in 2005. It narrowed to USD5.4 billion and USD5.9 billion respectively in 2006 and 2007 owing to an increasingly wide services account deficit. In 2008, the current account deficit was USD6.4 billion as the goods account surplus narrowed sharply while the services account remained in the red. The current account registered a surplus of USD32.8 billion in 2009, with imports decreasing at a faster pace than exports. In 2010, the current account registered a surplus of USD40.1 billion. Exports increased by a record high of 28.3% while imports rose by 31.6%. The services account deficit widened from the previous year's USD6.6 billion to USD8.6 billion. In 2011, the current account registered a surplus of USD26.1 billion due to a goods account surplus and a reduction in services account deficit. In 2012, the current account registered its largest-ever surplus of USD43.1 billion as the goods account surplus widened to a greater extent than in the previous year and the services account shifted into surplus.

In 2005, the increase in consumer prices slowed to an annual average level of 2.8%, mainly due to stable prices of agricultural commodities, and subsequently to 2.2% in 2006 and 2.5% in 2007 as the appreciation of the KRW against the US dollar offset the steady rise in international oil prices. However, from October 2007, consumer prices accelerated, affected by a surge in international oil prices. In 2008, it rose sharply by 4.7% due to a surge in
international commodity prices and the depreciation of the KRW against the US dollar. In 2009, it decelerated to 2.8% as demand pressure was slight and prices of international raw materials, including oil, fell sharply. In 2010, consumer prices recorded an annual average rate of increase of 2.9% owing largely to a surge in prices of agricultural, livestock and marine products in the wake of unusually adverse weather conditions from September. In 2011, consumer prices marked an average annual increase of 4.0% due to a spike in international commodity prices that affected domestic prices, including those of petroleum products, processed foods, and charges for personnel services. In 2012, consumer prices declined to an average annual increase of 2.2%, mainly attributed to the drop in prices of livestock and international raw materials. Institutional factors including the expansion of free nursery care and school meals also played a role in the decline of inflation.

The unemployment rate remained at 3.7% in 2005. During 2006–07 there was a slight reduction in the unemployment rate due to improvement in labor market conditions. In 2008, reflecting the slower growth of domestic demand, labor market conditions deteriorated. However, the unemployment rate remained at 3.2%, the same level as the previous year, owing to the low rate of participation of the younger age groups in economic activities. In 2009, labor markets worsened further. In 2010, the unemployment rate stood at 3.7%, as the economically active population increased at a faster pace than the number of persons employed. In 2011, the unemployment rate fell to 3.4% from the previous year's 3.7% and with further improvement in labor market conditions, the unemployment rate fell to 3.2% in 2012 [3a, 3c, 3e].

Contribution of Korean SMEs to the National Economy

Korean SMEs have been playing an important role in the nation's economic growth through active start-ups and the creation of jobs (Table 3). As of 2011, the 3.2 million SMEs (99.9% of total enterprises) employing 12.6 million individuals (86.9% of total employment), producing 46.6% of total manufacturing output and 47.3% of value added of the manufacturing industry, were truly the backbone of the Korean economy [4].

OVERVIEW OF SME FINANCING STRUCTURE

Definition of SME

The SME is defined as an enterprise with fewer than 300 employees in manufacturing, mining, construction, transportation and large general retail stores, 200 employees in business support service, 100 employees in wholesale and product intermediation and 50 employees in other sectors (Table 4). As of 2011, there were about 3.2 million SMEs including 2.8 million microenterprises (with fewer than 10 employees).

		Total (A)	SMEs (B)	Ratio (B/A)
All industry	No. of establishments	3,234,687	3,231,634	99.9
(1–299 employees)	No. of employees	14,534,230	12,626,746	86.9
	No. of establishments	114,651	114,020	99.4
Manufacturing	No. of employees	3,030,441	2,323,439	76.7
(5–299 employees)	Gross output USD billion	1,384	645	46.6
	Value Added %	445	211	47.3

 Table 3. Contributions of Korean SMEs to the National Economy (2011)

Source: National Statistical Office of Korea (NSO), Report on the Census on Basic Characteristics of Establishment and Report on Mining and Manufacturing Survey, 2013 [4a].

Features and Characteristics of SME Policies Focusing on Promotion of Innovation

Definition of Innovative SMEs

Innovative SMEs are SMEs with technological competitiveness and growth potential. As mentioned before, they are divided into three types: (a) venture business, (b) Inno-Biz, and (c) management-innovative business by certification criteria. The number of Korean innovative SMEs has grown continuously through ceaseless technological developments and the tripartite cooperation of industry, academia, and research institutes. Korean SMEs have also endeavored to upgrade their productivity and create new values by innovating non-technological aspects of their business.

Venture Company certification: SMBA designates qualified venture-type companies as "Venture Companies" based on the Special Measures on the Promotion of Venture Companies of 1997. Table 5 shows the certification criteria for a venture company.

Table 4. Definition of Korean SMEs

Sector	SN	Æs	Small Business	Micro- enterprises	
Sector	No. of Workers Capital and Sales		No. of Workers		
Manufacturing	Fewer than 300	Capital worth USD8M or less	Fewer than 50	Fewer than 10	
Mining, construction and transportation	Fewer than 300	Capital worth USD3M or less	Fewer than 50	Fewer than 10	
Large general retail stores, communications, and other computer-related industries	Fewer than 300	Capital worth USD30M or less	Fewer than 50	Fewer than 5	
Seed and seedling production, fishing, electrical, gas and business support service	Fewer than 200	Capital worth USD20M or less	Fewer than 10	Fewer than 5	
Wholesale and product intermediation, R&D and news provision	Fewer than 100	Capital worth USD10M or less	Fewer than 10	Fewer than 5	
Other sectors	Fewer than 50	Capital worth USD5M or less	Fewer than 10	Fewer than 5	

Source: Article 2 of Framework Act on SMEs and Article 3 of Enforcement Decree of the Act [4b].

Table 5 shows the certification criteria for a venture company.

Table 5. Venture	Company	Certification	Criteria
rubie 5. venture	Company	Continuation	Critoria

Criteria	First phase	Second phase
Investment by Venture Capital		Venture capital holds a minimum 10% equity stake, which is maintained for a minimum of six months.
Investment in R&D	Evaluation of Technology	A minimum of KRW50 million in annual R&D expenses and 5–10% of revenue depending on the industry.
Commercialization of New Technology	and Management Innovation	Received good evaluation for business from venture evaluation organization in the following areas. Received good evaluation for business from venture evaluation organization in the following areas. - Patents - Technology transferred from public institutions - Technology developed with government investment

Source: SMBA [4c].

Inno-Biz Certification: The ROK has been implementing a technology innovation certification system since 2001 to support SME innovation. The assessment is based on the "Oslo Manual" developed by OECD. Under the Framework Act on Small and Medium Enterprises, SMEs which have been in normal operation for more than three years after establishment as of the application date are qualified to apply for certification. There is a system of preliminary assessment through online self-diagnosis. A set of selection criteria is used. The next stage is the assessment of technology innovation systems. The assessment system consists of four fields: (a) technology innovation capability, (b) technology innovation management capability, (c) technology commercialization capability, and (d) technology innovation achievements.

Main-biz Certification: SMBA implements the Main-biz (Management Innovation Business) certification system, which is an assessment of management innovation capacity. The system, also based on the Oslo Manual, is designed to foster SME innovation in marketing, management, quality movement, etc., which are essential for the enhancement of firm competitiveness. Main-biz assessment indices include (1) leadership, (2) sustainable innovation, (3) human resource management process, (4) customer and market-oriented process, (5) production and service operation process, (6) production facility status (manufacturing), and (7) measurement, analysis, and knowledge/information management.

Policies for Promoting Innovative SMEs

Policy Framework of SME Innovation

The innovation capacity of SMEs is enhanced according to their business type and growth stage; for example, policy financing in their early stages of growth. Since the shift to a policy promoting competition and cooperation among SMEs, the government has continuously created a market-friendly business ecosystem and expanding infrastructure support [5]. In this regard, the government has promoted the balanced growth of traditional markets.

SMBA recently announced a five-year (2009–13) SME Technology Innovation Plan [6] that aims to foster global SMEs through enhancement of technological competitiveness and to maximize R&D investment efficiency in accordance with a "choice and concentration" strategy. SMBA intends to do the following: (a) increase SME R&D investment, allocate investments strategically and expand demand-oriented technology innovation infrastructures; (b) focus choice and concentration on future promising growth fields, new growth engines and knowledge services; and (c) strengthen custom-tailored support based on the stage of growth and innovation capability of SMEs. SMBA suggests identification of promising technologies, planning and efficiency enhancement of R&D investment, increase of commercialization success rates, etc.

For innovation-type SMEs, SMBA will support the R&D activities of selected 260 small business technology innovation groups to expedite technological innovation. After completion of the small groups' R&D activities, SMBA will identify and award excellent enterprises that have produced outstanding technological innovation results. It will also hold a "Nationwide Small Groups Contest" to spread the technological innovation atmosphere to all SMEs.

SMBA's Core Policies for Promoting Innovative SMEs

The objective is to maximize job creation via Inno-Biz start-ups by organizing special lectures on entrepreneurship by venture businessmen at universities; accelerating start-up activities by professors, researchers and collegiate students; and improving the spin-off start-up system for executives and employees of large firms. SMBA will also operate a "home-based start-up system" and expand the infrastructure for one-person creative enterprises, establish excellent SME/venture enterprise information databases and nurture industry–academia manpower that are custom-tailored to worksite demand. The second objective is to stimulate economic vitality and enhance productivity by implementing policy financing at an early date, executing timely SME-support budget, expanding purchase of new-technology products through support for R&D linked to supply and demand, diversifying sales channels and enhancing product reliability and productivity, nurturing manufacturing-based enterprises, improving fields with weak productivity, enhancing energy efficiency, and finally, spreading green management.

Structure of SME financing: financing policies, policy related funds and institutions

Problems of Korean SMEs Financing

In the past, SMEs experienced financial distress whenever banks tightened lending by imposing stricter terms and conditions for loans in response to changes in economic conditions, e.g., when there was a recession. This was because SMEs were substantially dependent (70–75%) on external financing provided by banks. As of 2011, the proportion of bank loans in the external financing of Korean SMEs was 83.3%, the largest in the recent history of SMEs (Table 6).

	Banks	Policy funds	Non- banks	Stocks	Corporate bonds	Private curb loans	Overseas
2005	72.2	22.7	2.8	0.0	0.3	1.3	0.8

(Unit · %)

Table 6. SME Funding by Source

	Banks	Policy funds	Non- banks	Stocks	Corporate bonds	Private curb loans	Overseas
2006	71.9	24.8	1.5	0.3	0.4	0.9	0.2
2007	74.3	21.7	2.1	0.1	0.4	1.2	0.2
2008	71.5	21.8	3.9	0.2	0.1	1.8	0.5
2009	62.5	30.8	3.1	0.3	0.8	2.8	0.1
2010	65.9	26.5	3.4	0.2	0.8	1.5	1.6
2011	83.3	10.6	0.9	1.1	3.2	0.4	0.6

(...continued)

Source: Korea Federation of Small and Medium Business (KBIZ) [6a].

SMEs also experience difficulty in investing in long-term equipment due to the term structure of bank loans. The ratio of loans of less than one year maturity to total bank loans is as high as 65-75%.

Most Korean financial institutions invest and make loans based on information about corporate financial affairs but prefer making loans over investing. Loans are given to startup or early-stage enterprises on the basis of real-estate collateral. Real-estate loans secured by collateral are the most common type of loans given by banks. As of 2011, the ratio of real-estate collateral loans to total bank loans was 35.6%; credit guarantee loans, 18.5%; and unsecured (credit) loans, 25.5% (Table 7). Accordingly, Korean SMEs, which do not have real-estate collateral or cannot get credit guarantees, have difficulty in raising funds.

Financial institutions in Korea encounter great difficulty analyzing the credit risk of SMEs because they cannot easily access credit information on SMEs. Thus, financial institutions require real-estate collateral or public credit guarantees for SMEs.

				(Unit: %)
	Real estate	Credit guarantees	Unsecured loans	Others
2005	43.3	30.1	11.7	14.9
2006	46.2	22.9	17.2	13.7
2007	47.2	21.1	16.9	14.8
2008	44.3	26.7	13.8	15.2

Table 7. Ratio of Bank Loans to SMEs to Total Loans, by type of Security

(...continued)

	Real estate	Credit guarantees	Unsecured loans	Others
2009	40.1	32.0	15.9	11.9
2010	44.7	25.3	16.3	13.6
2011	35.6	18.5	25.5	20.4

Source: Korea Federation of Small and Medium Business (KBIZ) [6a].

The Korean Financial Support System for SMEs

Credit Guarantee Services

The primary objective of a credit guarantee is to assist SMEs gain access to finance. Korea Credit Guarantee Fund (KODIT) mainly supports general SMEs; Korea Technology Finance Corporation (KOTEC) supports technology SMEs; and Regional Credit Guarantee Foundations (RCGFs) support regional small enterprises [7].

1. KODIT

KODIT is a public financial institution established in June 1976 under the provisions of the Korea Credit Guarantee Fund Act. The credit guarantee enables promising SMEs without enough collateral to obtain funds. The objectives of KODIT are as follows: first, lead the balanced development of the national economy by extending credit guarantees to promising SMEs which lack tangible collateral, and second, stimulate sound credit transactions through the efficient management and use of the credit information.

2. KOTEC

Founded in 1989 as a non-profit guarantee institution under the special enactment, the Financial Assistance to New Technology Businesses Act, KOTEC provides credit guarantees to facilitate financing for new technology-based enterprises while promoting the growth of technologically strong SMEs and venture businesses. Since its establishment, more than 80% of the total credit guarantees provided by KOTEC have been given to companies planning to develop or apply new technologies but lack security in financing.

3. RCGFs

Since 1996, RCGFs have been established in each city and province to extend credit guarantees for microenterprises that cannot obtain financing due to lack of substantial collateral required by financial institutions [8]. RCGFs of nine provinces and seven metropolitan cities also provide management consulting services to microenterprises to enhance their management skills and productivity.

(Unit: billion US dollars)

4. Korean Federation of Credit Guarantee Foundations (KOREG)

KOREG was established to enhance the development of RCGFs and provide them with re-guarantee services. KOREG's major functions are as follows: advancing techniques related to credit investigation and methods of guarantees; cooperating with governmental, financial and other related organizations; providing education and training for executives and employees of RCGFs, and operating re-guarantee services for RCGFs. Table 8 provides information on the credit guarantees extended by various institutions.

	2005	2006	2007	2008	2009	2010	2011
KODIT	28.5	29.8	30.7	26.8	32.7	33.5	34.7
KOTEC	11.2	11.7	11.9	11.3	14.2	15.0	15.4
RCGFs	3.3	4.2	5.0	5.7	8.4	12.4	13.1
Total	43.0	45.7	47.6	43.8	55.3	61.0	63.1

Table 8. Credit Guarantees, by institution

Source: KODIT, KOTEC, KOREG [8a].

Policy Fund Program

Small Business Corporation (SBC) [9], a non-profit, government-funded organization established to implement government policies and programs for the sound growth and development of Korean SMEs supplies loans at low interest rates directly or through banks to support start-ups, facility investment, and commercialization of technologies of SMEs. The maturity of the loan is relatively long term at three to eight years.

SBC operates financial and non-financial programs for SMEs. Under the financial programs that SBC finances are (a) venture firms in their start-up and early growth stages, (b) the expansion of SME operations, (c) development of new products, (d) improvement in financial structure by converting loans to capital, and (e) commercialization of intellectual property and R&D results. It also finances innovative SMEs in high-tech and low-carbon industry sectors to improve their competitiveness. Non-financial programs include consulting, training, marketing and global cooperation programs. SBC invests in venture capital companies and cooperatives that in turn, invest in promising start-ups and venture enterprises. Other governmental ministries and local governments also manage various financial support systems for SMEs respectively. Table 9 summarizes the amount of loans extended to SMEs in terms of SMBA policy funds.

Table 9. Policy Funds of SMBA

	2005	2006	2007	2008	2009	2010	2011
Results	3,065	2,965	3,047	2,860	3,369	2,957	3,070

(Unit: million US dollars)

Source: SBC [9a].

Problems in the Korean Financial Support System for SMEs

The financial support system has contributed greatly to enhancing SME growth. However, certain policy inefficiencies have to be addressed.

Credit Guarantee Service

First, is the direct performance of credit investigation and evaluation by credit guarantee institutions. Second, is the excessive dependence of both financial institutions and SMEs on credit guarantees. These hinder the growth of financial institutions' credit evaluation ability and the improvement of SMEs' ability to manage credit.

Policy Fund Program

First, is the focus on enterprises with medium- and high-credit rating Second, is credit evaluation based on corporate financial affairs. These have resulted in insufficient support for start-ups, ventures and small enterprises, and also reduced policy effectiveness.

Investment Promotion Scheme

First, is the focus on the support for loans. Second, is management by institutions undertaking indirect financing support. These cause insufficient support for start-ups and venture enterprises, and also lower the performance of support.

Recent Reform of the Korean Financial Support System for Promoting SMEs [10]

Reform of Credit Guarantee Program

First, is the extension of support for innovative SMEs. For example, credit guarantees for start-ups increased significantly and credit guarantees based on technology appraisal by KOTEC rapidly increased too. Second, is the expansion of loan guarantees for which financial institutions are responsible. Third, is the increase of long-term credit guarantees to encourage long-term loans by financial institutions. Fourth, is the establishment of a system by which enterprises, financial institutions and the government equally share the expense burden. For this it is necessary to increase the guarantee fee for enterprises and the contribution rate of financial institutions to credit guarantee funds.

Activation of SMEs Financing by Technology Appraisal

First, is to enhance the credibility of technology appraisal by using the technology assessment results of external institutions when KOTEC evaluates the loans for technology SMEs. Second, is the introduction of a new credit guarantee system which shares with enterprises both profit and risk. Third, is the simplification of the loan procedure based on technology appraisal by Korea Development Bank.

Reform of the Policy Fund System for SMEs

First, is the concentration of policy fund support for innovative SMEs. Second, is the extension of investments to innovative SMEs by utilizing "flow of funds". Third, is the enlargement of policy fund support to SMEs in which venture capitals invest. Fourth, is the compound support of investments and loans to regional SMEs for promoting balanced national development.

Activation of Financial Support by Market Mechanism

First, is to enlarge the function of Korea Enterprise Data (the credit bureau specializing in SMEs) by promoting the exchange of information about SMEs among participating institutions. Second, is to activate the listing of SMEs and the issue of stocks and corporate bonds by SMEs through the reform of listing conditions, and the improvement of disclosure and the accounting system. Third, is to activate restructuring by giving incentives to SME workouts by banks and eliminating the factors that obstruct workouts.

INNOVATION-RELATED ACTIVITIES AND SYSTEMS: MARKET- AND TECHNOLOGY-DRIVEN

Patent Supporting System

Statistical Overview

With 371,116 applications in 2011, the ROK ranked fourth in the world after China, the USA, and Japan in intellectual property right (IPR) applications (Table 10). These comprised 178,924 patents, 11,854 utility models, 56,524 designs, and 123,814 trademarks. IPR registrations numbered 214,013, with patents numbering 94,720, utility models 5,853, designs 42,185, and trademarks 71,255 (Table 11).

In 2011, with 10,447 applications under the Patent Cooperation Treaty, the ROK ranked fifth in the world after the USA, Japan, Germany, and China. The number of patents in force per 100,000 inhabitants in the ROK jumped significantly from 14th in 2005 to 5th in 2011.

Patent Supporting System for SMEs

KIPO has established a package of SME support programs [11] and has held on-site presentations on the programs since January 2009. The package includes a patent evaluation service the results pf which can be used by SMEs with a high level of technology but insufficient assets to secure loans using an on/off-line patent technology trade system – a one-stop total service system that comprises various services from the diagnosis of intellectual property (IP) capacity of SMEs to the commercialization of IP and IP education to reinforce SMEs' capacity in IP.

IPR Type	Patents	Utility Models	Subtotal	Designs	Trademarks	Total
1950	126	123	249	30	599	878
1960	611	1,207	1,818	329	1,209	3,356
1970	1,846	6,167	8,013	4,522	5,124	17,659
1980	5,070	8,558	13,628	10,075	13,558	37,261
1990	25,820	22,654	48,474	18,769	46,826	114,069
2000	102,010	37,163	139,173	33,841	110,073	283,087
2005	160,921	37,175	198,096	45,222	115,889	359,207
2007	172,469	21,084	193,553	54,362	132,288	380,203
2009	163,523	17,144	180,667	57,903	126,420	364,990
2010	170,101	13,661	183,762	57,187	121,125	362,074
2011	178,924	11,854	190,778	56,524	123,814	371,116

Table 10. Number of IPR Applications by Year

Source: KIPO [11a].

A patent commercialization consulting service matches potential licensees with potential licensors for a successful technology transfer by utilizing KIPO's database. KIPO began the pilot program for local brand development of SMEs to help increase penetration in non-English speaking markets in 2008.

IPR Type	Patents	Utility Models	Subtotal	Designs	Trademarks	Total
1950	5	6	11	7	0	18
1960	219	285	504	174	815	1,493
1970	266	864	1,130	1,657	2,585	5,372
1980	1,632	1,753	3,385	4,071	7,845	15,301
1990	7,762	8,846	16,608	13,927	23,790	54,325
2000	34,956	41,745	76,701	18,845	30,849	126,395
2005	73,512	32,716	106,228	33,993	57,873	198,094
2007	123,705	2,795	126,500	40,745	60,361	227,606
2009	56,732	3,949	60,681	32,091	53,155	145,927
2010	68,843	4,301	73,144	33,697	53,136	159,977
2011	94,720	5,853	100,573	42,185	71,255	214,013

Table 11. Number of IPR Registrations by Year

Source: KIPO [11a].

Technology and R&D Supporting Systems by Government-related Organizations

The following are technology and R&D supporting systems by government-related organizations [12]:

Korea Technology and Information Promotion Agency for SMEs (TIPA)

Established in May 2001 as a quasi-government institute under the SMBA, TIPA is a specialized organization supporting SMEs in technology development, management innovation and ICT promotion. TIPA has conducted a variety of projects, including technology and management innovation, establishment of ICT infrastructure, evaluation on consulting services, SME research and analysis, education and training for SME experts, and support of SME innovation in the APEC region.

Korea Institute for Advancement of Technology (KIAT)

Established in May 2009 as a quasi-government institute under the Ministry of Knowledge Economy (MKE), KIAT has a crucial role in suggesting R&D strategies for industrial technology. It does this through systemic technology planning and policy research and by strengthening the competitiveness of the industrial technology ecosystem by promoting various activities such as transferring and commercializing industrial technology, establishing an industrial technology infrastructure, supporting parts and materials industries, and regionally specialized industries.

KIAT supports SMEs by assisting them in commercialization efforts: It identifies excellent technological assets and manages a global technological information service network for the commercialization of technology and more effective investment in R&D. It provides funds for technology commercialization in future growth-driver fields, and encourages the growth of global technology-based corporations by linking them with those technology funds. KIAT promotes business-oriented networks of corporations, universities and research institutes, to transfer and commercialize technology for public use. It also supports the utilization of intellectual property rights. KIAT also provides infrastructure support and improves the competence of engineers and researchers on the scene as well as fostering manpower to meet the demands of the future.

Korean Institute of Industrial Technology Evaluation and Planning (KEIT)

Launched in May 2009 as the amalgamation of six previous R&D funding organizations, KEIT is a state-of-the-art technology think-tank charged with policy research, R&D management, technology assessment and international cooperation. KEIT performs comprehensive planning and evaluation for the diffusion of a technological base through the pursuit of domestic and international synergy. It supports technology planning and implementation, acts as a catalyst to expand technology infrastructure, and establishes industrial R&D support systems.

Technology Commercialization Policies [5]

The government enacted the Technology Transfer Promotion Act in 2000 to promote technology commercialization in universities and government research institutes [13]. The law was amended in December 2006 as the Technology Transfer and Commercialization Promotion Act to include most of the policies regarding technology commercialization in universities and public research institutes. As technology transfer and commercialization is inactive, the Korean government supports a group of TLO (Technology Licensing Office) organizations in building a consortium to overcome limited stock and experience within each TLO organization. The combination of government policies and intensive competition among public research institutes and universities for government research grants has resulted in a rapid increase of domestic and international patents and technology licenses with royalties.

Situation of Business Start-ups Based on Technology and Innovation [5]

SMBA cultivates a business environment that encourages, nurtures and grows startups based on technology and innovation while generating Korean "can-do" spirit-based entrepreneurship. Jointly with Korea Technology Finance Corporation (KOTEC), SMBA selects SMEs that have existed less than seven years since start-up and have excellent growth potential after succeeding in commercialization of new-tech or promising products. To spread the start-up fever and accelerate technological start-ups, SMBA has supported excellent technological start-up SMEs as "Technological Start-up Leader Enterprises" in the first and second half of every year since starting the program in 2008. SMBA plans to publicize the successful technological start-up practices of the selected excellent enterprises and support them further by holding investment marts, etc., in addition to presenting them with the SMBA Administrator's prize [14].

As of 2012, there were 47,142 business start-ups based on technology and innovation, 28,193 venture firms, 17,298 Inno-Biz firms, and 14,867 management innovative business (Main-biz) firms (Table 12).

	1998–2005	2007	2009	2011	2012
Venture	9,732	14,015	18,893	26,148	28,193
Inno-Biz	3,454	11,526	15,940	16,944	17,298
Main-biz	_	6,510	13,988	17,558	14,867
Sum	13,186	32,051	48,821	60,650	60,358
(Overlap)	2,455	8,913	12,207	14,348	13,216
Total	10,731	23,138	36,614	46,302	47,142

Table 12. Number of Start-ups Based on Technology and Innovation

Source: SMBA [4c].

Situation of R&D Institute and Research Personnel in SMEs

The Technology Development Promotion Law enacted in 1991 promotes the establishment of industrial R&D institutes in companies. This has led to a huge increment in the number of industrial R&D centers, which have become the driving force in making the ROK a global R&D powerhouse. Companies benefit from several incentives such as tax exemptions, tariff reduction and exemption of R&D personnel from military service. The number of R&D institutes among SMEs increased rapidly from 10,894 in 2005 to 22,876 in 2011 with researchers in SMEs increasing from 90,601 to 147,406 in the same period. As of 2011, the ratio of SMEs to total enterprises in industrial R&D institutes was 94.2% (Table 13).

(Unit: each, person						ch, person, %)
		2005	2007	2008	2010	2011
No. of R&D Institutes	Total(A)	11,810	14,975	16,719	21,785	24,291
	SMEs(B)	10,894	14,014	15,696	20.659	22,876
	B/A%	92.2	93.6	93.9	94.8	94.2
No. of researchers	Total(A)	163,646	193,340	209,137	235,596	257,510
	SMEs	90,601	111,348	122,944	141,080	147,406
	B/A%	55.4	57.6	58.8	59.9	57.2

Table 13. R&D Institutes and Researchers in SMEs

Source: Korea Industrial Technology Association (KOITA) [14a].

Situation of Business Incubating Activities [15]

The SMBA supports business incubators operated by universities and research institutes equipped with facilities and equipment that can support would-be entrepreneurs or new SME founders. This program promotes the survival and growth of newly established venture companies. SMEs are provided with land, an expert consulting service, marketing education and other forms of support. The government, which started funding this program in 1998, bears part of the costs of establishing BI (Business Incubator) centers at universities, and national and public research institutions. As of 2011, there are 280 BI centers, which accommodate 4,764 enterprises (Table 14).

	2005	2006	2007	2008	2009	2010	2011
Universities	-	_	224	223	226	228	220
SBC	-	_	7	7	7	7	7
Institutes	-	_	15	16	22	25	25
Local Government	_	_	7	8	11	11	11
Others	_	_	13	14	13	15	17
Total	-	_	266	268	279	286	280
Occupied firms	_	_	4,441	4,532	4,770	4,818	4,764

Table 14. Location of Business Incubating Activities

Source: SMBA [4c].

FINANCING PROGRAMS AND COMPLEMENTARY SYSTEMS TO PROMOTE INNOVATION BY SMES

The government has made consistent and sustained efforts to expand innovative SMEs' access to capital, opening funding channels that have traditionally been closed to them. SMBA's indirect SME financing programs help innovative entrepreneurs to establish or expand operations, develop new products, and invest in new staff or production facilities. The ultimate objective of innovative SME financing programs [16] is to maximize the SME financial pipeline and bridge the financing gap.

Development of Technologies: Expanding New Growth R&D Investment

The government continues to encourage R&D investment to cope with the contraction of SME investment potential following the economic slowdown and to strengthen strategic support for SMEs' R&D. SMBA provides financing for innovative SMEs in high-tech and low-carbon industry sectors to improve their competitiveness. If SMEs share intellectual property rights jointly with universities and research institutes, technology license fees will be supported. Moreover, the government has a five-year SME Technology Innovation Plan which encompasses continuous expansion of SMEs' R&D investment, support for technology innovation R&D by capability, intensive technology development support for expansion of future growth engines, and activation of technical start-ups, etc.

Established in 1998, the Korea Small Business Innovation Research (KOSBIR) program offers government-wide support for SME technology innovation activities. Under KOSBIR, 18 agencies composed of 12 government agencies with massive R&D budgets and six government investment agencies provide more than 5% of their R&D budget to SMEs. In 2011, approximately USD1.361 million or 10.5% of those agencies' R&D budgets were used to assist SME technology innovation activities (Table 15).

(Unit: million US dollars,						
	2005	2007	2009	2010	2011	
Agencies' R&D budget (A) USD million	6,508	9,645	9,963	12,144	13,005	
Support for SMEs (B) USD million	808	1,051	960	1,116	1,361	
B/A%	12.4	10.9	9.6	9.2	10.5	

Table 15. Performance of KOSBIR Program for Supporting SMEs

Source: SMBA [4c].

The government has also set up the SME Technology Innovation Development (TID) program to promote technological innovation by SMEs which have inherent R&D capacity and to enhance technological competitiveness by supporting costs for developing new products. SMBA undertakes the tasks as a one- or three-year project. Central government supports 50% of the cost of technological development while local government provides 25% of the cost. After conducting the TID Program, SMBA receives back 30% of its contribution as technology fees that are paid by way of installment for five years. Regarding the progress of the program, SMEs have sent SMBA numerous requests for technological development in view of problems with lack of finance and appropriate workforce in a rapidly changing technological environment. In response, SMBA secured a budget of USD31.5 million for the first time in 1977, financing 666 SMEs. Up to 2011, it provided funds worth USD1,968 million for 22,587 SMEs (Table 16).

Table 16. Performance of SME TID Program

(Unit: million US Dollars, each						
	1997–2007	2008	2009	2010	2011	Total
Amounts	1,109	213	205	242	199	1,968
Enterprises	16,270	2,057	1,665	1,525	1,070	22,587

Source: SMBA [4c].

DEVELOPMENT OF INFORMATION AND DIGITALIZATION

The SMBA also helps SMEs enhance their productivity through digitalization [17], including an assessment of the SME digitalization level, provision of comprehensive consulting for digitalization and digitalization facilities. Projects to encourage digitalization are as follows: SME Production Digitalization Project, Total Information Management Providers, and the Cluster for Digitalization Innovation Project. The Cluster for Digitalization Innovation Project, supported by SMBA, is designed to establish a broadband Internet infrastructure and Internet network that will be the foundation for digitalization in the cluster. The main purpose of the project is to accelerate the digitalization of SMEs in economically poor areas.

Technology Commercialization: Translating Technology into Commercial Success

Believing that the future of the Korean economy depends on the technological powers of its SMEs, SMBA has made the promotion of technologically innovative SMEs one of its most important policy initiatives. SMBA's technology policies focus on the reinforcement of industry–academia–research institute networks and the commercialization of developed

technology. Through SBC, SMBA provides SMEs with financing for the commercialization of intellectual property and R&D results [18]. SMBA provided about USD232.9 million in technology development funds in 2011 to support the commercialization of excellent technologies developed by SMEs and public research institutes. The support funds were provided without collateral or security by way of loans as SBMA expects a reduction of development expenses, shortening of the development period, and technical exchange, etc.

As the technology development environment changes from the development of single technologies to the development of cooperation-type fusion and complex technologies, and as the importance of technology transfer and commercialization grows, SMBA is promoting a C&D (Connect and Development) form of technology development to expand common development projects among enterprises and also to spread the research results of public research institutes to promising SMEs. SMBA also plans to operate an R&D coaching program to achieve successful commercialization of SMEs.

Knowledge Service: Commercialization of Knowledge Service Ideas

SMBA has strengthened support for commercialization of ideas in the knowledge service fields to activate start-ups by young people and create new jobs. It supports commercialization through diverse methods, such as publicity which utilizes public media including broadcasting, investment inducement, and the holding of purchasing consultation meetings. Since March 2009, SMBA has also promoted the activation of one-person creative enterprises. In 2010, SMBA intended to identify and select about 100 excellent cultural content ideas in nine business types within the cultural content field, including cartoons, games, characters, animation, movies and broadcasting, and in the IT field. For the 2010 tasks, SMBA intended to support their commercialization and also to increase the scope of support and budgets on a step-by-step basis.

SMBA actively plans to help those enterprises that succeeded in commercialization to secure sales channels via App Stores (Application Stores), mobile-based e-marketplaces that are growing rapidly of late.

Creation of Venture Business

Revitalizing and Globalizing Venture Businesses as New Growth Engine

SMBA promotes the venture sector as a new growth engine by providing financing in firms' start-up and early growth stages through SBC. SMBA also supports the globalization of ventures through the establishment of small business development centers abroad, Global Star Funds and other programs. To stimulate active M&As among venture businesses, the

SMBA has implemented various policy measures, especially relaxing regulations which include a simplified procedure regarding small-scale stock exchanges, corporate value assessment by certified institutions, a streamlined procedure for M&As and business transfer, replacement of a stockholders' meeting by an executive board when shares traded are less than 50% of the total. Also, tax benefits have been expanded in terms of stock trades and M&As.

Strengthening Venture Investment to Raise Growth Potential

Venture capital investment continued a growth trend that began in 2003 and opened the one-trillion-KRW (USD1,047 million) investment era in 2006. However, due to the recent financial crisis, investment has been sluggish. SMBA is supporting the creation of private funds through its investment in the Fund of Funds and additional investment from foreign and private funds.

The Korean government created the Fund of Funds to promote the establishment of investment funds for innovative SMEs and venture businesses, thereby expanding the supply of investment. KVIC, incorporated in 2005, is the government-backed management company of the Korea Fund of Funds with USD1.5 billion under management. KVIC invests in top-tier funds in a broad range of asset classes from venture capital to mid-cap buyout funds in Korea. Until 2009, investment resources worth KRW1 trillion (USD784 million) were targeted. As of 2011, KRW1.36 trillion (USD1.2 billion) has been accumulated. Since its establishment, KVIC has invested in over 227 partnership funds to incubate next growth engines and companies in various industries including ICT, life sciences and clean technology.

SMBA plans to encourage venture capital investment by overseas funds, oil money, etc. by allowing joint fund operations between overseas investment institutions and domestic venture capitalists while providing preferential treatment by increasing the investment equity ratio for foreign funds to 50% from the present 30%. SMBA also created a small unit venture ecological system that integrates the capabilities of newborn venture companies (technology) and leader venture companies (market). Under this system, SMBA intends to create a lot of funds and support joint R&D and overseas marketing for IT. After revision of the Special Act on Ventures in October 2009, SMBA is propelling a support program for medium-size venture companies that can grow into global venture enterprises after graduation from venture start-up. SMBA also intends to expand the advance of domestic enterprises into the USA procurement markets.

Entrepreneurial Education and Entrepreneurship

In 2009, to create a more nurturing environment for SMEs, SMBA introduced a system that evaluates the impact of regulations on SMEs and recommends solutions as well as an ombudsman system that will help SMEs solve specific problems. The SMBA provides financial support and training for Entrepreneur Clubs at universities to encourage a start-up mind-set and inspire entrepreneurship. This program is designed to train college students as future entrepreneurs with creativity and the pioneer spirit.

To foster start-up specialists through systematic and professional education, five universities and colleges have run pilot programs for entrepreneur graduate schools since 2004.

To inspire the pioneering spirit and business mentality among teenagers, 80 middle and high schools have implemented Biz-Cool pilot programs. About 20,000 students have participated in these programs and in a variety of financial education courses such as case studies on self-management, business start-ups, business administration, and finance.

Business Models with Creative Work

Invigorating Innovative Start-ups and Generating Entrepreneurship

SMBA has run various programs for prime innovative business start-ups across the country such as the start-up course education program. targeting would-be entrepreneurs designed to improve their management capabilities and raising start-up success rates. Local universities and specialized institutions offer about 100 courses a year [19].

Vitalizing One-Person Creative Enterprises

The global economic landscape has been changing dramatically, shifting from an industrial economy into a knowledge and creative economy paradigm. This monumental change has generated a new era for individual entrepreneurs. Anyone with a great business idea will be able to plug into a vast global network of interlocking marketplaces where one can quickly and easily assemble the right sets of business processes to succeed. In a plug-and-play economy, sourcing major business processes – design, animation, finance, scheduling, logistics, insurance, sales, and marketing – will be as easy as opening the Yellow Pages. Under this specification, automation and outsourcing of processes with global economies of scale will bring huge growth in the number of strategies for assembling business. The number of potential businesses and marketplaces will grow exponentially.

In advanced countries with developed IT including the Internet, one-person creative enterprises in the knowledge service field are taking the lead in business start-ups and job creation. The Korean government has similarly promoted fast-track development of one-person creative enterprises. SMBA is propelling various policies to foster one-person enterprises as follows: (a) establishing and operating the "Idea Biz Bank" designed to collect and identify creative ideas; (b) improving restrictions for activation of business start-ups (five laws and ordinances and seven systems of 11 ministries); (c) supporting creation of demand for one-person creative enterprises; and (d) strengthening the management stabilization support system for one-person creative enterprises.

Differentiation of Supply Chains

SMBA has pursued various policies which facilitate advances overseas and the extension of supply chains for innovative SMEs and venture companies. Large enterprises and SMEs need each other to maximize performance and competitiveness. SMBA has promoted a winwin relationship and thus, the construction of desired supply chains between large enterprises and SMEs. On 20 April 2010, SMBA held an inauguration ceremony for the Private-Government Joint R&D Cooperation Fund with four large enterprises. From the fund, SMEs which carry out development tasks desired by the large enterprises receive financial support of up to 75% of total development expenses. As the fund is to be implemented in the form of investment, SMEs will not have the burden of repaying principal and interest. If successful in technical development, SMEs are guaranteed stable sales channels for more than two years from the large enterprises that have suggested the successful development tasks.

The R&D project model with confirmed purchase represents a win-win form of cooperation between large enterprises and SMEs. With the continued participation of large enterprises, private–government joint R&D funds are expected to expand gradually.

SMBA has helped globalization and the advance of innovative SMEs overseas by providing links to networks at home and abroad to extend the benefits of the supply chain and content convergence effects.

CONCLUSION AND RECOMMENDATIONS

Policy Directions for Fostering Innovative SMEs

In the short term, it is necessary to set up the policy framework for supporting innovative SMEs. The policy framework for supporting SMEs is necessary to revitalize stagnation and

lay the foundation for productivity advancement. The R&D budget should be increased by stages, which is essential for promoting innovative SMEs. In the medium term, it is necessary to establish the innovative system for SMEs based on this supporting policy framework. The government should devise a development strategy for the next-generation growth engine in SMEs to increase the importance of innovative SMEs. It should expand the innovative model to all the SMEs and establish technology as a foundation to face global competition. The innovative SMEs should expand dramatically through the integrated support policy of all ministries. It is necessary to create the conditions that enable the SMEs specialized in the production of parts and materials to export their products.

In the long term, the innovative SMEs should be promoted to become the driving force of the Korean economy. It is crucial to create a growth ecosystem for market-friendly innovative SMEs, set up the innovative system for SMEs, and establish SMEs to be global supply sources for parts and materials. Innovative SMEs should be intensively supported so that their production and value added are comparable with those of large enterprises. Consequently, it is necessary to strengthen the financial market and the system to estimate and guarantee the value of developed technology including the credit evaluation of start-up SMEs.

Finally, policy support can be effective if there is continuous innovation effort even in difficult conditions.

Suggestions for Revitalization of Technology Financing

There are criticisms of the supporting system for innovative SMEs. First, is the problem of loan-type technology financing. It is said that SME loans are not made on the basis of their technology and thus, they do not contribute to technology development as much. The financing programs prevent SMEs and venture enterprises from being autonomous and distort the private financial market. Second, is the problem of guarantee-type technology financing. It is indicated that KOTEC's monopoly/oligopoly structure places a limit on the growth of technology evaluation and exchange. Third, is the problem of investment-type technology financing. The investment sectors characterized by the Fund have contributed to promoting innovative SMEs but the fund is not strong enough to attract future foreign investment. Fourth, is the problem of technology evaluation. The efficiency of the government's policy based on technology evaluation is falling due to lack of consistency/standardization and reliability in technology evaluation.

The suggestions to improve the financing support system for innovative SMEs are as follows. First, is revitalizing M&A to expand the financial market for private technology. It expands the inflow of private investment. Second, is the creation and operation of a new

technology investment fund [20]. This will address market failure and stimulate private investment in technology. The fund is envisaged to directly invest in the technological innovation enterprises and the initial stage of new technology. It fortifies the information system to connect with diverse R&D programs and to attract the private investment. Third, is easing the requirements to list Inno-Biz on the KOSDAQ. Venture companies among the innovative SMEs receive benefits when listed on the KOSDAQ. However, it is not easy to push listing for Inno-Biz because of the listing regulations.

Alternative Proposals for Promoting SME Financing

Policies for Promoting Korean Innovative SME Financing

First, is activating the investments of venture capital funds for innovative SMEs in the early stage. To do this, it is necessary to enhance the financial stability of venture capital companies by inducing large pension cooperatives and funds to invest in venture capital funds. Second, is activating bank loans to SMEs in the growth stage. There is a need to decentralize loan risks by developing financial derivatives. Third, is activating regional SME financing by rearing regional financial institutions. The loan risk of regional financial institutions will be decentralized by expanding basic finances in RCGFs [21]. Fourth, is activating the investment by private equity funds to innovative SMEs. This can be done by enlarging the scale of private equity funds through the active participation of large pensions and funds. Fifth, is activating SME financing from abroad. There is a need for a specialized organization that provides foreign investors and financial institutions with information about innovative SMEs.

Policies for Promoting Asian SME Financing

First, is establishing a credit bureau specializing in SMEs in each Asian country and sharing credit information about SMEs. Second, is establishing an international organization that collects information about innovative SMEs in Asia and provides information to investors and financial institutions in Asian countries. Third, is enhancing the transparency of SMEs by introducing international standard accounting systems in each Asian country. Fourth, is establishing a common Asian credit guarantee institution which can reduce the risks of investments and loans to innovative SMEs.

ENDNOTES

- A considerable portion of this paper is based on materials obtained from the websites of SMBA, SBC, KBIZ, BOK, KIPO, TIPA, KIAT, KEIT, KOITA, KODIT, KOTEC, KOREG, KVIC, KISED, APO, etc. I would like to thank the chief expert Dr. Gilberto Llanto and the national experts for helpful comments at coordination meetings.
- 2. APO, APO Productivity Databook 2012, p. 23.
- 3. India and Brazil witnessed their lowest levels of economic growth in recent years due to a reduction of demand for imports on the part of major economies, including the EU and China, as well as the shrinkage of fixed investment caused by a rise in policy interest rates initiated during 2011. Southeast Asian economies maintained relatively high economic growth rates, compared to other emerging economies, thanks largely to a robust level of domestic demand countering weak exports triggered by the aggravated external environment.
- 3a. APO, APO Productivity Databooks 2010–12.
- 3b. BOK, Annual Report 2012, 2013.
- 3c. BOK, Annual Reports 2005–12, each year's issue.
- 3d. Korean Economy 2005–12, each year's issue.
- 3e. http://www.bok.or.kr/ Economic Statistics System/English/accessed on June 10, 2013.
- 4. During the period 1997–2007, the number employed by SMEs rose to 2.9 million compared to 1.1 million with large enterprises.
- 4a. National Statistical Office of Korea (NSO), Report on the Census on Basic Characteristics of Establishment and Report on Mining and Manufacturing Survey, 2013.
- 4b. Article 2 of Framework Act on SMEs and Article 3 of Enforcement Decree of the Act.
- 4c. SMBA.
- 5. http://www.smba.go.kr/MajorPolicies/English/accessed on June 15, 2013.

- 6. At National Science & Technology Council (NSTC) meeting held in August 2009.
- 6a. Korea Federation of Small and Medium Business (KBIZ). http://www.kbiz.or.kr/ SMEs in Korea/ English/ accessed on June 12, 2013.
- http://www.kodit.co.kr/ Service of KODIT/ English/ accessed on June 18, 2013. http://www.kibo.or.kr/ Service of KOTEC/ English/ accessed on June 18, 2013. http://www.koreg.or.kr/ Performance/ English/ accessed on June 18, 2013. http://www.sbc.or.kr/ What We Do/ English/ accessed on June 20, 2013.
- 8. RCGFs were established in accordance with the provision of Article 32 of the civil law. To strengthen credit support for microenterprises, the Regional Credit Guarantee Foundation Act, a special law, was enacted in September 1999.
- 8a. KODIT, KOTEC, KOREG.
- 9. A subsidiary of SMBA
- 9a. SBC
- 10. http://www.smba.or.kr accessed on April 17, 2014.
- 11. http://www.kipo.go.kr/ KIPO's Activities/ English/accessed on June 21, 2013.
- 11a. KIPO
- http://www.tipa.or.kr/ Business/Korean/accessed on June 24, 2013. http://www.kiat.or.kr/ Major Activities of KIAT/English/accessed on June 22, 2013. http://www.keit.re.kr/ Activities/ English/accessed on June 22, 2013.
- 13. Shortly after the enactment of the Act, most of the ROK's universities organized new managing teams and established Technology Licensing Offices (TLOs). This law was slightly modified in 2005 and explicitly indicates that the rewards to inventors should be more than half of the technological royalties. Despite this new law and government support, the performance of technology commercialization is still below expectation.
- 14. As mentioned, the "five-year SME Technology Innovation Plan" aims to foster global SMEs through enhancement of technological competitiveness and promotion of new business start-ups based on technology & innovation. SMBA is promoting the spread of the research results of public research institutes to technological start-up SMEs.

- 14a. Korea Industrial Technology Association (KOITA). http://www.koita.or.kr/ Programs & Services/ English/accessed on June 25, 2013.
- SMBA, Annual Reports 2005–12, each year issue http://www.smba.go.kr/Major Policies/ English/accessed on June 15, 2013 http://www.kobia.or.kr/ Activities of KOBIA/Korean/accessed on June 24, 2013.
- 16. SMBA, Annual Reports 2005–12. http://www.smba.go.kr/Major Policies/ English/accessed on June 15, 2013. http://www.kodit.co.kr/ Service of KODIT/ English/accessed on June 18, 2013. http://www.kibo.or.kr/ Service of KOTEC/ English/accessed on June 18, 2013. http://www.sbc.or.kr/ What We Do/ English/accessed on June 20, 2013. http://www.k-vic.co.kr/ Fund of Funds/ English/accessed on June 24, 2013. http://www.kised.or.kr/ Business/Korean/accessed on June 25, 2013.
- 17. As stated, SMBA is supporting the information promotion of SMES through TIPA.
- 18. SMBA has also supported technology commercialization of SMEs through KIAT.
- 19. Business incubator is described in section 5.
- 20. Hong Soon-Yeong and Co-authors, A Study for Promotion of Korean SME Finance (the report to the President), Korea National Economic Advisory Council, 2006.
- 21. Hong S-Y., Rhee C.O. A Study on SME Policies with Changes in the Economics and Financial Structure, Korea Small Business Institute, 2007.
- 22. Hong S-Y., Rhee C.O. A Study on the Economic Effectiveness of Korean Financial Policies for SMEs against Global Financial Crisis, Korea Small Business Institute, 2010.

CHAPTER SIX: MALAYSIA

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INTRODUCTION

In line with global trends and technological advancements, future business growth will be driven mainly by technology and innovation. Globalization and new technologies will accelerate the necessity for changes in business models, industrial structures, and employee competencies.

Survey findings by SME Corporation Malaysia have shown that the recovery of Malaysian SMEs from the global financial crisis is firmly established. In the first quarter of 2010, SMEs based on 3,264 survey respondents expanded by 13% year-on-year in terms of sales growth. The respondents expected a better performance of 20% growth in the second quarter of 2010 and a full recovery by the second half of the year.

In Malaysia, the foundation for transformation is the New Economic Model (NEM) (Annex Figure 1). This supports innovation across all sectors and in everything from industry, education and healthcare, to management and even our way of thinking. The NEM offers initiatives to support the transformation of companies, including SMEs.

The NEM's approach is embedded in Strategic Reform Initiatives designed to re-energize the private sector, to build a knowledge-based infrastructure and to pursue additional sources of growth. Under the NEM, the role of SMEs as internal sources of economic growth will be further strengthened. Incentives will be offered to speed the transformation of SMEs that have high potential for innovation.

A key factor is having knowledge infrastructure that links government, the private sector, and academic institutions toward common goals and forging R&D linkages between institutions of higher learning and the private sector. Closer and pro-active collaboration between SMEs, research institutes, and universities will also be undertaken by making R&D programs more market-driven to meet the specific needs of SMEs, with emphasis on innovation.

The National Innovation Agenda (NIA), launched in 2007, is already helping to transform Malaysia into an innovation-led economy. It has three main thrusts. The first is a research agenda that targets the areas of competitive advantage and emphasizes commercialization of output. The second involves the development of intellectual capital in the fields of science and technology. The final thrust supports the National Innovation System.

To move innovation and commercialization forward, the government has established the National Innovation Center which is supported by a network of innovation excellence centres. The Center coordinates innovation activities and provides a movement for new product development and commercialization. It drives innovation across all fields.

The innovation-led economy demands a new breed of SMEs – firms that can foster marketand technology-driven innovation and create high-skilled jobs in all economic sectors. To fulfill this vision, the government is encouraging the development of innovation-led (InnoCERT) SMEs. These are SMEs that are market- and customer-focused, have a high percentage of knowledge professionals, and utilize technology and innovation for process and product development. Initiatives have been put in place to ensure a conducive environment for these companies to thrive, including a higher ceiling and higher margin of financing for 1-Innovation Certification for Enterprise Rating and Transformation (1-InnoCERT) SMEs.

In addition, the government has identified programs to harness the innovation potential of SMEs. SME Corp. Malaysia, through its One Referral Center, will provide SMEs with the information they need, about everything from business start-ups to exportation.

To complement the NIA, SME development programs under the 10th Malaysia Plan (10MP) will focus on developing innovative, competitive and resilient SMEs. The 10MP has three strategic thrusts: strengthening the enabling infrastructure, building capacity and capability, and enhancing access to financing.

The immense transformational power of technology and innovation improves the lives of all Malaysians. Through innovation and the exploitation of new ideas, additional value can be

captured from the same capital and human resource base. The government has an important role to play, setting the ground rules and providing a conducive environment for innovation. The government is committed to unlocking the growth and innovation potential of SMEs to create domestic, regional and global champions, to realise the goal of Vision 2020 to become a developed nation.

With the right infrastructure, programs and incentives in place, it is hoped that the government and the private sector can work together to ensure that Malaysia becomes a more competitive and prosperous nation.

OVERVIEW

Innovation will be the key to ensuring the high productivity growth that the Malaysian economy requires in order to attain high income and developed status by 2020. In many developed countries, SMEs have been the catalyst for initiating innovative ideas. In this regard, Malaysian SMEs have shown remarkable progress, with real GDP of SMEs consistently expanding at a faster pace than the overall economy since 2004, with an average annual growth rate of 7.7% compared with 5.7% growth in the overall economy.

SMEs in Malaysia constitute 99.2% or 548,627 of total establishments in the three main economic sectors of manufacturing, services, and agriculture. Most of the SMEs are found in the services sector, accounting for 86.6% of total establishments.

Malaysia has put in place policies, infrastructure, programs, and incentives to spur the development of SMEs, and acculturate innovation among SMEs. In conjunction with these, this chapter has been compiled to present the government's policy framework for supporting SME financing to promote innovation. The chapter covers Malaysia's economic growth as well as the contribution of SMEs to the Malaysian economy, how SMEs are defined in Malaysia, the level of innovation in Malaysia and promotion of the innovation-led economy which was initiated by the government, and financing programs to promote innovation by SMEs in Malaysia.

ECONOMIC GROWTH

The Malaysian Economy in 2009

Despite the downturn caused by the global economic and financial crisis in 2009, the Malaysian economy recorded strong growth of 7.2% in 2010. This was largely the result of domestic demand, further supported by external demand recovery. Strong support from domestic demand continued into 2012 which cushioned the negative impact of the weak external environment during 2009–12. Furthermore, domestic demand recorded the highest rate of expansion of the decade with support from consumption and investment spending.

In 2009, **aggregate domestic demand** recorded -0.4% as households and businesses became cautious following a significant deterioration in external demand, weaker labormarket conditions and an overall decline in private sector sentiment in the first half of the year. However, conditions began to stabilize in the second-half of the year and continued to do so into 2010. Increased consumer spending, improved labor market conditions and the expansion of capital spending by private investment improved domestic demand in 2010. In 2012 aggregate domestic demand contributed significantly to GDP growth. The large contribution was attributed mainly to investment activity and strong growth in private consumption (Annex Table 1).

On the **supply side**, 2010 witnessed a recovery in the manufacturing sector after a decline in 2009 resulting from the significant deterioration in external demand. Nevertheless, the services sector was the largest contributor to GDP growth, accounting for 3.9% in 2010, though it experienced a marginal decline in the first quarter in 2009 mainly due to contractions in the sub-sectors related to manufacturing and trade. In 2012, all sectors expanded while the construction and services sectors remained the largest growth contributors. Both exportand domestic-oriented industries registered better growth in 2012 as a result of growth in the manufacturing sector's performance (Annex Table 2).

Conditions in the **labor market** recorded an improvement in 2010 after experiencing a weakening in 2009 due to firms in the manufacturing sector being affected by the crisis, which scaled back some of their operations. The unemployment rate declined in 2010 to 3.4% compared to 3.7% in 2009. The employment rate continued to grow in 2012 at 3.6% with additions mostly in services and agriculture sectors.

Headline inflation averaged 0.6% in 2009 as inflationary pressures in Malaysia moderated substantially, in line with global developments. The marked decline in headline inflation

was driven by supply-related factors and subdued demand conditions. In 2010, core inflation moderated to 1.5%, while in 2012 it was 1.6% resulting from better domestic food supply conditions and a slower increase in transport prices (Annex Table 3).

Malaysia's **external position** remained strong in 2009 despite the extremely weak external environment. During the year, the current account remained in surplus, supported by a sizeable trade surplus and improvements in the services account. Despite the significant deterioration in gross exports, particularly in the first half of the year, the trade surplus remained large as lower demand for exports was accompanied by a decline in imports. In the financial account, lower net outflows were recorded, reflecting the significant moderation in portfolio outflows in the first half of the year and the net inflows in the second half of the year. As the current account surplus more than offset the net outflows on the financial account, the overall balance of payments recorded a surplus in 2009. This situation remained in 2010, with lower net outflow and lower trade surplus due to import growth being outpaced by export growth. Meanwhile, the services account posted a small surplus supported by receipts from tourism and IT services. During the year the financial account recorded a smaller net outflow due to the resumption of portfolio inflows and higher foreign direct investment. Malaysia's balance of payments continued to be resilient in 2012 despite uncertainties in the global economy and financial markets. The current account recorded a surplus that more than offset the net capital outflow.

In 2009, the **net international reserves** of Bank Negara Malaysia increased by MYR13.8 billion to MYR331.3 billion (equivalent to USD96.7 billion) as at 31 December 2009. The increase in reserves was mainly supported by the continued surplus in the current account. Net foreign portfolio inflows in the second half of the year also contributed to the increase in net international reserves. As at the end of 2010, international reserves amounted to MYR328.6 billion (equivalent to USD96.8 billion). Meanwhile, in 2012 reserves increased to MYR427.2 billion (equivalent to USD139.7 billion).

SME Contribution in Malaysian Economy

SMEs represent the majority of businesses in Malaysia, constituting 99.2% of total establishments in the country and providing employment for about 56% of the total workforce. Nevertheless, in terms of contribution to GDP and export, Malaysian SMEs lag behind SMEs in developed nations (National SME Development Council, 2010) [1]. Thus, SME development has been accorded national priority to realize the full potential of SMEs to the economy. An aggressive development program has been put in place to transform SMEs into competitive, resilient and value-creating entities with the aim of achieving sustainable and balanced economic growth with high standards of living.

SMEs stimulate entrepreneurship and private ownership as well as act as incubators for developing domestic entrepreneurs into large corporations. In addition, SMEs also provide a broad range of activities and can act as a catalyst to new areas of growth, thus broadening the economic base. Given their importance to the economy, development of SMEs has been made a national priority. The target is to raise the contribution of SMEs to GDP from 32% in 2010 to 41% in 2020, export from 19% to 25% and employment share from 59% to 62% in 2020 (Ministry of International Trade and Industry (MITI, 2006) [2].

Current Situation in Malaysia

The adoption and application of advanced technologies contribute significantly to creating competitive businesses. While it can turn out to be costly exercise, ICT has been instrumental in improving the efficiency, productivity and performance of SMEs. The global acceptance of electronic payment (e-payment) for example, provides both speed and convenience in making and accepting payments, allowing SMEs to transact more efficiently and, in the process, take advantage of the opportunities for their businesses to grow.

The ICT sector in Malaysia contributed 9.8% to GDP in 2009 and is expected to contribute 10.2% in 2015. Despite recording slower growth in 2009 of 5.0%, compared to 7.0% in 2008, the sector was expected to accelerate in 2010. The positive outlook was attributed to two main factors. The first was continued focus on developing the regional economic corridors that require extensive ICT infrastructure. The second was the role of ICT in the development of Islamic banking, Takaful and re-Takaful premiums. The deployment of shared services and outsourcing (SSO), content development, e-commerce and Internet-based services and solutions were also expected to play a significant role in the development of the ICT sector.

To implement the ICT development program, the government has allocated MYR400 million (USD114.3 million) for the provision of broadband, covering both wired and wireless modes in the economic stimulus package. In particular, the High Speed Broadband Project (HSBP), with a planned capacity of 10Mbps, was targeted at areas experiencing high economic and population growth. With such stimuli and catalysts, the provision of broadband was poised to increase from a level of 11% per household in 2005 to 50% by 2010. This initiative was targeted to increase GDP and create another 135,000 jobs.

To ensure the continued success of broadband provision and the take-up of electronic services in the public and private sectors, the participation of target communities is crucial, especially in embracing this technology. The usage of computers, the Internet and broadband among the Malaysian population is relatively low compared to other

countries. The broadband penetration rate per 100 households was 31.7% in 2009. Under the 10MP, it was targeted that in 2010 the penetration rate would increase to 50.0% and further to 75.0% in 2015.

OVERVIEW OF SME FINANCING STRUCTURE

Definition of SME

Malaysia has adopted a common definition of SMEs to facilitate their identification in the various sectors and subsectors. This has facilitated the government to formulate effective development policies and support programs and to provide technical and financial assistance.

An enterprise is considered an SME in each of the respective sectors based on its annual sales turnover or number of full-time employees as shown in Annex Table 4.

Manufacturing, Manufacturing-Related Services and Agro-based industries

"Small and medium enterprises in the manufacturing, manufacturing related services and agro-based industries are enterprises with full-time employees not exceeding 150 OR with annual sales turnover not exceeding MYR25 million" (National SME Development Council, 2010)

Services, Primary Agriculture and ICT

"Small and medium enterprises in the services, primary agriculture and ICT sectors are enterprises with full-time employees not exceeding 50 OR with annual sales turnover not exceeding MYR5 million" (National SME Development Council, 2010) [1].

Definition of K-Based SMEs

National SME Development Council-defined K-Based SMEs are shown in Annex Table 5.

Features and Characteristics of SME Policies in General

The government's policy aspirations for SME development are embodied in the medium and long-term development policies, namely the Ninth Malaysia Plan (9MP) and the Third Industrial Master Plan (IMP3). The National SME Development Council is an important

platform established in 2004 to chart the overall policy direction and strategy for SME development. The Annual Plan underlines three main strategic thrusts aimed at:

Strengthening the enabling infrastructure

Developing and strengthening the physical infrastructure and information management and creating conducive regulations and operating requirements for SMEs;

Building the capacity and capability of domestic SMEs

This focuses on areas pertaining to entrepreneurship development, human capital development, advisory services, awareness and outreach, marketing and promotion, technology enhancement and product development; and

Enhancing access to financing by SMEs

This encompasses the development and strengthening of institutional arrangements to support SMEs' financing outreach.

SME POLICIES FOCUSING ON PROMOTION OF INNOVATION

The Ninth Malaysia Plan (9MP)

The 9MP, from 2006 to 2010, was designed to prepare and equip SMEs with the necessary capabilities and capacity to meet the challenges of an increasingly liberalized business environment. Innovation and the acquisition of new technologies and compliance to internationally accepted standards are integral factors in creating more competitive SMEs with global aspirations. The 9MP was organized according to the thrusts of the National Mission, with policies focusing on promotion of innovation contained in Strategic Thrust 2.

Thrust 2: To Raise the Capacity for Knowledge and Innovation and Nurture "First-Class Mentality"

During the 9MP period, efforts were intensified and programs undertaken to deliver the National Mission's priorities of increasing innovation and nurturing top quality R&D. Strategies in place are:

Strengthening Policy Commitment

During the Plan period, the government placed emphasis on human resource capacity building and on strengthening the National Innovation System. A National Innovation Council (NIC) was to be established to provide leadership in the formulation of policies and key strategies to stimulate a culture of innovation in the country.

The NIC (Annex Figure 2), under the Ministry of Science, Technology and Innovation (MOSTI) and chaired by the prime minister, established the NIA which aimed to establish the National Innovation-Led Economy to achieve market-driven and technology-driven innovation for wealth creation and societal well-being. The NIC also established the Jawatankuasa Tindakan Penyelarasan Inovasi Negara (JTPIN), a committee responsible to drive the decisions of the NIC for the NIA.

The innovation economy demands a new breed of SMEs that can help drive market-driven and technology-driven innovation to create jobs and wealth. Unlike traditional SMEs, these new i-SMEs need to manage risks associated with market-driven and technology-driven innovation, namely technology risk, funding risk, and market risk. As such, government support is urgently needed to mitigate these high risks in order to achieve a critical mass of this new breed of i-SMEs (Annex Figure 3).

Enhancing Research and Development Capabilities

The 9MP targeted national R&D expenditure of 1.5% of GDP by 2010. To obtain the targets, research and innovation capabilities were to be strengthened and various initiatives undertaken to help build a critical mass of researchers in priority areas. The R&D capacity of universities and research institutions were also increased. To date, there are 22,321 researchers including scientists. In addition, the private sector, including GLCs, will be encouraged to provide more grants and funds for research in priority and strategic areas including in developing innovative products for commercialization.

Promoting Technopreneurship and Technology-based Enterprises

The Technology Incubator Programme will be enhanced to develop sustainable indigenous technopreneurs and technology-based companies. To further encourage innovation, technology transfer and commercialization, the existing intellectual property (IP) framework will be strengthened to enhance IP support facilities and to shorten the IP approval process. The technopreneurship development program will also be utilized as part of the effort to nurture a Bumiputera science and technology community. The World Bank ranked Malaysia 57th, with a GDP of USD\$7,221 (GDP from high-tech industries)

The Tenth Malaysia Plan (10MP)

The 10MP, from 2011 to 2015, is designed to translate the strategies and policies related to the Government Transformation Program (GTP) and NEM into action. The 10MP is built on five key strategic thrusts, which include to continue developing SMEs to be more competitive in the global economy and to be engines of growth for the country.

Developing SMEs as Engines of Growth and Innovation

The Malaysian government is committed to unlock the growth and innovation potential of SMEs during the 10MP period to create domestic, regional, and global champions. With that, the following initiatives will be undertaken:

- Reducing the regulatory costs borne by SMEs
- Building capacity and capabilities of SMEs
- Supporting the creation of an entrepreneurial culture
- Strengthening support systems for SMEs
- Enhancing access to financing for SMEs

The Third Industrial Master Plan (IMP3)

The IMP3 underlines strategies to strengthen the economic foundation of SMEs across all key sectors. The strategies are:

- Enhancing competitiveness
- Capitalizing on outward investment opportunities
- Providing a cohesive and supportive regulatory and institutional framework
- Nurturing the services sector
- Focus on technology and innovation

Strategy: Focus on Technology and Innovation

The National SME Innovation Focal Point was established in 2006 under the IMP3's Strategic Thrust of "Driving the Growth of SMEs through Technology and Innovation". This Focal Point reinforces the collaboration between industry associations, entrepreneurs, research institutions, financiers, and relevant government agencies. Their roles are to discuss initiatives and programs for the development of innovation-driven SMEs and to ensure that SMEs have access to the best technologies. Action plans for the implementation of strategies and policies for SME development based on innovation under the IMP3 are as follows:
- To strengthen incubation centres to further support growth of technology-based SMEs.
- To support the upgrading of resources, research institutes, and universities to enable the provision of more effective advisory services for the commercialization of research findings.

In 2008, the National SME Innovation Focal Point was merged with the Jawatankuasa Kecil SME/Teknopreneur, a sub-committee established under JTPIN, and is now known as Jawatankuasa Inovasi EKS. JTPIN is a committee chaired by the Secretary General to drive the implementation of the NIA, to transform Malaysia into an innovation-led economy. Among the key outcomes of the Jawatankuasa Inovasi EKS are:

Development of i-SMEs

The innovation economy demands a new breed of SMEs that can help foster market- and technology-driven innovation to create more high-skilled jobs in all economic sectors. Unlike traditional SMEs, these i-SMEs need to manage new risks associated with technology, funding, and markets. Hence, the government has provided a conducive environment for the development of i-SMEs through:

- 1. Provision of fiscal incentives, including lower individual income tax to reduce their tax burden and encourage greater participation in high risk ventures;
- 2. Launching of a fast-track program for i-SMEs to shorten time-to-market by providing ready access to capital risk, priority access to government procurement and IP/patent registration; and
- 3. Provision of access to research for technology through existing technology fund.

The characteristics of i-SMEs are detailed in Annex Figure 4.

LEVEL OF INNOVATION-RELATED ACTIVITIES

Definition of Innovation in Malaysia

An innovation is the implementation of a new or significantly improved product be it a good, service, process, a new marketing method, or a new organizational method in business practices, workplace organization or external relations (OECD, 2005) [3].

Patents

A patent is an exclusive right granted for an invention, which is a product or a process that provides a new way of doing something, or offers a new technical solution to a problem. Meanwhile, a utility innovation is an exclusive right granted for a "minor" invention which does not need to satisfy the test of inventiveness required for a patent [4].

An applicant must file a patent or utility innovation application with the Intellectual Property Corporation of Malaysia (MyIPO). Patent or utility innovation protection gives the owner of the patent/utility innovation the exclusive right to stop others from manufacturing, using and/or selling the owner's invention in Malaysia without the owner's consent or permission.

A patent is protected 20 years from the date of filing and a utility innovation is protected 10 + 5 + 5 years from the date of filing subject to use.

For a patent to be granted, an invention must:

- Be new, which means that the invention has not been publicly disclosed in any form, anywhere in the world;
- Involve an inventive step, that is to say the invention must not be obvious to someone with knowledge and experience in the technological field of the invention; and
- Be industrially applicable, meaning it can be mass produced.

Patent statistics are shown in Annex Table 6 and Annex Table 7.

FINANCING PROGRAMS TO PROMOTE INNOVATION FOR SMES

R&D and innovation assume key roles in advancing S&T in a knowledge-based and innovation-driven economy. New and/or cutting-edge technologies create new products/ services that enhance wealth creation and societal well-being for nations. At the same time, R&D enhances national competitive advantage.

Malaysia has factored in an innovation-led strategy in its 9MP. In it, emphasis is given to service innovation, and a multidisciplinary approach is taken that encompasses technology innovation, business innovation, demand innovation, and socioorganizational innovation. Realizing the importance of R&D and innovation, the government has initiated a few programs to promote and accelerate the growth of new start-up technologies and innovation-based companies.

Strategic Thrust	Related Ministries/ Agencies	Major Programs	Program Objectives
Building Capacity and Capability	MTDC	Commercialization of R&D Fund	Leverage of science, technology and innovation (STI) for national development, wealth creation via commercialization of products and processes.
	MTDC	Technology Acquisition Fund	Promote utilization of foreign technology for manufacturing and physical development of existing and new products and processes to increase wealth creation and technology content of Malaysian companies while enhancing their global competitiveness.
	MOSTI	TechnoFund	Competitive funding to undertake development of new or cutting- edge technologies which have the commercial potential to create new businesses and create economic wealth.
Building Capacity and Capability	MOSTI	Innofund	To develop new or improve existing products, process or services with elements of innovation for commercialization.
	Malaysia Venture Capital Management Berhad	ICT	Empower entrepreneurs to create wealth and serve as an ideal training ground to groom venture capitalists.
	Malaysia Debt Ventures Berhad	iMTN Issue	To provide innovative financing solutions, nurturing and supporting companies through timely business advice and ongoing cooperation and collaboration.
	Cradle Fund Sdn. Bhd.	CIP Catalyst Grant	To provide funds to group of entrepreneurs for development of prototype or proof of concept.

Table 1. Summary of Financing Programs by Related Ministries/Agencies

(...continued)

Strategic Thrust	Related Ministries/ Agencies	Major Programs	Program Objectives
	Kumpulan Modal Perdana Sdn. Bhd.	Perdana Fund	Enables Modal Perdana to build a pool of local technology companies as potential recipients of technology transfer arising from its overseas Venture Capital funds or investments.
	SME Corporation Malaysia	Matching Grant for Product and Process Improvement	Provide matching grant to SMEs for improvement and upgrading of existing products, product design and process upgrading.
Building Capacity and Capability	SME Corporation Malaysia	Matching grant for Certification and Quality Management Systems	Provide matching grant for SMEs to obtain certification and quality management systems.
	SME Corporation Malaysia	SME-University Internship Programme	Facilitate and upgrade SMEs' knowledge towards improving the business processes, productivity and financial performance while the students will be further nurtured with knowledge related to entrepreneurship.
	SME Corporation Malaysia	1-InnoCert	To identify suitable and capable SMEs who are eligible to be placed in a FTP to shorten time-to-market by providing ready access to capital risk, including for technology acquisition.

Note: MTDC, Malaysian Technology Development Corporation; MOSTI, Ministry of Science, Technology and Innovation; (iMTN) Islamic Medium Term Note; (FTP) Fast Track Programme (FTP).

Commercialization of R&D (CRDF)

Description

The CRDF was established to provide partial grants to qualified R&D projects for commercialization and as an added stimulus towards the commercialization of R&D activities.

Target Group

- University/Research Institution (RI) commercialization offices
- Researchers/Academic Staff
- Start-up companies, excluding subsidiaries of existing companies
- All Malaysian incorporated SMEs

Funding ranges from MYR500,000 (USD0.15 million) to MYR4 million (USD 1.25 million) to cover 50%–90% of eligible projects costs depending on the categories of CRDF.

Results Achieved

Under the 9MP, 21 start-ups based on technologies were approved under CRDF. Performance of programs under the 9MP:

- 1. Number of projects commercialized: 124
- 2. Details of IP created is as follows:

Table 2. Intellectual Property under CRDF

Intellectual Property	CRDF
Patents	71
Copyright	6
Trademarks	88
Industrial Designs	12
Total	177

Technology Acquisition Fund (TAF)

Description

The establishment of the Technology Acquisition Fund (TAF) is to facilitate the acquisition of strategic and relevant technology by the Malaysian industrial sector. It provides partial grants to further promote efforts by the private sector to acquire new technology and to enhance their technology level and production processes through:

- 1. Licensing of technology
- 2. Purchase of technology; and
- 3. Outright purchase of technology

Target Group

Incorporated Malaysian manufacturing companies (SMEs and large corporations) excluding government-linked companies (GLCs), public listed companies and their subsidiaries.

Funding is MYR2 million (USD0.63 million) to cover 50% of eligible project cost.

Results Achieved

Performance for program under 9MP:

- 1. Number of projects commercialized: 26
- 2. Details of IP created is as follows:

Table 3. Intellectual Property under TAF

Intellectual Property	TAF
Patents	18
Copyright	2
Trademarks	19
Industrial Designs	7
Total	46

Besides the CRDF and TAF programs, MTDC also has a graduate entrepreneurial program known as the SymbiosisTM Program, which has among its objectives:

- 1. To promote the commercialization of R&D output of public universities and research institutions (U/RI);
- 2. To increase the number of technology-based start-ups;
- 3. To equip fresh graduates with entrepreneurial skills; and
- 4. To provide employment for fresh graduates in a technology-based industry set-up.

To date, MTDC has conducted two Symbiosis[™] Programs with 24 participants trained to be entrepreneurs. Through these programs, successful participants will commercialize potential technologies from Unversiti Kebangsaan Malaysia (UKM) and Universiti Teknologi Malaysia (UTM).

TechnoFund

Description

TechnoFund is a competitive funding to undertake development of new and/or cutting-edge technologies in five technology clusters – biotechnology, ICT, industry, sea to space, and S&T core. These technologies must have the commercial potential to create new businesses and generate economic wealth for Malaysia. The objectives are:

- To stimulate the growth and successful innovation of Malaysian technology-based enterprises by increasing their level of R&D and commercialization;
- To encourage institutions, local companies and inventors to capitalize their intellectual work through patent registration.

Types of funding

- Type A: Pre-commercialization
- Type B: IP acquisition (laboratory scale)

Eligibility

- 1. Companies incorporated in Malaysia with a minimum of 51% equity held by Malaysians;
- 2. Institutions of higher learning (IHLs); and
- 3. Government research institutes (GRIs).

Quantum of Funding

Up to a maximum of the total project cost or MYR3 million (USD0.94 million) whichever is lower based on merit of the case and reasonable justification. For projects with IP acquisition (Type B), funding is up to a maximum of 100% of the total acquisition cost or MYR2 million (USD0.63 million) whichever is lower.

InnoFund or Enterprise Innovation Fund (EIF)

Description

- To increase the participation of micro businesses, small businesses, and individuals/soleproprietors in innovative activities.
- To develop new or improve existing products, processes or services with elements of innovation for commercialization.
- To encourage technological innovation for product, process and service improvement.

Eligibility

- Applicants must be Malaysian individuals, sole-proprietors, micro or small enterprises
- Project proposals must contain elements of technological innovation leading to commercialization of innovative products, processes and services.

The technological innovation may be:

- The re-combination, fusion or integration of technologies that lead to new products, processes or services;
- The replication or refinement of existing technologies with improved value enhanced efficiency or cost reduction.
- The project must focus on one of the technology clusters identified.
- Person(s) involved in the project should have suitable qualification or experience.
- Applicants must show proof of financial capability to fund the portion of project costs not supported under EIF.
- The project must be undertaken in Malaysia.
- The applicant (for individual applicants only) must identify one key person/referee whom MOSTI may contact for verification purposes. The consent of the individual must be sought. The referee must also be aware of the details of the application.

Quantum of Funding

The quantum and duration of funding approved under EIF will be based on the merits of each application as listed in Table 4:

Table 4. Funding approved under EIF

Category	Quantum (Maximum)	Maximum Duration (Months)
Individual	MYR50,000 (USD0.015 million)	12
Other	MYR300,000 (USD0.094 million)	12

Information Communication and Technology (ICT) Fund

Description

The ICT Fund was established to meet a few objectives:

- Empower entrepreneurs to create wealth
- Generate attractive returns from its investment
- Serve as an ideal training ground to groom venture capitalists

Fund Size

Minimum – MYR1 million (USD0.31 million) per recipient Maximum – MYR30 million (USD9.41 million) per recipient

Results Achieved

Performance for program under 9MP:

- 1. Number. of funded investees -20
- 2. Malaysia Venture Capital Management Bhd (MAVCAP) has funded many new technology businesses and has taken 10 companies for listings

Islamic Medium Term Note (iMTN) Issue

Description

The ICT and Biotech Project Financing Programme was established to provide innovative financing solutions, nurturing and supporting companies through timely business advice and ongoing cooperation and collaboration, supporting the Malaysian government initiative in the national ICT and Biotech agenda.

Fund Size

Minimum – MYR250,000 (USD0.078 million) per recipient Maximum – MYR120 million (USD37.6 million) per recipient

Results Achieved

Performance for program:

- 1. Number of funded investees 81
- The total value of contracts financed by Malaysia Debt Ventures Bhd (MDV) via its programs is estimated at close to MYR2 billion (USD627 million). MDV has financed 225 ICT/Biotech companies, of which 68% were SMEs and 59% are Bumiputera-owned. MDV funding of companies has supported more than 15,000 employment opportunities. To date, total financing channeled by MDV to growth companies in emerging sectors has exceeded USD1.41 billion.

Cradle Investment Program (CIP) Catalyst Grant

Description

The grant was established under Cradle Fund Sdn. Bhd. (CFSB) to provide funds to groups of entrepreneurs for development of prototype or proof of concept.

Max Fund Size

MYR150,000 (USD0.047 million) per recipient

Results Achieved

Performance for program: Number. of funded investees - 411

Perdana Fund

Description

The fund was established under Kumpulan Modal Perdana Sdn. Bhd. (KMPSB). It is a Malaysian-based investment fund that invests in pre-initial public offering (pre-IPO) and high-growth companies. Perdana Fund enables KMPSB to build a pool of local technology companies as potential recipients of technology transfer/business collaboration opportunities arising from its overseas venture capital funds/investments.

Fund Size

Minimum – MYR0.5 million (USD0.16 million) per recipient Maximum – MYR4.0 million (USD1.25 million) per recipient

Results Achieved

Performance for program:

- 1. Number of funded investees -15
- 2. As of 30 June 2010, KMPSB has 40 portfolio companies. Six portfolio companies are already listed on Bursa Malaysia while one is listed on AIM in London, one on the New York Stock Exchange (NYSE) and one on the Singapore Stock Exchange.

Matching Grant for Product and Process Improvement

Description

The program was established to provide matching grant to SMEs for improvement and upgrading of existing products, products design and process upgrading.

Eligible Sectors

- Manufacturing and manufacturing-related services
- Services

Eligible Expenses

- Technology feasibility studies
- Development of prototypes and system design

- Product testing, registration, marking and labeling
- Machine and equipment testing and calibration
- Development and designing of equipment and machinery
- Purchase of machinery and equipment related to the project
- Initial patent registration / patent search / IP protection
- Specific project mission for technology study

Results Achieved

In 2009, 333 SMEs benefited from the Matching Grant for Product and Process Improvement program to the value of MYR43.07 million (USD13.5 million).

Figure 1 shows the number of SMEs that have benefited from the Matching Grant for Product and Process Improvement program from 2007 to 2009.



Figure 1. Number of SMEs benefiting from the Matching Grant for Product and Process Improvement program

Matching Grant for Certification and Quality Management Systems

Description

This program was established to provide matching grant for SMEs to obtain certification and quality management system.

Eligible Sectors

- Manufacturing and manufacturing-related services
- Services

Eligible Expenses

- ISO 13485, ISO 14000, ISO 22000, product certification
- Hazard Analysis Critical Control Point (HACCP)
- Halal certification & MS1500:2004, TS 16949
- Quality improvement practice, good manufacturing practice
- Occupational safety and health management system (OSHA)
- Other related costs to comply with the requirements of standards and certification

Results Achieved

In 2009, 172 SMEs benefited from the Matching Grant for Certification and Quality Management Systems program worth MYR6.61 million (USD2.07 million). Figure 2 shows the number of SMEs benefiting from the program.



Figure 2. Number of SMEs benefiting from the Matching Grant for Certification and Quality Management Systems program

SME–University Internship Program

Description

The SME–University Internship Program is an initiative to link SMEs to universities as part of the government's efforts to enhance the synergy between industry and universities to upgrade the capacity and capability of SMEs.

Under this program, final year students under the tutelage of their lecturers, SME Corp.. Malaysia's business counsellors and SME Expert Advisory Panel (SEAP) provide consultancy, advisory and mentoring to upgrade and improve the SME's operations including management, branding, marketing, accounts and technical advisory.

On the part of the students, the program provides industry exposure, "real-life" SME day-today issues, practical application of their studies and boosts their interest in doing business.

Pilot Project

Final year university students are attached to selected SMEs for a period of three months. The students, with guidance from lecturers, will analyse issues and problems faced by the SMEs and recommend possible solutions to improve the situation.

Results Achieved

Performance of the program:

- No. of students and SMEs involved: 2008: 20 students and 5 SMEs 2009: 50 students and 10 SMEs
- 2. The project saw an overall improvement in the performance of the participating companies which included increases in sales, better layout of their premises as well as more systematic business management and operations.

1-Innovation Certification for Enterprise Rating & Transformation (1-InnoCERT)

Description

This program has been developed to identify suitable and capable SMEs which are eligible to be placed in a FTP to shorten time-to-market by providing ready access to risk capital, including for technology acquisition.

SME Corp. Malaysia has been appointed to lead the 1-InnoCERT Programme and Malaysia Industry-Government Group for High Technology (MIGHT) has been appointed as an

Operating Vehicle to implement the 1-InnoCERT Programme.

By pursuing the 1-InnoCERT certification, companies will be guided through coaching and business advisory to implement innovation systems, processes, and business models in order to comply with the innovation standard. Certified companies will be granted fast-track access to incentives, including funding for their project (Annex Figure 5).

Initiatives

Four initiatives have been introduced to develop the 1-InnoCERT program. These are (Annex Figure 6):

- Provision of fiscal incentives to encourage greater participation in high risk venture;
- Launch of FTP for 1-InnoCERT;
- Establishment of angel network; and
- Innovation-Enhancement Points, incorporated under FTP as benefits for the 1-InnoCERT.

Parameters

Four main parameters evaluated in the 1-InnoCERT are (Annex Figure 7):

- Technology innovation ability
- Technology commercialization ability
- Technology innovation management ability
- Technology innovation result

Results Achieved

A pilot test was conducted to observe the viability of the criteria for Malaysian SMEs. Four companies were selected and completed the initial pilot test of the online and on-site assessment. All four companies qualified for 1-InnoCERT certification based on on-line assessment and on-site visit audit. It was concluded that the model is suitable for Malaysian SMEs. The pilot companies were:

- 1. Manufacturing (food) Sal's Food Industries Sdn. Bhd.
- 2. Renewable energy (biomass plant) Mensilin Holding Sdn. Bhd.
- Design (mixed signal integrated circuit (IC) product design MSC Status) IC Microsystems Sdn. Bhd.
- 4. Design (crypto mobile and biotech equipment) Dallab Inc. Sdn. Bhd. and Dallab Sdn. Bhd.

A total of 105 companies that completed the on-line assessment obtained a pass mark of 700. Out of these, 63 companies were successfully certified for 1-InnoCert in 2010.

CONCLUSION

Malaysia has put in place policies, infrastructure, programs, and incentives to spur the development of SMEs and acculturate innovation among them. The year 2010 marked the end of the 9MP, with continued support given in the 10MP, which runs from 2011 to 2015. It is noted that SMEs are important contributors to the nation's wealth and societal well-being. The above analysis of the financing program to promote innovation for SMEs has shown that the program has assisted them to enhance their performance.

ANNEX FIGURES AND TABLES



Annex Figure 1. New Economic Model Source: National Economic Advisory Council (2009), New Economic Model for Malaysia Part 1 [5].



Annex Figure 2. National Innovation Council

Source: Ministry of Science, Technology and Innovation [7].

Note: MOF, Ministry of Finance; BNM, Bank Negara Malaysia; MDeC, Multimedia Development Corporation; MIDA, Malaysian Investment Development Authority; MOH, Ministry of Health; MOA, Ministry of Agriculture; MNCs, Multinational Corporations.



Annex Figure 3. Definition of SMEs, K-SMEs & i-SMEs

Source: Small and Medium Enterprise Corporation Malaysia [8].

Note: * *i-SME* was the original term. It was subsequently broadened to include non-SMEs. Then the term was changed to 1–Innovation Certification for Enterprise Rating & Transformation (1-InnoCERT).



Annex Figure 4. Characteristics of i-SMEs Source: Small and Medium Enterprise Corporation Malaysia [8].



Annex Figure 5. 1-InnoCERT Certification Process Source: Small and Medium Enterprise Corporation Malaysia [8].



Annex Figure 6. National Innovation Action Plan Source: Ministry of Science, Technology and Innovation [7].



Annex Figure 7. Innovation Certification Assessment Criteria Source: Small and Medium Enterprise Corporation Malaysia [8].

Real GDP by Expenditure Components (% change)							
	2008	2009	2010	2011	2012		
Domestic Demand ¹	6.8	-0.4	6.3	7.9	10.6		
Private sector expenditure							
Consumption	8.5	0.7	6.5	6.8	7.7		
Investment	0.8	-17.0	17.7	10.5	21.9		
Public sector expenditure							
Consumption	10.9	3.9	0.5	15.8	5.1		
Investment	0.7	7.5	2.8	1.0	17.1		
Net exports of goods and services	-3.5	3.2	-25.7	-4.6	-31.7		
Exports	1.3	-10.5	9.9	4.6	-0.1		
Imports	1.9	-12.2	15.1	6.1	4.7		
Real GDP	4.6	-1.6	7.2	5.1	5.6		

Annex Table 1. Real GDP by Expenditure Components (% change)

Source: National SME Development Council (2013), SME Annual Report 2012/13 [5]. Note: 1 Excluding stocks.

Annex Table 2. Real GDP by Sector (2000=100)

Real GDP by Sector (2000=100)								
	2008 2009 2010 2011							
Annual change (%)								
Agriculture	4.0	0.6	2.1	5.8	1.0			
Mining & quarrying	-0.8	-6.3	0.2	-5.5	1.4			
Manufacturing	1.3	-9.3	11.4	4.7	4.8			
Construction	2.1	5.9	5.1	4.7	18.1			
Services	7.2	3.1	6.8	7.0	6.4			
Real GDP	4.6	-1.6	7.2	5.1	5.6			

Source: Department of Statistics, Malaysia [6].

Inflation and Unemployment							
	2008 2009 2010 2011 201						
	Inflation (% change)						
СРІ	5.4ª	0.6ª	1.7ª	3.2 ^b	1.6 ^b		
Core CPI	4.0	2.7	1.5	2.7	2.4		
Unemployment (% of labor force)	3.7	3.7	3.4	3.1	3.0		

Annex Table 3. Inflation and Unemployment

Source: National SME Development Council (2013), SME Annual Report 2012/13 [5]. Note: a 2005=100,b 2010=100.

Annex Table 4. Definition of Small and Medium Enterprises

	Micro-enterprise		Medium enterprise		
Manufacturing, Manufacturing- Related Services and Agro-based industries	Sales turnover of less than MYR250,000 OR full time employees less than 5	Sales turnover between MYR250,000 and less than RM10 million OR full time employees between 5 and 50	Sales turnover between MYR10 million and MYR25 million OR full time employees between 51 and 150		
Services, Primary Agriculture and Information & Communication Technology (ICT)	Sales turnover of less than MYR200,000 OR full time employees less than 5	Sales turnover between MYR200,000 and less than MYR1 million OR full time employees between 5 and 19	Sales turnover between MYR1 million and MYR5 million OR full time employees between 20 and 50		

Source: Department of Statistics, Malaysia [1].

Annex Table 5. Definition of K-Based SMEs

	Definition					
	SMEs, including consultancy firms that have knowledge workers making up more than 20% of their staff. Knowledge workers must possess at least tertiary or professional education;					
K-Based SMEs	SMEs that directly use ICT and technology in business processes or for product improvements;					
	SMEs that adopt innovation and R&D in business processes or for product improvements; or					
	SMEs that provide systematic training and learning of technical skills to their employees.					

Source: National SME Development Council (2010), SME Annual Report 2009/10 [1].

VEAD	A	APPLICATIO	N		D		
YLAK	Malaysia	Foreign	Total	Malaysia	Foreign	Total	
1986	29	233	262	-	_	_	
1987	71	3,195	3,266	-	_	_	
1988	73	1,547	1,620	_	6	6	
1989	84	1,803	1,887	11	121	132	
1990	92	2,213	2,305	20	498	518	
1991	106	2,321	2,427	29	1,021	1,050	
1992	151	2,260	2,411	10	1,124	1,134	
1993	198	2,684	2,882	14	1,270	1,284	
1994	223	3,364	3,587	21	1,608	1,629	
1995	185	3,992	4,177	29	1,724	1,753	
1996	221	5,354	5,575	79	1,722	1,801	
1997	179	6,278	6,457	52	741	793	
1998	193	5,770	5,963	21	545	566	
1999	218	5,624	5,842	39	683	722	
2000	206	6,021	6,227	24	381	405	
2001	271	5,663	5,934	18	1,452	1,470	
2002	322	4,615	4,937	32	1,460	1,492	
2003	376	4,686	5,062	31	1,547	1,578	
2004	522	4,920	5,442	24	2,323	2,347	
2005	522	5,764	6,286	37	2,471	2,508	
2006	531	4,269	4,800	187	6,562	6,749	
2007	670	1,702	2,372	338	6,645	6,983	
2008	864	4,539	5,403	198	2,044	2,242	
2009	1,234	4,503	5,737	270	3,198	3,468	
2010	1,275	5,189	6,464	204	1,973	2,177	
2011	1,136	5,423	6,559	335	2,057	2,392	
2012	1,160	5,867	7,027	308	2,193	2,501	
TOTAL	11,927	114,382	126,309	2,544	47,172	49,716	

Annex Table 6. Application and Granted Patents from 1986–2012

Source: Intellectual Property Corporation Malaysia [9].

VEAD				SECT	ΓΙΟΝ				
YEAK	A	В	С	D	Е	F	G	Н	TOTAL
1993	215	169	503	15	37	52	155	138	1,284
1994	260	267	505	12	71	79	192	243	1,629
1995	336	268	542	27	48	61	194	277	1,753
1996	285	323	483	31	76	103	178	322	1,801
1997	151	138	196	13	32	45	82	132	789
1998	104	98	141	4	18	31	64	106	566
1999	132	112	191	9	21	49	68	139	721
2000	61	59	110	8	19	42	36	70	405
2001	155	233	288	18	44	102	231	399	1,470
2002	206	236	334	19	42	104	228	323	1,492
2003	224	242	396	28	38	119	190	341	1,578
2004	325	377	625	25	50	132	321	492	2,347
2005	333	452	600	30	82	164	316	531	2,508
2006	948	1,155	1,275	101	197	448	1,042	1,583	6,749
2007	1,179	1,213	1,748	109	221	407	883	1,223	6,983
2008	423	421	451	33	98	159	293	364	2,242
2009	656	633	837	53	119	185	488	497	3,468
2010	364	390	599	22	75	125	274	328	2,177
2011	404	402	693	28	90	126	283	366	2,392
2012	445	424	722	25	72	101	328	384	2,501
TOTAL	7,635	7,898	11,905	635	1,519	2,711	6,046	8,522	46,871

Annex Table 7. Patents Granted Based on Field of Technology

Source: Intellectual Property Corporation Malaysia [4]. Note: International Patents Classification (IPC).

Section A:	Human Necessities
Section B:	Performing Operations; Transporting
Section C:	Chemistry; Metallurgy
Section D:	Textiles; Paper
Section E:	Fixed Constructions
Section F:	Mechanical Engineering; Lighting; Heating; Weapons; Blasting
Section G:	Physics
Section H:	Electricity

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CHAPTER SEVEN: PHILIPPINES

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INTRODUCTION

SMEs play an important role in economic growth and development. They create employment opportunities, add value and contribute to growth. SMEs have the potential to become powerful engines of manufactured export growth and upgrading in developing Asian countries [2]. To take advantage of globalization and be able to compete in regional and global markets, SMEs have to innovate. Innovation means the development, deployment, and economic utilization of new products, processes, and services (OECD, 1999). By being able to develop and commercialize competitive new products and processes, SMEs can significantly contribute to growth and employment. Recognizing their importance to growth, a joint ministerial statement by Asia-Pacific Economic Cooperation (APEC) countries called for steps to develop their innovative capacity and stressed the importance of financing for innovation [3]. This is important since innovation holds the key to SME survival and longterm growth and competitiveness. The APO (2007) has identified limited access to financing as one of the most critical impediments to SME growth. Several factors affect SMEs' access to financing: lack of collateral, lack of management skills, and poor corporate governance among SMEs. On the part of financial institutions, the factors are the high cost of financing, limited sources of funds, and the limited number of financial institutions capable of SME financing, among others.

This chapter examines government programs to promote innovation and financing to promote SME innovation in the Philippines, identifies barriers to such financing, and provides some recommendations to make financing more accessible to SMEs. After a brief introduction, section 2 provides an overview of the general findings of the paper. Section 3 summarizes the country's recent macroeconomic performance. Section 4 presents policies for the promotion of innovation among SMEs while section 5 describes the level of innovation-related activities in the country. Section 6 discusses financing policies and programs to promote innovation among SMEs and the last section provides some recommendations to strengthen SME financing for innovation.

OVERVIEW

The Magna Carta for MSMEs [4] defines SMEs as any business activity or enterprise engaged in industry, agri-business and/or services, whether single proprietorship, cooperative, partnership, or corporation, whose total assets [5] are valued as follows: small (PHP3.1 million/USD71,909 to PHP15 million/USD347,947); medium (PHP15.1 million/USD350,267 to PHP100 million/USD2.3 million) and large (PHP above 100 million). Microenterprises are those with assets of PHP3 million (USD69,590) or less. Enterprises are also categorized based on the number of employees: microenterprises (1–9); small (10–99); medium (100–199); and large (more than 200).

SMEs have great potential to contribute to sustained growth and employment creation, which can be realized through innovation in product offerings, processes and technologies. However, SMEs, and Philippine firms in general, have weak innovation capabilities and relatively poor technological absorption.

To foster a culture of innovation, the government formulated a national innovation strategy following the triple helix model of academe–industry–government linkages. The government, private universities, Non-Governmental Organizations (NGOs), and international aid agencies have launched varying programs and support services to promote innovation that could improve SME productivity and competitiveness. The government has stressed the importance of linkage between small and large firms, strengthening technology and R&D, human resource development, and access to financing.

Several financing programs to support innovations have been formulated but this has not solved the issue of difficult access to financing by SMEs. There is a great need to make these programs more accessible to SMEs. Improving coordination, fostering deeper information exchange and linkage among government agencies, academe and industry on such programs, and ensuring an appropriate incentive structure that protects intellectual property rights of innovators and inventors are critical for encouraging innovation among SMEs.

ECONOMIC GROWTH

Economic Growth

The Philippines exhibited creditable growth over the period 2008–12 with GDP expanding at an average of about 4.7% per year [6]. Sound macroeconomic fundamentals: continuing

improvement in the government's fiscal position, declining inflation, favorable interest rates, and a surplus in the current account, underpinned the recent remarkable performance, which seems to indicate that the economy is primed for higher and sustained growth (Table 1 and Figure 1). In the first half of 2013, GDP growth was 7.6% while inflation was 2.1%. External debt was less than a quarter of GDP while international reserves more than sufficiently covered imports and short-term debt requirements. Fixed capital formation and household final consumption expenditure contributed significantly to growth during the period. Exports declined due to weak external demand and slow recovery in advanced economies. Manufacturing, construction, finance, trade, and other services were the growth drivers [7].

Indicators	2008	2009	2010	2011	2012	Average
GDPa (at 2000 constant prices, in billion USD)	121.5	122.9	132.3	137.1	146.4	102.7
GDP growth rate (at constant prices, %)	4.2	1.1	7.6	3.6	6.8	4.66
Population (in million persons)	91.1	91.6	93.2	94.8	96.4	93.42
Population growth rate (%)	2.82	0.55	1.75	1.72	1.69	1.71
Per capita GDPa (in current USD)	1,333.5	1,341.4	1,419	1,446	1,518.8	1,411.7
Per capita GDP growth rate (at 2000 constant prices, %)	-	0.60	5.78	1.89	5.04	3.3
Unemployment rateb (2000-based population projection)	7.4	7.5	7.3	7	6.9	7.22
Inflation ratec (%, 2006-based CPI series)	8.3	4.1	3.8	4.6	3.2	4.8
Current account balance (in million USD)	3,627	9,358	8,922	6,970	7,126	7,200.6
Official reserve assets (in million USD)	37,550. 8	44,242.6	62,373.1	75,302.4	83,831.4	66,437.4
Exchange rate, PHP/USD	44.5	47.6	45.1	43.3	42.2	44.6

Table 1. Philippine Economic Indicators

Sources: PIDS Economic and Social Database (ESD) (http://econdb.pids.gov.ph/) [6]; NSCB Population Statistics

 $(http://www.nscb.gov.ph/secstat/d_popn.asp)\ [8].$

Notes:

a. Conversion rate employed PHP43.11: USD1.

- b. Starting 2007, employment estimates were based on population projections based on the 2000 Census of Population. Computation of Annual Estimates is based on NSCB Resolution No. 9, Approving and Adopting the Official Methodology for Generating Annual Labor and Employment Estimates (using the average estimates of the four LFS rounds.).
- c. Starting in 2004 inflation data were classified into Headline Inflation Rate.

Average per capita GDP in 2008–12 was USD1,411 while the per capita GDP growth rate averaged 3.3% in the same period. Poverty reduction is a continuing challenge, with poverty incidence among households hovering at 22.3% as of 2012 [9]. The economy was not able to generate enough jobs resulting in an unemployment rate of about 7.2% in 2008–12. In response, the government's Philippine Development Plan focuses heavily on the restructuring and strengthening of manufacturing and improving labor productivity. In 2011, MSMEs generated 3,872,406 jobs, with micro enterprises creating 1,778,353 jobs, small enterprises, 1,642,492, and medium enterprises 451,561. Large enterprises generated 2,473,336 jobs [10]. However, many of MSME jobs were of the low-skill, low-wage, low value-added type, which indicates the need for SMEs to innovate.

Contribution of SMEs to the National Economy

SMEs account for about 9% of all registered establishments in the country, contribute about 33% of GDP [11] and employ around 5.2% of the total workforce [12]. Around 60% of all exporters are SMEs, which account for 25% of the country's total export revenue, and are mostly in the wholesale and retail trade industries and manufacturing industries concentrated in the National Capital Region (NCR) and the Calabarzon [13].

As of 2011, there are 820,255 establishments in the country of which 90.6% (743,250) are microenterprises, 9% (73,509) are SMEs, and 0.4% (3,496) are large enterprises. Table 2 shows that the majority of the SMEs are in the wholesale and retail trade industries and the repair of motor vehicles and motorcycles (29.2%), followed by accommodation and food service activities (15.6%), manufacturing (14.9%), education (9%), and financial and insurance activities (7%).

Industry Sector	Total	%	Micro	%	SMEs	%	Large	%
Agriculture Forestry and Fishing	5,124	0.6	3,559	0.5	1,417	1.9	148	4.2
Mining and Quarrying	570	0.1	356	0.0	180	0.2	34	1.0
Manufacturing	112,789	13.8	100,837	13.6	10,928	14.9	1,024	29.3

Table 2. Distribution of Establishments by Industry and Firm Size, 2011

(...continued)

Industry Sector	Total	%	Micro	%	SMEs	%	Large	%
Electricity, Gas, Steam and Air Conditioning Supply	753	0.1	212	0.0	445	0.6	96	2.7
Water Supply; Sewerage Waste Management and Remediation Activities	1,058	0.1	533	0.1	500	0.7	25	0.7
Construction	2,994	0.4	1,602	0.2	1,259	1.7	133	3.8
Wholesale and Retail Trade; Repair of Motor Vehicles and Motorcycles	384,031	46.8	362,159	48.7	21,477	29.2	395	11.3
Transportation and Storage	6,248	0.8	4,243	0.6	1,887	2.6	118	3.4
Accommodation and Food Service Activities	105,208	12.8	93,690	12.6	11,433	15.6	85	2.4
Information and Communication	19,630	2.4	18,085	2.4	1,443	2.0	102	2.9
Financial and Insurance Activities	28,742	3.5	23,435	3.2	5,143	7.0	164	4.7
Real Estate Activities	6,486	0.8	5,094	0.7	1,353	1.8	39	1.1
Professional Scientific and Technical Activities	18,356	2.2	16,287	2.2	1,990	2.7	79	2.3
Administrative and Support Service Activities	19,118	2.3	15,884	2.1	2,584	3.5	650	18.6
Education	15,227	1.9	8,371	1.1	6,628	9.0	228	6.5
Human Health and Social Work Activities	30,878	3.8	29,145	3.9	1,602	2.2	131	3.7
Arts, Entertainment and Recreation	13,223	1.6	12,163	1.6	1,027	1.4	33	0.9
Other Service Activities	49,820	6.1	47,595	6.4	2,213	3.0	12	0.3
Total	820,255		743,250		73,509		3,496	

Source: 2011 MSME Statistics, DTI [14].

Table 3 indicates that SMEs are highly concentrated in the National Capital Region (43.2%), the Calabarzon (11.2%), and Central Luzon (8.8%).

Region	Total	%	Micro	%	SMEs	%	Large	%
National Capital Region (NCR)	213,594	26.0	180,183	24.2	31,791	43.2	1,620	46.3
Cordillera Administrative Region (CAR)	15,311	1.9	14,459	1.9	825	1.1	27	0.8
Ilocos Region	43,495	5.3	41,457	5.6	1,999	2.7	39	1.1
Cagayan Valley	24,281	3.0	23,263	3.1	998	1.4	20	0.6
Central Luzon	83,476	10.2	76,827	10.3	6,452	8.8	197	5.6
Calabarzon	123,173	15.0	114,293	15.4	8,269	11.2	611	17.5
Mimaropa	22,822	2.8	21,749	2.9	1,056	1.4	17	0.5
Bicol Region	26,772	3.3	25,034	3.4	1,702	2.3	36	1.0
Western Visayas	47,300	5.8	43,394	5.8	3,772	5.1	134	3.8
Central Visayas	50,411	6.1	45,138	6.1	4,940	6.7	333	9.5
Eastern Visayas	18,405	2.2	17,285	2.3	1,094	1.5	26	0.7
Zamboanga Peninsula	27,272	3.3	25,751	3.5	1,474	2.0	47	1.3
Northern Mindanao	29,873	3.6	27,085	3.6	2,679	3.6	109	3.1
Davao Region	40,327	4.9	36,748	4.9	3,422	4.7	157	4.5
Soccsksargen	31,637	3.9	29,716	4.0	1,845	2.5	76	2.2
Caraga	13,892	1.7	12,893	1.7	964	1.3	35	1.0
Autonomous Region in Muslim Mindanao (ARMM)	8,214	1.0	7,975	1.1	227	0.3	12	0.3
Total	820,255		743,250		73,509		3,496	

Table 3. Number of Establishments in the Philippines by Region, 2011

Source: 2011 MSME Statistics, DTI [14].

About 33% (2,094,053) of the total jobs generated by all types of business establishments in 2011 came from the SME sector. Large enterprises employed about 39% (2,473,336) and microenterprises almost 28% (1,778,353) of the total workforce. Total employment by industry and by size of establishment is shown in Table 4.

Industry	Total	%	Micro	%	SMEs	%	Large	%
Agriculture, Forestry and Fishing	175,547	2.8	13,027	0.7	55,290	2.6	107,230	4.3
Mining and Quarrying	42,682	0.7	1,354	0.1	7,412	0.4	33,916	1.4
Manufacturing	1,373,367	21.6	253,945	14.3	394,647	18.8	724,775	29.3
Electricity, Gas, Steam and Air Conditioning Supply	75,793	1.2	991	0.1	25,782	1.2	49,020	2.0
Water Supply; Sewerage Waste Management and Remediation Activities	34,984	0.6	2,441	0.1	18,192	0.9	14,351	0.6
Construction	143,902	2.3	6,382	0.4	50,769	2.4	86,751	3.5
Wholesale and Retail Trade; Repair of Motor Vehicles and Motorcycles	1,487,681	23.4	806,164	45.3	506,887	24.2	174,630	7.1
Transportation and Storage	154,229	2.4	16,298	0.9	63,832	3.0	74,099	3.0
Accommodation and Food Service Activities	575,978	9.1	241,907	13.6	297,412	14.2	36,659	1.5
Information and Communication	167,170	2.6	33,836	1.9	52,187	2.5	81,147	3.3
Financial and Insurance Activities	411,198	6.5	85,883	4.8	107,198	5.1	218,117	8.8
Real Estate Activities	69,462	1.1	15,857	0.9	37,278	1.8	16,327	0.7
Professional Scientific and Technical Activities	155,723	2.5	42,908	2.4	54,660	2.6	58,155	2.4
Administrative and Support Service Activities	756,600	11.9	41,102	2.3	102,550	4.9	612,948	24.8
Education	332,483	5.2	33,583	1.9	200,811	9.6	98,089	4.0
Human Health and Social Work Activities	168,275	2.7	50,568	2.8	56,072	2.7	61,635	2.5
Arts, Entertainment and Recreation	72,881	1.1	28,354	1.6	23,558	1.1	20,969	0.8
Other Service Activities	147,787	2.3	103,753	5.8	39,516	1.9	4,518	0.2
Total	6,345,742		1,778,353		2,094,053		2,473,336	

Table 4. Total Employment by Industry and by Size of Establishment, 2008

Source: 2011 MSME Statistics, DTI [14].

SME POLICIES AND PROGRAMS TO PROMOTE INNOVATION

SME policies to promote innovation

The Department of Science and Technology (DOST) is the government agency responsible for supporting the upgrading of technology and innovation among SMEs. This is done through financing, skills training, productivity improvement, Intellectual Property Rights (IPR) assistance, technology commercialization, consultancies, and exhibits, among others. The government's three-pronged approach to promote innovation among SMEs consists of: (a) Filipinnovation or the Philippine National Innovation Strategy, (b) Technology Business Incubation (TBI), and (c) Fostering Entrepreneurship in the Academy.

Filipinnovation: The Philippine National Innovation Strategy

The government's national innovation strategy follows a triple helix model [15] wherein government, academe, and industry together promote competitiveness and innovation. Under Filipinnovation are four strategies: (a) strengthening of human capital, (b) supporting business incubation and acceleration efforts, (c) regenerating the innovation environment, and (d) upgrading the Filipino mindset toward entrepreneurship. Box 1 shows the Filipinnovation strategies [16].

Filipinnovation Strategies							
Strategy	Tactics	Action agenda					
Stengthening Human Capital	Formation of multi-sectoral consortia of institutions and/or experts working towards achieving strong technological R&D capabilities (tech) and management or services skills (non-tech) that will influence industries and public policy	 Initiating competitive innovation in basic education Establishing multi-stakeholder linkages Upgrading skills and knowledge to better adapt to local and globaldemands through postgraduate education, and other forms of lifelong learning Developing human resources with advanced knowledge and expertise 					
Supporting Business Incubation and Acceleration Efforts	Encourage industry participation in incubation and human capital collaboration to ensure productivity and returns through innovation	 Identifying and managing avenues for collaboration Increasing government's investments on physical infrastructure to support business technology innovation and acceleration Engaging available existing Filipinos' talents and resources for business incubation and acceleration, including 					
	Filipinnovation Strategies						
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Strategy	Tactics	Action agenda					
		those from the overseas Filipino community4. Adopting a new business incubator model					
Regenerating the Innovation Environment	Engage stakeholders in the creation of clear government policies and efficient procedures which encourage innovative behavior	 Creating an innovation strategy championed by public and private sector executives Increasing innovation awareness and understanding in legislation Leveling the playing field by setting a policy environment that supports competition (i.e., a sound IP regime) 					
Upgrading the Filipino Mindset	Filipinnovation: branding Filipino competitive innovation for sustainable development and global positioning	 Increasing the role of multimedia in highlighting the essence and benefits of innovation in society Having an IP regime that is neither restrictive nor regulatory but rather serving as depository of innovative ideas which can inspire others to innovate competitively as well Aid in increasing public awareness that competitive innovation entails a multidisciplinary approach Foster a culture of entrepreneurship through innovation 					

Source: Velasco; http://www2.region5.dost.gov.ph/filipinnovation/innovationstrategy.htm [16, 17].

Small Enterprise Technology Upgrading (SETUP)

Launched in 2002 by DOST, the SETUP assists MSMEs adopt technological innovations to boost productivity and competitiveness. Among the priority sectors are food processing, furniture, gifts, toys, houseware, handicrafts and fashion accessories, cut flowers, fruits and high value crops, agriculture, marine and aquatic resources, and metals and engineering. SETUP links up all DOST services to address the technological needs of MSMEs.

SMEs are assisted with technology needs assessment, sourcing, and installation, seed funds for technology acquisition, human resource development, and technical and productivity consulting services. Other services are training on hazard analysis and critical control, good

manufacturing practices, and quality and environment management systems. SETUP also assists with functional package design and identification of alternative packaging materials using local resources. DOST has established product standards and networks of ISOaccredited regional product-testing laboratories. Database management and information systems with a list of available technologies, S&T experts and other relevant information are made available to SMEs. The Inter-Agency Design and Engineering Assessment (IDEA) team assesses the equipment requirements of firms, establishes efficiency indicators, maintenance and troubleshooting guidelines for equipment, identifies accessories to enhance equipment efficiency, and trains local experts on troubleshooting, material/ energy balance [18].

From 2003 to the first half of 2010, SETUP supported 836 projects with a total approved investment of PHP 427 million (USD9.91 million) (Table 5) [19].

Sector	2003	2004	2005	2006	2007	2008	2009	1 ST half of 2010
Food	7	16	24	27	40	54	59	76
Furniture	10	10	14	18	24	24	9	22
Gifts, Toys and House ware	6	16	12	10	5	13	8	11
Marine and Aquatic	4	7	12	13	22	17	3	3
Horticulture	13	6	18	16	7	16	14	27
Metals and Engineering	10	8	8	5	11	18	14	8
Others	0	1	3	3	3	8	13	10
Total	50	64	91	92	112	150	120	157
Project Cost	21,212,140	28,813,513	42,245,961	41,659,724	52,078,247	75,780,486	80,384,107	85,129,909

Table 5. SETUP Supported Projects 2003–10

Figure 1 shows that the majority (120 out of 157 or 76%) of funded projects are under the innovation system support program; 27 (17.2%) are packaging and labeling projects, followed by technical assistance/institutional support (TA/IS) with 6 (3.8%) projects. Most of the funding went to innovation system support, amounting to about PHP51.7 million (USD1.2 million) or 61% of the total funds, followed by TA/IS with roughly PHP21 million (USD487,125) or 24.6% and packaging and labeling with PHP10.4 million (USD241,243) or 12.2% (Table 6).

Type of Intervention	No. of Projects	%	Amount (in PHP)	%
Innovation System Support (ISS)	120	76.4	51,736,102 (USD1,200,095)	60.8
Training	2	1.3	525,000 (USD12,178)	0.6
Publication/ Information Materials	1	0.6	995,000 (USD23,080)	1.2
Advocacy/ Information Education Communication	1	0.6	491,170 (USD11,393)	0.6
Technical Assistance/ Institutional Support	6	3.8	20,968,945 (USD486,406)	24.6
Packaging/ Labeling	27	17.2	10,413,692 (USD241,561)	12.2
Productivity/ Consultancy	0	0.0	0	0.0
TOTAL	157	100.0	85,129,909 (USD1,974,714)	100.0

Table 6. Distribution of funded projects as of the first half of 2010 by type of intervention

Source: DTI.





Source: DTI.

Note: IEC, Information Education Communication.

About 50% of the projects are in the food processing sector, followed by the horticulture and agriculture sector (17.2%), and the furniture sector (14%). Roughly 34% of total funding went to the food-processing sector, 16% to horticulture and agriculture, and 27% to other sectors (Table 7).

Sector	No. of Projects	%	Amount in PHP	%
Food	76	48.4	28,661,976 (USD664,857)	33.7
Furniture	22	14.0	9,694,108 (USD224,869)	11.4
Gifts, Decors and Houseware	11	7.0	4,160,846 (USD 96,517)	4.9
Horticulture/ Agriculture	27	17.2	13,501,814 (USD 313,194)	15.9
Aquatic/ Marine	3	1.9	1,323,000 (USD 30,689)	1.6
Metals/ Engineering	8	5.1	4,988,050 (USD115,705)	5.9
Others	10	6.4	22,800,115 (USD528,882)	26.8
Total	157	100.0	85,129,909 (USD1,974,71)	100.0

Table 7. Distribution of funded projects as of the first half of 2013 by sector, by number and amount

Source: DTI.

Technology Application and Promotion Institute (TAPI)

TAPI [20] takes care of technology transfer through three divisions: the Investment and Business Operations Division (IBOD), the Technology Information and Promotion Division (TIPD), and the Invention Development Division (IDD).

Investment and Business Operations Division (IBOD)

IBOD is a division of TAPI tasked to advance the application of new technologies in industries, communities and the academe. It has five programs namely CAPE, MPEX, DATBED, STEVPP and Venture Financing Program.

1. Consultancy for Agricultural Productivity Enhancement (CAPE) Program promotes the application of S&T innovation in agriculture-based enterprises. The CAPE pool of consultants transfers farm technologies and management strategies to individual farmers, farmer's cooperatives, NGOs, and local government units (LGUs). The program focuses on aquaculture (prawn, milkfish, mud crab, tilapia, etc.) and horticulture (vegetables, fruits, ornamentals, plantation crops, etc.). In 2008, the program supported CAPE-implementing regions covering 238 farms in 91 municipalities nationwide. The beneficiaries covered 135 hectares devoted to aquaculture and 19 hectares devoted to horticulture. CAPE productivity consultancy services on mango production in Ticzon's farm located in Orani, Bataan had a total area of 36 hectares planted with 456 mango trees. Other interventions included pruning, weeding, sanitation, fertilization, irrigation, flower induction, fruit bagging, record keeping, integrated pest and disease management (IPDM), and soil fertility and nutrition. For the De Oro Resources, Inc. (DORI) prawn farm in Negros Occidental, the CAPE program generated a net income of PHP2.4 million (USD55,672) with 55 jobs created. Interventions included proper pond preparation, weeding of dikes, monitoring of stocks, harvesting and cleaning, and maintenance of ponds.

2. The Manufacturing Productivity Extension (MPEX) Program assists SMEs in the manufacturing sector to achieve higher productivity by fielding productivity consultancy teams composed of industrial engineers to help firms identify areas for improvement especially those involving technologies. In 2008, the MPEX program assisted 116 new client firms in nine regions of the country. Two MPEX graduations were held through the assistance of the ECOP Big Enterprise Small Enterprise (EBESE) program in General Santos City for 38 SMEs in Region XII and in Dusit Hotel Nikko Makati for 50 SMEs in NCR and Calabarzon. EBESE is a customer–supplier partnering approach towards productivity improvement designed to develop and sustain long-term mutually profitable working relationships between big enterprises and SMEs in the Philippines.

The MPEX program at the Bohol Bee Farm in Dauis, Bohol resulted in an increased net income of PHP5.2 million (USD120,622) with 100 jobs created. Interventions included improved plant layout, good housekeeping practices, product improvement, packaging and label design, and training on food hygiene and good manufacturing practices (GMP).

3. The S&T Experts Volunteer Pool Program (STEVPP) brings scientists and technologists who are experts in their respective fields to where they are needed – the countryside. The program provides short-term technical assistance and experts services in technology transfer, technology commercialization, productivity enhancement, technical capability development including upgrading skills, technical assistance/advisory services, troubleshooting, and training and seminars. The usual clients of the program are Local Government Units (LGUs), NGOs, cooperatives, and rural communities.

The program supported 57 requests covering 37 provinces, cities, and municipalities all over the country in 2008, deploying 92 experts covering various S&T activities benefiting 2,554 clients. Examples of training workshops are: Training on Finishing Techniques for Driftwood Furniture and Fixtures (Damilag, Agusan del Sur); Technology Clinic on Veggie Noodles and Bread; Construction and Installation of Portable Biogas Digester (Bayog, Zamboanga del Sur); Coffee Technology Transfer Training; Laundry and Bath Soap Making cum Packaging (Calapan, Oriental Mindoro).

4. The DOST Academe Technology-Based Enterprise Development (DATBED) Program assists technology-based entrepreneurial ventures of students in selected higher education institutions (HEIs) and out-of-school youth under the care of selected NGOs. The program encourages entrepreneurship courses in schools and at the same time enables the creation of income-generating projects for participating institutions.

In 2008, DATBED supported the implementation of new technology-based entre-preneurial ventures of students in the University of Southeastern Philippines and Mindanao State University-General Santos City (MSU-GSC); monitored on-going projects in 14 HEIs; and facilitated the full transfer of DATBED funds to Misamis Oriental State College of Agriculture and Technology and Aurora State College of Technology (ASCOT). Misamis Oriental State College of Agriculture and Technology set up 22 projects benefiting 65 student-recipients generating 22 seasonal jobs gaining a net income PHP27,635.81 (USD641.05). At ASCOT, five projects were launched creating five seasonal jobs with a net income of PHP46,899.76 (USD 1,087.9).

5. The Venture Financing Program speeds up commercialization of inventions and innovations by providing funds for start-up companies and financing technology-based expansion activities of SMEs. The financial assistance covers limited working capital and also the acquisition of the necessary production equipment. The program encourages SMEs to adopt technologies developed by the Filipino S&T community. Seed money for SMEs adopting the technology consists of 70% of the total project cost. The program also helps beneficiaries look for other sources of funding for these start-ups. In 2008, several new ventures were approved for assistance [21]. The program also monitored 59 on-going projects, four of which already graduated from the program, meaning they have fully returned to TAPI the seed money that was provided to them. These projects are the GIS services (Cebu City) Integrated Coconut Processing, Intensive Culture Tilapia Fingerling Production, and Broiler Production.

Technology Information and Promotion Division (TIPD)

TIPD is a division of TAPI primarily responsible for the promotion of DOST's key technological innovation strategies.

1. The Academe/Industry Prototype Development Assistance Program provides financial support for the fabrication, testing and promotion of a prototype. This program aims to shorten the lag time between technology development and its utilization and to ensure that the prototype can be successfully and profitably commercialized. Qualified beneficiaries include research development institutions (RDIs) and academic institutions that offer engineering and science courses accredited by the Commission on Higher Education

(CHED), Department of Education and Technical Education and Skills Development Authority (TESDA). For 2008, the program assisted the Refrigeration Recovery and Recycling Machine of the University of Northern Philippines (Ilocos Sur), the Improved Commercial Banana Chipper of the Western Philippines University (Palawan), and the Improved Commercial Model Cashew Sheller also of WPU.

2. The DOST Technology Fairs and Exhibition Programs serves as an excellent platform for the dissemination, sharing and exchange of information and ideas involving S&T development for the benefit of various sectors – researchers, educators, businessmen, entrepreneurs, students, policy makers and ordinary citizens as well as the international community.

3. *The Technology-Based Enterprise Development Assistance Program* aims to develop technology-based enterprises in the country that will assist MSMEs by providing financial and technical assistance to help in the set-up and operation of pilot ventures.

4. *The Investor's Forum Program* aims to translate technology-based opportunities into actual business investments by bringing together interested government, academe and private technology generators, businessmen, investors, financiers, industry associations, and NGOs for the purpose of matching towards new ventures. The forum features presentations on technologies that can be commercialized as well as services and programs that can be availed by technology generators.

5. Publication Assistance for Technology Promotion grants financial support for the preparation and publication of promotional materials on technologies, inventions and innovations, including the programs and services of DOST-attached agencies, other government entities and private firms. It covers the printing costs of promotional materials such as brochures, leaflets, tarpaulins, posters, manuals, books, and others.

6. The DOST Technology Training Center (DTTC) Program promotes and hastens technology transfer by supporting the conduct of technology training courses for the benefit of entrepreneurs, technical personnel from industries, investors, educators and trainers.

7. The DOST Display and Exhibit Center (DEC)/ Business Assistance Center (BAC) is a permanent showroom of the DOST system featuring agency programs, projects and activities. It gives visitors a quick tour of the DOST agencies through photo exhibits, prints, handouts and prototype models of the technologies that are on display. The BAC serves as the clearing house for TAPI's visitors, and as a venue for one-on-one consultations between technology generators and potential adaptors/users.

Invention Development Division (IDD)

A division of TAPI, IDD is mainly responsible for providing assistance to Filipino inventors.

1. The Intellectual Property Rights (IPR) Assistance Program provides assistance in getting intellectual property protection particularly through patent/utility model registration, a crucial step in technology transfer and commercialization. Table 8 lists the patents and utility model registrations obtained from the Intellectual Property Office (IPO) through TAPI's assistance.

	Title	Category
1	A Rapid Multi-Media Filtration System	Invention
2	Reactor for Co-production of Activated Carbon and Energy	Invention
3	An Improved Multi-Tasking Alarm and Security System	Utility Model
4	A Casual Drinker's Way of Preventing a Hang-over	Utility Model
5	Plug With Safety Wing Handle	Utility Model
6	Rice Planting Machine	Utility Model
7	Fuel Air Autotransmizer	Utility Model
8	All-Purpose Grain Dryer	Utility Model
9	Process for the Manufacture of Seamless Bamboo Plates	Utility Model
10	Process for the Manufacture of Particleboard Utilizing Waste Plastic as Binder	Utility Model
11	A Method of Producing Bioactive Glass Using Eggshell	Utility Model
12	Method of Producing Appatite/ Mica Bioactive Glass Ceramics Using Bone Ash	Utility Model
13	Method of Producing Appatite/ Wollastonite Bioactive Glass Ceramics Using Bone Ash	Utility Model
14	Manufacture of Tiles From Electrostatic Precipitator (EP) Dust	Utility Model
15	CD-CO Spinnel Ferrite Material for Magnetic Ceramics and Process Thereof	Utility Model
16	Rasching Rings and Process Thereof	Utility Model
17	Process for Preparing Sodium or A-Type Zeolite Utilizing Soda-Rich Feldsphatic Lahar	Utility Model
18	Manufacture of Modified Plastic Block from Polyesterene and Low Density Polyethylene	Utility Model
19	Bioactive Glass using Eggshell	Utility Model
20	Apatite/ Mica Bioactive Glass Ceramics Using Bone Ash	Utility Model
21	Apatite/ Wollastonite Bioactive Glass Ceramics Using Bone Ash	Utility Model

Table 8. Patents/Utility Model Registrations obtained with TAPI's assistance, 2008

Source: Department of Science and Technology (DOST).

2. The Industry-Based Invention Development (IBID) Program funds inventions that have industrial applications. It is implemented through a partnership between the inventor and a private enterprise. TAPI finances the fabrication of one prototype of the invention that will undergo testing, debugging, and refining while it is being run in an actual industrial environment. The firm pays TAPI the costs of the project when the invention is accepted. In 2008, 3 out of 21 proposals/applications were approved for funding and technical assistance under the IBID Program – the Driver Assistant Unit; Upgraded Motorbike Street Sweeper; and Hospital Waste Treatment Facility using High Pressure High Temperature Boiler.

3. The Invention-Based Enterprise Development (IBED) Program aids an inventor in developing his or her invention into an enterprise commodity to make it available to the consumers. It covers pilot production, field/marketing testing and formulation of systems and procedures in preparation for a larger production scale. Of the 13 project proposals submitted for the IBED program, three were approved for funding and technical assistance – Portable Water Treatment Device; Hyper-Torque (Fuel Saving Device); and Conversion of Used Cooking Oil into Bio-Fuels.

4. The Invention Testing and Analysis Assistance Program grants financial assistance of up to PHP50,000.00 (USD1,160) to assist technologists, inventors and researchers needing laboratory services and refers these program clients to the laboratories and testing facilities of RDIs, regional offices and other government agencies. In 2008, the program supported testing and analysis requirements of the following inventions: JATHROPA Oil Diesel Composition, Portable water treatment device, Hydrogasifier (ETV) Phase II, Electronic fuel economizer for internal combustion engine, and Charcoal briquetting machine.

Republic Act 7459 Related Programs

Tax and Duty Exemption Inventions Assistance Program

This program aims to facilitate the evaluation and processing of requests for tax/duty exemption of inventors for endorsement to the Bureau of Internal Revenue (BIR) and the Department of Finance (DOF). Only Filipinos can make use of this tax exemption which includes payment of license fees, permit fees, and other business taxes.

National Invention Contest and Exhibits (NICE)

This program gives encouragement and recognition to inventors so that they can maximize their capability and productivity through cash rewards and other forms of assistance and promotional support. The National Invention Contest, a major highlight of the NICE celebration, is a competition for public- and private-sector inventors and researchers that selects and grants cash rewards to the Outstanding Invention (Tuklas Award), Outstanding Utility Model, Outstanding Industrial Design, Outstanding Creative Research (Likha Award), and Outstanding Student Creative Research (Sibol Award for High School and College Levels).

The Travel Assistance for Inventors Program

This program sponsors the travel expenses of the NICE winners wanting to participate in international events. Their exposure to competitions abroad will enhance their technological capabilities and showcase Filipino talent (Table 9).

Invention	Awards Received	Event/ Venue/ Date
Single Double Flaring Tool (Mechanized)	Gold Medal for Excellence and a Gold Medal Award Certificate of Merit	INPEX-Invention and New Product Exposition Pittsburgh, USA June 11–14, 2008
Vitamin Beer	Gold Prize	Seoul International invention Fair, Seoul, South Korea
Level Actuated Rat trap with Light and Sound Alarm	Silver Prize	December 11–15, 2008
Combined Wrench, Pliers & Screwdriver	Silver Prize	
Non-lethal Tactical Ancillary Tool for unarmed Public Order Policing	Bronze Prize	
Gynecological Douching Apparatus	Gold Prize	Seoul International invention Fair, Seoul, South Korea
Lagundi (Vitex Leucoxylon) Herbal Cough and Cold Medication in lollipop Form	Silver Prize	December 11–15, 2008

Table 9. Travel Assistance for Inventors Program, 2008

Source: DOST.

The Invention Guarantee Fund (IGF) Program

This provides guarantees for loans from government banks to qualified Filipino inventors. The assistance supports the commercial production of their patented inventions.

The Inventors' Forum and Inventors' Consultation Program

The Inventors' Forum program sponsors the conduct of a forum for inventors who may have some issues or problems that need to be addressed regarding the invention they are working on. The program invites panelists who are experts on the technology being evaluated, usually coming from the DOST or other government agencies, the private sector and fellow inventors. The Inventors' Consultation Program, on the other hand, serves as a feedback mechanism for TAPI to know the various issues affecting the inventors nationwide.

The Inventors Training and Invent School Program

The Inventors' Training program subsidizes costs for training designed to intensify inventors' competence in the areas of IP rights protection, business policies and operations, manufacturing, R&D, and information technology. The Invent School Program (ISP) creates awareness of IP rights protection and encourages creativity and innovation among young students in public and private schools. This information campaign is conducted in cooperation with the LGUs, NGOs and inventors' group.

Other Legislation

Under the Investment Priority Plan 2009 [22] innovators can claim pioneer firm status that qualifies for a six-year tax exemption and duty-free importation of materials.

The Philippine Technology Transfer Act of 2009 makes R&D institutions the default owner of IP rights arising from government-funded research. This allows scientists to invent, manage or serve as consultants to companies that can commercially exploit technology arising from government-funded research [23]. This law also provides researchers with a share in royalties from their inventions and authority to launch their own start-ups [24]

The Filipinnovation strategy is an important component of the country's innovation system. However, Velasco [16] has identified certain issues that must be addressed to improve and strengthen that strategy. Statistics suggest that faculty and students lack capability in conducting advance research that can lead to technology-based products and services. Most research is based on the search for knowledge rather than for addressing the demand of a target market, resulting in failure to produce technologies with market potential. There is a need to improve the capacity of universities and firms to absorb ideas from developed countries, adapting incremental innovation with a defined market demand, and helping industries improve production efficiency.

Technology Business Incubation (TBI)

TBI [25] aims to develop technology entrepreneurship, stimulate technological innovation, encourage technology transfer and commercialization, and promote government, academic, and private sector collaboration in support of SME development. TBI supports start-up enterprises that have innovative ideas but lack resources to run the business and ensure a high rate of success within a specified period. TBI provides locators with first-class facilities and technologies support to R&D, legal and financial services, marketing support, and intellectual property assistance. Table 10 presents the status of the TBI program.

No	TBI facility	Project duration/status	Focus	Number of assisted startups
1	DOST-UP-Ayala	On-going/under management of Ayala Foundation Inc.	Information and communication technologies and electronics (ICTE)	18
2	DOST-Food and Nutrition Research Institute	Still operational as common		
3	DOST-Industrial Technology Development Institute	service facility/ semi-TBI		
4	DOST-Metals Industry Research and Development Institute			
5	DOST-Technology Application and Promotion Institute	Phased out		
6	UP Institute of Small Scale Industries	Phased out		
	2 nd ger	neration DOST-fund	ed TBIs (since 2009)	
1	DOST-Philippine Economic Zone Authority (PEZA) Open	February 2009– July 2011	ICTE	16
2	DOST-UP Enterprise Center for Technopreneurship	August 2010– October 2012	ICT; Electronics, industrial machinery materials/ nanotechnology; Creatives and multimedia, learning/ education; Health and biotechnology; Food technology; Energy and green technology; Social enterprise	23

Table 1	0	Status of	TRI	Program	25.01	f Decemh	her	2012
	υ.	Status OI	IDI	Flogram,	as U		JCI	2012

No	TBI facility	Project duration/status	Focus	Number of assisted startups
3	DOST-Cebu	July 2009– November 2012	ICT	23
4	DOST-University of the Philippines Los Baños	January 2011– January 2013	Agri-biotechnologies, information and communication technologies	10
5	DOST-Central Luzon State University	2010	Processed food products, animal nutrition and agricultural goods	

Source: Technology Business Incubation Program: Status and Prospects (as of December 2012), DOST (http://pcieerd. dost.gov.ph/images/documents/programs/Status%20and%20Prospects%20of%20DOSTs%20TBI_FINAL_updated. pdf) [26].

Currently, there are four operational TBIs [27], i.e. UP Cebu, UP Los Baños, UP Center for Technopreneurship, and PEZA Open TBI which are monitored by the Philippine Council for Industry, Energy and Emerging Technology Research and Development (PCCIERD) of DOST.

The DOST-Philippine Council for Advanced Science and Technology Research and Development (PCASTRD) together with Capacity Building International Germany [28] launched the "Capability-Building for Technology Business Incubation" project in 2008, consisting of seminars and workshops on how to make TBIs successful [29].

In addition to the pilot TBIs listed above, PCASTRD has also supported the DOST-PEZA Open Source TBI at the Advanced Science and Technology Institute in UP Diliman and the UP Diliman Entrepreneurship Program. Annex Tables C-1 and C-2 list the TBIs currently supported by PCASTRD.

The private-sector Ayala TBI pioneered technology business incubation in the Philippines and has partnered with the University of the Philippines (UP) and the Asian Institute of Management (AIM) on four incubating facilities (Table 11). This initiative targets startups with high-value creation potential in the fields of information and communication technology, environment and clean energy, agribusiness and biotechnology. The Ayala TBI acts as facilities and locator services manager for assistance with human resources, finance and accounting, intellectual property and legal services [30], and networking for funding. It has sponsored activities such as the Innovation Forum that holds technology forums and networking sessions to promote innovation and technology entrepreneurship and helps cultivate a favorable ecosystem for start-ups; Kape at Teknolohiya, [31] a casual venue to discuss research outputs, for start-ups to pitch their products, for entrepreneurs and venture capitalists to share their market insights, and for policy makers to explain Philippine government thrusts; and the Tech Boot Camp, a rigorous three-day training course to help start-ups transform ideas into profitable ventures. Ayala TBI also offers LabTech Network, a one-stop-source of information on laboratory services for technology entrepreneurs, and PhilTechExperts, a database of Filipino technology experts in advanced S&T based in the country or overseas [32].

TBI	Technologies Represented	Locators
UPV CEBU-AYALA TBI	Integrated Enterprise Solutions	Kaisa Consulting
UP Visayas-Cebu College, Cebu City		
UP-AYALA TBI	1. Chip Design	AET-Tech Corporation
UP Science &	2. Embedded Systems	Astra Philippines, Inc.
Technology Park, Diliman Quezon City	3. Software Development	JAVA Education and Development Initiative
	4. Robotics	MICOM Technologies Corporation
	5. Geographic Information Systems	Optiserve Technologies, Inc.
	6. Wireless/Mobile Content Applications	Shared Asia-Pacific Project of the Center for Economic Policy and Research
	7. e-Learning Technologies	Symphony Consulting
	8. Document Management Systems and Archiving	Systema Computer Solutions Corporation
	9. Environmental Solutions for Water Systems	TeknoLogika Pilipinas Inc.
		Manila Water Total Solutions Corporation
		Global Trade Infosys Services, Inc.
AIM-AYALA TBI	1. Biomedical Devices, Diagnostic Kits	Hybridigm Consulting
AIM, Makati City	2. Potential Therapeutics	
	3. Biotechnologies including nutraceuticals	

Table 11. The Ayala TBI Network

ТВІ	Technologies Represented	Locators		
TECHNO HUB- AYALA TBI	1. Linguistic and Artificial Intelligence Software	and Artificial ABBYY Software House		
Commonwealth Ave., Diliman Quezon City	2. Software Development and Applications	Actius, Inc.		
	3. e-Learning Systems	Headstart Business Solutions Inc.		
	4. Communications Equipment and Hardware/Digital TV Broadcast	JJDD Broadcast Service Inc.		
	5. Business Outsourcing Services	SPT Business Process Outsourcing Services		
	6. Systems Development for Online Trading	Trade Channel Philippines Inc.		
	7. Business Intelligence Research, Development, Implementation and Support	TechFactors, Inc.		
	8. Robotic Applications	Lotus Edge		
		RF Windows Asia		
		Haystack		
		Pobletech		

Source: DOST.

There seem to be few successful locator companies after graduating from the TBIs. Among the identified barriers to success of those first-generation TBIs are insufficient entrepreneurial culture and support for industry partnerships; lack of business skills among academics; universities being strongly motivated by revenue generation thus retaining IPRs which are often quickly licensed rather than developed; venture capitalists abandoning the start-up business; and weak linkages between firms and RDIs. Tenants of the DOST systems also identified the following problems: inadequate/inappropriate facilities; lack of time and non-availability of TBI manager/staff; lack of maintenance support; competition with host for the use of equipment; insufficient capital; lack of marketing/promotion and market information; and lack of technical expertise in the host agency [33].

However, there are also success stories such as Fluxion, a relatively new SME at the UP-Ayala TBI established by a group of young entrepreneurs, that has become a key platform developer and solutions provider for mobile technology companies in the Philippines. Fluxion's well-known innovations include a program that allows subscribers with lowmemory phone units to store up to 500 messages on their mobile service providers' servers, and another that allows users to monitor traffic by tapping into the surveillance cameras set up along major thoroughfares. These unique products attracted companies in Europe and Asia providing value-added services to mobile phone networks and led to the acquisition of Fluxion by a major player in the wireless applications industry (Clavesillas 2007) [34].

Fostering Entrepreneurship in the Academe

Aside from incorporating entrepreneurship in elementary and high school curriculums, the government encourages colleges and universities to have entrepreneurship programs focusing on early life-cycle development challenges, such as recognition of opportunities, market entry, protecting intellectual property, legal requirements of new businesses, and severe resource constraints (Clavesillas 2007) [43]. A number of private colleges and universities have started to offer entrepreneurship courses [35]. Box 2 describes an entrepreneurship course in a private university that has been instrumental in fostering innovative SMEs [36].

Box 2. Fostering innovation and SME development

The Ateneo de Manila University launched the John Gokongwei School of Management Business Accelerator (SOMBA) in 2002. The 12-month program is divided into three stages: Jumpstart, Prototype and Takeoff. In the Jumpstart stage, aspiring entrepreneurs submit business proposals to be reviewed by the SOMBA board. Students are given strategic visioning workshops, detailed action planning and entrepreneurial skills development through self-management, team-building and project management activities among others. After the final presentation, the SOMBA board will choose the proposals with the highest business potential to move on to the next stage.

In the Prototype stage, students are expected to deliver a working prototype of their product or services. Action plans finalized in the previous phase are carried out and monitored through incorporation, hiring of employees, and fine-tuning of the prototype. After the final presentation of the revised prototypes and final business plans, the best teams are then selected to move on to the next stage.

During the Takeoff stage, business development and marketing plans are carried out and monitored through contract negotiations, raising additional funds, relocating to a new site, and launching in a new market. SOMBA's incubation program boasts of the availability of a network of coaches and business advisors among faculty members and alumni, where students can seek professional help from free of charge. A network of funding sources which consists of "angel" investors, corporate sponsors, and development institutions are also provided to the students. This is on top of the office space and equipment provided for each team.

Among the first batch of successful student business ventures under the program are the following: Tropical Kiss, Incorporated (marketing Philippine fruits); Graffiti Drive Incorporated (scrap-booking); Pixel Point Interactive (3D animation for architectural and interior designs); Mirrus Advanced Nutrition (sports/health supplement products containing whey protein); and The Grapplers Shop (import of martial arts gear from Brazil and the USA).

Source: http://www.ateneo.edu/som/news/somba_update.htm [37].

LEVEL OF INNOVATION-RELATED ACTIVITIES

The indicators to monitor resources devoted to R&D are the Gross Domestic Expenditure on R&D (GERD), R&D intensity (ratio of GERD to GDP), and patent registrations. The Philippines' R&D standing is below the average performance for developing countries as determined by the UN. The country's R&D intensity in 2002 was only 0.11% compared to the target set for developing countries of 1% [38]. This figure has hardly moved despite the government's efforts to promote R&D through incentives and other programs.

Per capita GERD is also very small at PPP USD4.70. Table 12 shows comparative R&D spending among selected countries. A number of factors are behind the low spending on R&D in the country [39]. Among the most crucial is the inability to protect property rights and intellectual property. Another factor is the lack of S&T awareness especially outside the NCR. R&D awareness is highest in the NCR and Region 4 and falls below the national average in other regions particularly the poorest.

Despite the low level of R&D investment, the Philippines has become a major exporter of ICT and high-technology goods. However, Posadas [38] pointed out that Philippine-based firms merely import core components and other materials for the assembly of those high-technology goods with the use of cheap labor, which results in very little value added.

Country	Veen Gross Domestic Expe		
Country	Tear	% of GDP	Per Capita (PPP\$)
USA	2004	2.68	1,062.20
Japan	2003	3.15	878.5

Table 12. Gross Domestic Expenditures on R&D (GERD) of Philippines and Selected Countries

Country	Veen	Gross Domestic Expenditure on R&D (GERD)					
Country	Year	% of GDP	Per Capita (PPP\$)				
Korea, Rep.	2003	2.64	479.6				
Taiwan	2003	2.5					
Singapore	2004	2.25					
Australia	2002	1.7					
China	2004	1.44	78.5				
Malaysia	2002	0.69	64.2				
Thailand	2003	0.26	19.5				
Philippines	2002	0.11	4.7				
Vietnam	2002	0.19	4.4				
Indonesia	2001	0.05	1.6				

Source: USPTO (as cited by Posadas, 2006) [38].

Patent registrations also indicate the level of innovation in a country. Table 13 shows data on U.S. utility patents granted to inventions coming from several Asian countries. Only 379 (0.01%) of the total number of utility patents granted by the USPTO from 1997 to 2009 were for the Philippines. Of this small number, about 53% were granted to individual inventors and 47% were for inventions filed by Philippine subsidiaries of foreign multinational firms (Table 14).

Countries	1977– 2002	2003	2004	2005	2006	2007	2008	2009	All Years
US	1,532,793	98,590	94,128	82,586	102,267	93,690	92,001	95,037	2,191,092
	56.08	52.71	51.91	52.36	52.06	51.22	49.66	49.52	54.56
Japan	500,584	37,248	37,032	31,834	39,411	35,941	36,679	38,066	756,795
	18.31	19.91	20.42	20.18	20.06	19.65	19.80	19.83	18.84
Taiwan	43,732	6,676	7,207	5,993	7,920	7,491	7,779	7,781	94,579
	1.60	3.57	3.97	3.80	4.03	4.10	4.20	4.05	2.36
S. Korea	26,869	4,132	4,671	4,591	6,509	7,264	8,730	9,566	72,332
	0.98	2.21	2.58	2.91	3.31	3.97	4.71	4.98	1.80
China	1,557	424	597	565	970	1,235	1,874	2,270	9,492
	0.06	0.23	0.33	0.36	0.49	0.68	1.01	1.18	0.24

Table 13. USA Utility Patents Granted to Inventions Coming from the Several Asian countries

Countries	1977– 2002	2003	2004	2005	2006	2007	2008	2009	All Years
Singapore	1,774	460	485	377	469	451	450	493	4,959
	0.06	0.25	0.27	0.24	0.24	0.25	0.24	0.26	0.12
Malaysia	391	63	93	98	131	173	168	181	1,298
	0.01	0.03	0.05	0.06	0.07	0.09	0.09	0.09	0.03
Thailand	273	47	28	25	42	25	40	39	519
	0.01	0.03	0.02	0.02	0.02	0.01	0.02	0.02	0.01
Philippines	212	25	21	18	35	21	22	25	379
	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.01	0.01
Indonesia	127	12	23	23	16	15	19	18	253
	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Total USA and Foreign	2,733,339	187,048	181,319	157,741	196,437	182,928	185,244	191,933	4,015,989

Source: United States Patent and Trademark Office (USPTO) website [40].

Table 14. Organizational and Individual Inventors from the Philippines that were Granted Utility Patents [40] by the USPTO, 1969–2008

Organizations	1969– 2002	2003	2004	2005	2006	2007	2008	Total
Individually Owned Patent	128	4	1	1	3	3	0	140
Texas Instruments, Incorporated	8	3	7	4	7	3	4	36
FairChild Semiconductor Corporation	1	5	4	5	7	5	3	30
Astec International, Ltd.	3	3	3	1	5	3	1	19
Intel Corporation	0	2	3	3	5	3	1	17
Colgate-Palmolive Company	4	1	0	0	1	0	1	7
InternationaleErfinder- Und Patentanstalt	7	0	0	0	0	0	0	7
Union Oil Company of California	6	1	0	0	0	0	0	7

From 2000 to June 2010, 44,967 patent applications of all types were received by the Intellectual Property Office of the Philippines (Figure 2) but only 55.7% (25,032) were registered by the IPO [41]. Out of the total patent grants, 17,418 or 70% were granted to foreigners and 7,614 or 30% were granted to Filipinos (Figure 3). By patent type [42], the bulk of the total patent registrations during these years were invention patents, with 13,174 or 53% of the total patent grants (Figure 4), followed by industrial designs with 8,005 or 32% and utility models with 3,853 or 15%.



Figure 2. Distribution of Patent Applications received by Type 2000-10



Figure 3. Distribution of Patent registrations from Foreign and Local Inventors 2000-10



Figure 4. Distribution of Patent Grants by by Type 2000-10

Majority of the patents granted to foreign inventors by the IPO from 2000 to June 2010 were original inventions, comprising 74% (12,979) of the total 17,418 patent grants to foreigners. Industrial designs accounted for 24% (4,166) while utility models were a mere 2% (273). Of the 7,614 patents granted to Filipino inventors, 50% (3,839) were industrial designs, 47% (3,580) were utility models and the remaining 3% (195) were original inventions (Figure 5).



Figure 5. Distribution of Patent Grants to Filipinos and Foreigners

Though 53% of all patents granted by the government during this period were invention patents, 99% of these inventions were in fact registered to foreign inventors and only 1% to Filipinos (Figure 6). For utility models, 93% were registered to foreigners and only 7% were registered to locals. As for industrial designs, 52% were registered to locals while 48% were with foreign inventors."





Also, the percentage of patent grants with respect to patent applications from 2000 to 2010 was higher for foreign inventors compared with local inventors (Figure 7). Forty-seven percent of all invention patent applications submitted by foreigners (12,979 out of 27,633) were granted by the IPO whereas only 10.4% of all Filipino inventions submitted (195 out of 1,876) were granted patents.



Figure 7. Distribution of Patent Grants to Patent Applications 2000-10

Analyzing patent statistics by entity [43], 57% of all patent grants for the years 2003 to April 2010 were made to large enterprises while 43% were made to MSMEs [44] (Figure 8). Of the 7,965 patents granted to large enterprises, 3,895 (49%) were original inventions, 3,755 (47%) were industrial designs, and 4% (315) were utility models (Figure 9). Of the total 5,962 patent grants to MSMEs, 50% (3,007) were industrial designs, 48% (2,844) were utility models and only 2% (111) were patents for original inventions (Figure 10).



Figure 8. Distribution of Patent Grants by Entity, 2003-10



Figure 9. Distribution of Patent Grants by Entity, All Types 2003-10



Figure 10. Distribution of Patent Grants to Large Firms and MSMEs, 2003-10

Of the total patent grants from 2003 to 2010, industrial designs accounted for about 48%; 29% were invention patents while 23% were utility models (Figure 11). Of the total invention patents, only 3% were granted to MSMEs and 97% were granted to large enterprises. As for utility patents, 90% were registered to MSMEs and 10% to large enterprises. 56% of total industrial designs were registered to large firms and 44% to MSMEs (Figure 12).



Figure 11. Distribution of Patent Grants by Types, 2003-10



Figure 12. Distribution of Patent Grants to Patent Applications, by Entity, 2003-10

Looking at the approval rate of patent applications by entity, from 2003 to April 2010 there were more approvals of patent applications from large firms compared with MSMEs (Figure 13). For invention patents, large firms were granted 18.5% (3,895) out of 21,082 invention patent applications. Only 7.5% (111) out of 1,484 invention patent applications were granted to MSMEs. For utility models, the approval rate was 83.8% and 75.6% for large firms and MSMEs, respectively.



Figure 13. Distribution of Patent Grants to Patent Applications, by Entity, 2003-10

The data clearly show that Filipino innovations are more focused on developing utility patents and industrial designs rather than inventing original products, processes or technology. Patents and utility model registrations obtained through TAPI's IPR assistance program for 2008 indicate that only two were categorized as inventions and 20 were utility models. The low approval rate of 10% for local inventions for the years 2000–10 seems to indicate a low level of domestic inventiveness and innovations.

While patent grants are almost equally distributed between large firms (57%) and MSMEs (43%), it is the larger firms that are developing new commercial products, services, and technology while the smaller firms are focused on industrial designs and utility models.

The low level of patent registrations can be attributed to the weak technology transfer system in the country, which could be the result of inadequate funding/investment, poor linkage between public and private R&D efforts, and insufficient support for intellectual property rights. Despite the enactment of the 1998 Intellectual Property Code of the Philippines, welldefined intellectual property policies and support systems to protect and utilize inventions and innovations seem to be lacking. Technology ownership arising from public-funded research has been subject to debate among scientists, institutions and funding agencies. The government addressed this issue through the Technology Transfer Act of 2009. However, there is still a lack of awareness among scientists and researchers on the use and importance of the patent system. There is a need to intensify IPR and IP protection familiarization programs in the scientific community (Philippine Council for Agriculture, Forestry and Natural Resources Research and Development (PCARRD) 2009).

Aside from under-investment and weak technology transfer systems, inadequate R&D personnel limits the country's innovative capacity. While the number of scientists, engineers and technologists has increased from 90 per million population in 2002 to the current 125 per million population, this compares unfavorably to UNESCO's standard of 380 per million population (PCARRD, 2009). As of 2010–11, the majority (88%) of students are enrolled in baccalaureate programs while a few pursue doctorate studies that involve training in advanced research, among others (Table 15).

Program	Total Students (2004–2005)	%	Total Students (2010–2011)	%	Increase/ Decrease (%)
Pre-Baccalaureate	253,287	10.5	194,898	7.8	-2.71
Baccalaureate	2,046,236	85.2	2,184,966	87.8	2.62
Post-Baccalaureate	4,170	0.17	4,557	0.2	0.01
Master's	88,373	3.7	91,457	3.7	-0.02
Doctoral	10,349	0.04	12,615	0.5	0.47
Total	2,402,415	100	2,488,493	100	

Table 15.	Enrolment by	Program Level
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Source: CHED Statistics, 2010-11; 2004-05 (as reported by Velasco, 2009) [16].

Enrolment is concentrated on business administration and related fields while the majority of students enrolled in S&T-related disciplines are in the medical and healthcare service

delivery (Table 16). A noticeable development is the rise of enrolment in information technology, which responds to the growth of the business process outsourcing industry.

Discipline	2004–05 (%)	2010–11 (%)	Increase/ Decrease (%)
Agricultural, Forestry, Fisheries, and Vet Med.	3	2	-1
Architectural and Town Planning	1	1	0
Business Administration and Related	22	27	5
Education Science and Teacher Training	15	14	-1
Engineering and Technology	13	12	-1
Fine and Applied Arts	1	1	0
General	1	0	-1
Home Economics	0	0	0
Humanities	1	1	0
Information Technology	_	13	-
Law and Jurisprudence	1	1	0
Maritime	_	4	-
Mass Communication and Documentation	1	1	0
Mathematics and Computer Science	10	0	-10
Medical and Allied	19	12	-7
Natural Science	1	1	0
Religion and Theology	0	0	0
Service Trades	1	2	1
Social and Behavioral Sciences	3	3	0
Trade, Craft and Industrial	1	0	-1
Other Disciplines	7	6	-1
Total	100	100	

Table 16. Enrolment Share by Discipline

Source: CHED Statistics, 2010-11; 2004-05 (as reported by Velasco, 2009) [16].

FINANCING PROGRAMS TO PROMOTE SME INNOVATIONS

The Department of Trade and Industry (DTI) prepared the SME Development Plan 2004 -10 which seeks the creation of globally competitive SMEs. To implement the goals of this plan, the Bureau of Small and Medium Enterprises Development of DTI acts as a "one-stop-shop" to assist SMEs with various support services, e.g., managerial and technical assistance, etc.

SME financing policies, policy funds, and institutions

In 1991, the Magna Carta for MSMEs was enacted into law [45]. It created the Small and Medium Enterprise Development (SMED) Council and the Small Business Guarantee and Finance Corporation (SB Corp.), mandated public and private banks to respectively set aside 6% and 2% of their total loan portfolio as loans to SMEs [46],and stipulated that SMEs should have a 10% share of the total procurement value of goods and services supplied to the government. Banks appear to be generally compliant with the required lending for SMEs. However, Aldaba (2008) [47] reported that it is actually large firms, not SMEs, that get loans from large banks, and that microenterprises and livelihood programs, not SMEs, have mostly benefitted from funds from government lending programs [48].

The government provided various incentives [49] and formulated the Access of Small Enterprises to Sound Lending Opportunities (ASENSO) program, the One Town-One Product (OTOP) program, and the Big Brother-Small Brother program to promote clustering among SMEs especially in rural areas.

Access of Small Enterprises to Sound Lending Opportunities (ASENSO)

In 2012, a strengthened state-led financing program dubbed as ASENSO, was launched to provide SMEs better access to financing. This program revitalized the previous SME Unified Lending Opportunities for the National Growth (SULONG) program. It was initiated by several government institutions (DTI, Department of Social Welfare and Development, Government Service Insurance System, Social Security System, PHILEXIM, National Livelihood Development Corporation, and the National Anti-Poverty Commission), and GFIs (SB Corporation, LBP, DBP, People's Credit and Finance Corporation).

The GFIs granted loans amounting to around PHP30.4 billion (USD705.2 million) to SMEs in 2012. Since its inception in 2004, ASENSO has lent a total of PHP272.6 billion (USD6,323 million) to 325,132 SMEs [50].

Enterprises in all industries except trading of imported goods, liquor, cigarettes and extractive industries are qualified for the loan. Enterprises must be at least 60% Filipinoowned, with assets valued at not more than PHP100 million (USD2.3 million) excluding the value of the land, or subject to ownership rules as defined under existing Philippine laws for specific industries. Short-term loans of up to 70% of the value of export financing (export packing credit, that is, letter of credit or purchase order) and up to 70% of temporary working capital requirement are given. The maximum amount of a short-term loan is PHP5 million (USD115,982). For long-term loans, 80% of the incremental project cost at a maximum of PHP5 million may be given. Interest rates are pegged at 9% per annum for short-term loans, 11.25% for medium-term loans, and 12.75% for long-term loans. The repayment term for short-term loans is a maximum of one year; for long-term loans, a maximum of five years, inclusive a grace period of one year on principal monthly amortization [51].

While most of the financing programs were really directed-lending through GFIs, a few private banks have maintained SMEs as main clients. One such bank is showcased in Box 3. Planters went beyond traditional banking – both loans and non-financial services – to strengthen SME operations.

Box 3 Planters Development Bank Successful Case of SME Finance [52]

The experience of Plantersbank, a commercial bank, shows that SME lending can be profitable. SME clients include those in high-end clothing and accessories, automotive parts and capital equipment, electrical components, furniture, and plastic packaging. First-time borrowers were taught how to access and properly use credit. Planters simplified its loan documentation process and matched loan repayment to the SMEs' cash flow. For long-term loans, Planters tapped government special programs to provide SMEs with reasonably priced long-term funds.

Where loan collateral was inadequate, guarantees were taken from government agencies. Based on its long experience of lending to SMEs, Planters created its own SME credit scoring system, which led to improvements in its loan process system. It assisted in the preparation of feasibility studies, reconstruction of accounting records, correction of project weaknesses uncovered during project appraisal. Planters referred clients to potential buyers, investors and business partners.

With the International Finance Corporation, Planters established SME.com.ph, an Internet company that allows SMEs to sell their products to the local and world markets using web-based technology. SME.com.ph designs and manages the websites of member-SMEs, provides a payment gateway and offers Internet business solutions using the World Bank's SME Toolkit. A number of clients increased their sales and successfully penetrated the export market via SME.com.ph's facilities. To date, the SME.com.ph website gets an average of 36,000 hits per day.

Planters also introduced SME Proposition, a package of customized facilities offering financial services and technology solutions to help simplify daily administrative tasks. It

has accounting and time-keeping software to help SMEs automate their operations and enhance their productivity and efficiency. It comes bundled with a free desktop computer and printer to encourage SMEs to use technology in their businesses.

The Plantersbank SME Industrial Park, the country's first-ever industrial park dedicated to SMEs, was recently inaugurated. This Park has a strategic location, the right physical facilities and attractive investment and fiscal incentives to SMEs, which before, were only available to large companies.

Source: Ma. Flordelis Aguenza, President, Planters Bank, "Pushing Philippine Manufacturing Towards Sustained Growth" November 2007 Philippine Economic Society Conference [52].

One Town, One Product (OTOP), One Million Pesos Program

This program seeks to stimulate domestic demand through SME development on a countrywide basis. Under OTOP, the government allocates PHP1 million (USD23,196) for lending to an SME in every locality at a maximum effective interest rate of 10% per annum DTI coordinates with LGUs to identify product or service clusters for funding support.

The same financial institutions implementing the above-mentioned SULONG provide the following financial services to SMEs: small business loans, revolving credit lines, credit lines for MSMEs, term loans, contracts to sell purchase facilities, and non-traditional guarantees.

Special Funds

Special Funds [34] consist of:

BMBE Development Fund

In line with Barangay Micro Business Enterprises Act of 2002, a BMBE development fund was set up with an endowment of PHP300 million (USD6,960) under the administration of the SMED Council.

Easy Pondong Pang-Asenso (EPPA)

EPPA loans provided by LBP for expansion of SMEs have easier collateral requirements and simpler documentation.

Special Financing Assistance to Small and Medium Exporters (SFA–SMEx) LBP's SFA–SMEx provides financing to small and medium exporters endorsed by PhilExport and the Foreign Buyers Association of the Philippines (FOBAP).

Accelerating Change in the Countryside thru Equity Sharing Strategy (ACCESS) This was set up by LBP to catalyze countryside development by promoting livelihood and rural employment, agri-related and off-farm economic projects.

CONCLUSION AND RECOMMENDATIONS

A vigorous SME sector will augur well for sustained growth and poverty reduction. SMEs have to innovate in order to be able to stay competitive and exploit business opportunities created by globalization and trade liberalization. It is those innovative firms that can develop new products, processes and services that will be able to take advantage of rising demand in domestic, regional and global markets. However, without investments in innovation, it will be difficult for SMEs to attain competitiveness and growth objectives.

To encourage innovation among SMEs in the country, the following barriers need to be addressed: (1) weak innovation capability of SMEs which includes lack of management skills and poor corporate governance; (2) limited capability of faculty and students, and research institutions in general to conducting advanced research which is related to weak science and technology education, and weak linkage between such institutions and industry; (3) lack of coordination among government agencies, academe and industry in the implementation of programs promoting innovations among SMEs, and weak information dissemination; and (4) lack of an appropriate incentive structure to protect intellectual property rights of innovators and inventors and reward them for their effort.

It is equally important to address factors that hinder the accessibility of financing by SMEs. There are demand-side and supply-side issues involved here. There seems to be a good array of interventions, e.g., technical assistance, and financing programs for SME innovations but these are not accessible to the majority of SMEs. Some of the hindering factors include the high cost of financing, limited sources of funds, as well as the limited number of institutions that are capable of financing SMEs. On the other hand, SMEs have to overcome limitations in managerial and technical capability, e.g., lack of sound financial and accounting systems, among others, and develop a culture of innovation and inventiveness.

The Philippine government has developed several financing and technology/innovation programs that can support innovative SMEs. There have also been successful cases of private sector efforts to improve products and business processes and innovate using new technologies.

There is great scope for substantial improvement in SME productivity and general competitiveness. In this light, the author of this chapter submits the following recommendations:

- Strengthen the education system to improve the quality of human capital, especially those involved in R&D;
- Ensure the protection of intellectual property and develop an effective incentive or reward scheme for inventors and innovators;
- Strengthen the linkages between public and private academic and R&D institutions, and their collaboration with business and industry;
- Develop a culture of innovation and inventiveness through appropriate incentives;
- Streamline financing programs to eliminate duplication and overlaps, and consolidate them into a more efficient financing program with proper accountability;
- Strengthen the credit guarantee programs to mitigate risks in SME lending;
- Coordinate diverse efforts of the public institutions and private business that are engaged in innovations for greater efficiency and synergy;
- Facilitate data access and information dissemination to address information asymmetry or lack of information among stakeholders in the SME sector, e.g., establishing a credit bureau for SMEs.

ANNEX TABLES

Annex Table 1. List of Operational/Approved TBIs supported by PCASTRD

Name of Institution	Year Started	Technical Focus/ Thrust	Funding Source/ Amount	PCASTRD Support
Operational				
DOST-UP-Ayala TBI		ICT		1. Support mainly from DOST
DOST-PEZA Open Technology Business Incubator	July 2009	ICT	1. DOST-GIA (PHP9M) 2. PEZA (PHP10M)	1. Capability building
UP Visayas- Cebu College	December 2009	ICT	 1. DOST-GIA (Jan 2011) 2. PCASTRD (Dec 2009- Dec 2010) 3. UPVCC 	 Capability building Support for Feasibility Study and Business Plan Start-up Fund
			(Dec 2009- Dec 2010)	(P2M)
DOST Regional Office No. VIII	October 2007	ICT	 Leyte Provincial Local Government Unit DOST VIII 	1. Capability building
Approved				
DOST-UP Enterprise Center for Technopreneurship	August 2010	ICT	 DOST-GIA (PHP9.87M) PCASTRD (PHP825,000) UP Diliman (PHP3.7M) PEZA (PHP2.5M) 	 Capability building Project Monitoring Agency
UP Los Banos	August 2010	Processed food products Animal nutrition products	1. DOST-GIA (PHP10M) 2. PEZA (PHP10M)	 Capability building Support for Feasibility Study and Business Plan Project Monitoring Agency

Name of Institution	Technical Focus/ Thrust	PCASTRD Support	Status
	Food processing Potential locators are	Capability building	Awaiting TBI Proposal
DOST Regional Office No. XI	MSMEs involved in sago flour industry	Support for Feasibility Study and Business Plan	
Honeyfruit Gourmet Foods	Processed food	Capability building	Awaiting TBI Proposal
Incubator		Study and Business Plan	
MSU-IIT	IT	Capability building	To submit feasibility study
	Engineering	Support for Feasibility Study and Business Plan	
	IT	Capability building	To submit feasibility study
Western Visayas State College	Pharmaceuticals and Cosmetics	Support for Feasibility Study and Business Plan	
	Agricultural products		
DOST Bicutan	Processed food	Capability building Support for Feasibility Study and Business Plan	Awaiting TBI Proposal
	Agricultural products	Capability building	Have submitted feasibility study and business plan
Central Luzon State University	Animal nutrition products/ Dairy products	Support for Feasibility Study and Business Plan	Potential locators are MSMEs producing agricultural products such as rice, mangos, tomatos, onions, etc.
UP VisayasMiag- ao Iloilo	Food products	Capability building	Have submitted feasibility study and business plan
	Agro-fisheries	Support for Feasibility Study and Business Plan	

Annex Table 2. Other TBI Projects in the pipeline supported by PCASTRD

Veee	Invention			Utility Model			Industrial Design			All Types		
Year	Foreign	Local	Total	Foreign	Local	Total	Foreign	Local	Total	Foreign	Local	Total
2000	3,482	154	3,636	36	536	572	340	479	819	3,858	1,169	5,027
2001	2,470	135	2,605	21	426	447	316	382	698	2,807	943	3,750
2002	769	149	918	39	522	561	335	448	783	1,143	1,119	2,262
2003	1,801	141	1,942	21	477	498	343	667	1,010	2,165	1,285	3,450
2004	2,538	157	2,695	19	573	592	476	536	1,012	3,033	1,266	4,299
2005	2,762	210	2,972	27	519	546	619	646	1,265	3,408	1,375	4,783
2006	3,038	223	3,261	22	519	541	486	475	961	3,546	1,217	4,763
2007	3,248	225	3,473	32	395	427	434	431	865	3,714	1,051	4,765
2008	3,095	216	3,311	33	512	545	581	640	1,221	3,709	1,368	5,077
2009	2,825	172	2,997	48	496	544	320	458	778	3,193	1,126	4,319
2010	1,605	94	1,699	23	291	314	219	240	459	1,847	625	2,472
Total	27,633	1,876	29,509	321	5,266	5,587	4,469	5,402	9,871	32,423	12,544	44,967

Annex Table 3. Patent Applications Received, 2000–June 2010

Source: Intellectual Property Office of the Philippines [53].

N	Invention			Utility Model			Industrial Design			All Types		
Year	Foreign	Local	Total	Foreign	Local	Total	Foreign	Local	Total	Foreign	Local	Total
2000	566	8	574	1	287	288	291	506	797	858	801	1,659
2001	1,082	7	1,089	5	184	189	241	152	393	1,328	343	1,671
2002	1,112	12	1,124	26	227	253	530	352	882	1,668	591	2,259
2003	1,160	13	1,173	23	393	416	544	457	1,001	1,727	863	2,590
2004	1,434	18	1,452	16	335	351	45	329	374	1,495	682	2,177
2005	1,638	15	1,653	14	296	310	332	426	758	1,984	737	2,721
2006	1,191	24	1,215	18	282	300	306	293	599	1,515	599	2,114
2007	1,785	29	1,814	58	715	773	865	468	1,333	2,708	1,212	3,920
2008	797	41	838	52	405	457	721	493	1,214	1,570	939	2,509
2009	1,657	22	1,679	52	405	457	213	309	522	1,922	736	2,658
2010	557	6	563	8	51	59	78	54	132	643	111	754
Total	12,979	195	13,174	273	3,580	3,853	4,166	3,839	8,005	17,418	7,614	25,032

Annex Table 4. Patent Grants, 2000–June 2010

Source: Intellectual Property Office of the Philippines [53]

Veee	I	Invention			Utility Model			Industrial Design			All Types		
year	Foreign	MSMEs	Total	Foreign	MSMEs	Total	Foreign	MSMEs	Total	Foreign	MSMEs	Total	
2003	1,811	134	1,945	50	510	560	421	589	1,010	2,282	1,233	3,515	
2004	2,536	159	2,695	57	539	596	541	486	1,027	3,134	1,184	4,318	
2005	2,763	210	2,973	64	501	565	645	629	1,274	3,472	1,340	4,812	
2006	3,031	225	3,256	56	485	541	527	437	964	3,614	1,147	4,761	
2007	3,282	215	3,497	37	380	417	466	404	870	3,785	999	4,784	
2008	3,087	223	3,310	53	501	554	595	514	1,109	3,735	1,238	4,973	
2009	2,701	195	2,896	27	488	515	333	473	806	3,061	1,156	4,217	
2010	1,871	123	1,994	32	357	389	274	285	559	2,177	765	2,942	
Total	21,082	1,484	22,566	376	3,761	4,137	3,802	3,817	7,619	25,260	9,062	34,322	

Annex Table 5. Patent Applications Received by Entity 2003–10

Source: Intellectual Property Office of the Philippines [53].

Annex Table 6	. Patent	Grants by	Entity	2003-10
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Year	Invention			Utility Model		Industrial Design			All Types			
	Foreign	MSMEs	Total	Foreign	MSMEs	Total	Foreign	MSMEs	Total	Foreign	MSMEs	Total
2003	377	5	382	23	344	367	500	412	912	900	761	1,661
2004	508	10	518	26	317	343	422	531	953	956	858	1,814
2005	799	20	819	16	224	240	374	335	709	1,189	579	1,768
2006	704	15	719	56	470	526	414	365	779	1,174	850	2,024
2007	360	13	373	101	667	768	924	411	1,335	1,385	1,091	2,476
2008	238	12	250	51	445	496	665	514	1,179	954	971	1,925
2009	695	22	717	36	272	308	401	369	770	1,132	663	1,795
2010	214	14	228	6	105	111	55	70	125	275	189	464
Total	3,895	111	4,006	315	2,844	3,159	3,755	3,007	6,762	7,965	5,962	13,927

Source: Intellectual Property Office of the Philippines [53].

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- 11. This includes GDP contribution of MSMEs as of 2008. Source: Department of Trade and Industry (2011) MSME Development Plan 2011–16.
- 12. SMEs play a crucial role in both developed and developing economies. On average, they comprise over 95% of the economy, employ a large segment of a country's work force,
and contribute significantly to national output. As a vital engine of economic growth, SMEs stimulate growth in the rural areas, expand domestic markets and earn foreign exchange through exports.

- 13. Calabarzon is a contiguous area south of Metro Manila.
- 14. 2011 MSME Statistics, DTI.
- 15. The Triple Helix (Etzkowitz 2003) approach is a model where the actors, universities, government, and firms cooperate for the innovation system to work. It is not only knowledge that flows within the boundaries of actors in the innovation system but also the interchanging of roles of each actor that will support and sustain innovation (as cited by Velasco, 2009).
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- 25. Current DOST-supported TBI projects are second-generation TBIs since the DOST, through the Technology Application and Promotion Institute (TAPI) had implemented TBIs providing common-service facilities and technical assistance in the 1990s. In 1991, the collaborative TBI project of DOST and UNDP engaged in a wide range of technology-based businesses from metal-working and ceramics to tissue culture and food processing. TBI tenants benefitted from access to leading edge technologies, technical assistance and expertise, marketing and other support services, and trained manpower; reduced overhead costs; dynamic environment; and increase in income. The University of the Philippines (UP) and DOST signed a memoranda of agreement establishing Science and Technology Parks in UP campuses (Orijola, 2004; UNESCAP 2000).
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- 27. Source: PCIEERD website http://www.pcieerd.dost.gov.ph/index.php/programs/ support-for-t-t-and-c/technology-business-incubation#existing-tbis.
- 28. German government-affiliated development organization.
- 29. For example, workshops on preparation of TBI feasibility study, TBI business planning and implementation, and setting up of a TBI association.
- 30. For example, eLEGIS Reference System, an on-line database of local legislation enacted from 1992 to the present.
- 31. Meaning "coffee and technology."
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- 39. Paderanga as cited by Yap (2009).
- 40. Utility Patents refer to patents for invention (USPTO website).
- 41. See Annex Tables C-3 and C-4 in the Annex for details of patent applications and IPOregistered patents in the Philippines.
- 42. As per the IPP website, patent is a grant issued by a government giving an inventor the exclusive right to exclude others from making, using, importing, and offering for sale the product of his invention, and gives protection of 20 years from filing date of application. An invention is any technical solution of a problem in any field of human activity, which is New, involves Inventive Step, and is Industrially Applicable. Utility models are devices that possess novelty and utility but not the inventive step needed for a patent for invention and are entitled to only seven years of protection, while industrial designs are any composition of lines or colors or any 3D form that can give a special appearance to, serve as a pattern for, an industrial product or handicraft and are protectable for five years (IPC 1997 as cited by Posadas).
- 43. See Annex Tables C-5 and C-6 in the Annex for details of patent statistics by type of entity.
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- 45. In the 1970s the Philippine government started to advocate the development of SMEs through the establishment of the DTI, the setting up of Small Business Assistance Centers and the Commission on Small and Medium Industries. Various programs and projects were undertaken to address the problems faced by SMEs, especially the lack of access to sources of financing. During President Corazon Aquino's administration (1986–92), economic development programs were focused on SMEs and countryside development and microenterprise development. The trade liberalization in the 1980s spurred the government to adopt market improvement strategies to increase market access and expand the local market of SMEs. The government focused on the creation of subcontracting linkages, provision of financing and guarantees to exporters and common market facilities, market intelligence and information access, identification of local market centers, and rural transport facilities.
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 - Exemption from corporate income taxes (four to eight years), national and local taxes, duties and taxes on machinery, spare parts, materials and supplies; tax credit for imports and import substitution of capital equipment and for breeding stock and genetic materials (Republic Act 7916 and Republic Act 7227, Special Economic Zones Act and Clark and Subic Special Economic and Freeport Zone).
 - Exemption from value-added tax for certain exporting industries and from excise taxes on locally produced products, and lowered taxes on spirits made from indigenous materials (Republic Act 8424, Tax Reform Act).
 - Incentives under preferred areas of investment in the Investment Priorities Plan (IPP) (Executive Order 226, Omnibus Investment Code).
 - Incentives for specified locations such as the Registered Economic Zones (Republic Act 7916), Less Developed Areas, (Republic Act 7844) and those granted by Local Government Units under the Local Government Code.
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CHAPTER EIGHT: THAILAND

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INTRODUCTION

Innovation is considered key to the development and strength of SME businesses. Through innovation, local business operators will be inspired to be more active in continuously enhancing their capabilities, and they will assist in becoming role models for other SMEs in setting standards and boosting sustainable economic growth.

EXECUTIVE SUMMARY

Firstly, SMEs apply e-commerce mostly for the "production" of basic products such as printing, food and processing, paper, ceramics, furniture, and metal. In this line of product, physical appearance in the real store is more important than virtual and Internet displays. However, since distribution and logistics systems throughout the country are both time- and budget-consuming, e-commerce plays a relatively key role in the manufacture of these products.

On the other hand, for industries with more specific customer group such as perfume, health products, and jewelry, the key success factor is to access and satisfy every aspect of customer demands as much as possible. High-end customers do not shop in stores as frequently as those for basic products because products from the latter group are not dispensable. As a result, the role of e-commerce as a sales channel has become most important for these specialized products.

Secondly, as the majority of Thai SMEs pertain to service and retail industries, in which business-to-customer (B2C) activities are the predominate application of e-commerce, they have applied for B2C as the primary e-commerce source. In addition, the nature of the niche market occupied by Thai SMEs precludes them from using business-to-business (B2B) e-commerce since, in niche or specific-customer-group markets, every bit of information can give a firm a competitive aedge. As such, for Thai SMEs, the benefits of e-commerce have been largely in the form of more convenient access to variety group of customers via B2C, rather than B2B.

Thirdly, SMEs in Thailand are more adept at enhancing products and services rather than at creating new products. The result is thats increasing business process efficiency is the main focus of Thai SMEs and not the creation or construction of new ideas or concepts of business processes in the production and service industries. This should be understandable since, mostly, Thai SMEs generally play a major role in the downstream value chain.

Finally, while big firms have opted for database and industry systems, small SMEs play an important role in software innovation by having a 40% share in new software initiatives. In addition, registration, organizational resource, and document support system are the areas that small SMEs are mostly active in when it comes to software innovation.

ECONOMIC GROWTH OF THAILAND

This section has two parts: the first deals with the macroeconomic perspective, particularly GDP growth, and the second outlines SME contributions to the Thai economy.

Economic Scale and Growth and Per Capita GDP

	1980			2000			2005			2006	
Japan	1,051,784	100.0%	Japan	3.273,088	100.0%	Japan	3,909,635	100.0%	Japan	4,125,728	100.0%
India	283,086	26.9%	India	1,517,997	46.4%	India	2,399,788	61.4%	India	2,716,571	65.8%
Iran	132.535	12.6%	ROK	758,729	23.2%	ROK	1,004,980	25.7%	ROK	1,088,632	26.4%
ROK	98,980	9.4%	Indonesia	500,754	15.3%	Indonesia	709,796	18.2%	Indonesia	776,367	18.8%
Indonesia	97,751	9.3%	ROC	434,433	13.3%	Iran	648,766	16.6%	Iran	719,250	17.4%
Philippines	61,065	5.8%	Iran	444,499	13.6%	ROC	570,478	14.6%	ROC	617,662	15.0%
ROC	58,527	5.6%	Thailand	309,777	9.5%	Thailand	448,388	11.5%	Thailand	486,514	11.8%
Pakistan	56,960	5.4%	Pakistan	237,358	7.3%	Pakistan	341,906	8.7%	Pakistan	378,788	9.2%
Thailand	50,624	4.8%	Malaysia	214,579	6.6%	Malaysia	285,618	7.3%	Malaysia	310,957	7.5%
Hong Kong	33,813	3.2%	Philippines	179,949	5.5%	Philippines	253,329	6.5%	Philippines	275,874	6.7%
Malaysia	32,044	3.0%	Hong Kong	176,066	5.4%	Hong Kong	243,081	6.2%	Hong Kong	268,430	6.5%
Bangladesh	25,887	2.5%	Singapore	134,822	4.1%	Singapore	184,852	4.7%	Singapore	208,741	6.1%
Singapore	17,139	1.6%	Bangladesh	112,307	3.4%	Vietnam	178,883	4.6%	Vietnam	199,815	4.8%

Table 1. GDP in Asian Countries

(...continued)

	1980			2000			2005			2006	
Sri Lanka	11,830	1.1%	Vietnam	110,336	3.4%	Bangladesh	164,683	4.2%	Bangladesh	182,065	4.4%
Nepal	5,261	0.5%	Sri Lanka	53,179	1.6%	Sri Lanka	69,986	1.8%	Sri Lanka	77,841	1.9%
Fiji	1,044	0.1%	Nepal	22,831	0.7%	Nepal	28,528	0.7%	Nepal	30,517	0.79%
			Cambodia	11,469	0.4%	Cambodia	20,235	0.5%	Cambodia	23,124	0.6%
			Lao PDR	6,727	0.2%	Lao PDR	10,238	0.3%	Lao PDR	11,677	0.3%
			Mongolia	4,213	0.1%	Mongolia	6,673	0.2%	Mongolia	7,476	0.2%
			Fiji	2,801	0.1%	Fiji	3,530	0.1%	Fiji	3,820	0.1%
(regroupe	d)		(regroupe	ed)		(regroupe	ed)		(regroupe	ed)	
Asia21	2,269,212	215.7%	Asia21	11,485,957	350.9%	Asia21	16,956,534	433.7%	Asia21	18,919,347	458.6%
APO20	2,018,331	191.9%	APO20	8,505,915	259.9%	APO20	11,483,374	293.7%	APO20	12,509,848	303.2%
ASEANB	258.623	24.6%	ASEAN8	1,408,414	44.9%	ASEAN8	2,091,339	53.5%	ASEANB	2,293,059	55.6%
(reference)		(reference	e)		(reference	e)		(reference	e)	
PR China	250,881	23.9%	PR China	2,980,042	91.0%	PR China	5,473,160	140.0%	PR China	5,409,499	155.4%
USA	2,751,700	261.6%	USA	9,631,200	294.3%	USA	12,199,900	312.0%	USA	12,952,200	313.9%
EU15	3,207,466	305.0%	EU15	9,502,489	290.3%	EU15	11,610,827	297.0%	EU15	12,281,208	297.7%

Unit: Millions of US dollars at current Market prices.

Source: APO Productivity Databook 2009 [1].

According to Table 1, the Thai economy has grown expeditiously during the past 30 years. From 1980 to 2000, Thailand's GDP as a percentage of Japan's has nearly doubled (jumping from 4.8% to 9.5%). Thereafter, the relatively high rate of Thai GDP growth has gradually increased the share of GDP in relation to that of Japan, reaching 11.8% in 2006. Among ASEAN countries, Thai income per capita was the third highest while it ranked the second in terms of GDP, as shown in Figure 1.



Figure 1. Per Capita PPP-GDP 2006

In terms of contribution to economic growth, Figure 2 shows that while Thailand ranked seventh in Asia and the second among ASEAN countries during the years 2000–06, it had the highest rate of growth during the 1995–2000 and 2000–06 periods.



Figure 2. Country Contributions to Asian Economic Growth

Finally, from the perspective of diversification of industry type, Thailand has the lowest variability in terms of industry composition (composed of agriculture, manufacturing, services, and other industries) based on total value added in 2006, as shown in Figure 3. This is considered to be a sign of resiliency and the ability to be on guard against external shocks. Hence, Thailand possesses a very high degree of risk tolerance when encountering any unfavorable events. The reason for this is that, in general, the good and bad performances of different economic sectors tend to cancel each other out, thus resulting in a relatively stable level of income in the country



Figure 3. Industry Composition of Total Value Added, 2006

Contribution of SMEs to the National Economy (2005–09)

Based on Table 2, in Thailand, SMEs have played a cushioning role against economic volatility due to the following reasons: Revenue from SMEs accounts for 40% of GDP, the value of Thai exports from SMEs is as much as 30% of total exports, and SMEs contribute nine million jobs of 78% total employment in Thailand (Office of Small and Medium Enterprise Promotion (OSMEP) 2010).

	Number of SM	IE Businesses
	Number	Ratio (%)
SMEs	1,541,251	93.9
- Production	(258,925)	(15.8)
- Trade	(783,001)	(47.7)
- Service	(499,325)	(30.4)
LEs	99,999	6.1

Table 2. Number of LE & SME Business

Source: Department of Industrial Promotion [2].

Commercial banks have played a more crucial role than government agencies in SME financing. For instance, while commercial banks had total outstanding SME loans of approximately USD90 billion in 2009, the SME bank had only USD1.3 billion. In addition, the Small Business Credit Guarantee Corporation, the government loan guarantee agency has only THB22,000 million in loan guarantees. According to Table 3.3, almost half of the total loan amount went to the financial services and personal consumption sectors, in which there are generally a significant proportion of SME customers. In summary, this means that, so far, government agencies have played a less than optimal role in SME financing in Thailand.

While SMEs have not been nurtured appropriately by the government as outlined above, the role of SMEs as an economic cushion is very explicit. Rajitpinyolert [3] demonstrates the position of SME loans playing the role of absorber during times of economic fluctuation. There are two reasons for supporting this conclusion. Firstly, commercial banks normally have a different strategy for lending to high- and low-rated customers. Since, generally, SMEs are medium-rated customers, the degree of fluctuation in SMEs' lending would normally be lower than other segments. In addition, this also results in a reduced erdegree of procyclicality, the nearly perfect correlation between lending expansion/contraction and GDP growth/slowdown.

OVERVIEW OF SME FINANCING STRUCTURE

This section defines SMEs and outlines the Thai organizations that play a role in promoting innovation among SMEs.

Definition of SME in Thailand

According to OSMEP (2010) [4], the Ministry of Industry introduced the definition of Thai SMEs on 11 September 2002. This definition was based on the number of salaried workers and the amount of fixed capital. SMEs are enterprises with fewer than 200 employees and less than USD6.7 million in fixed capital, excluding land and property. In general, SMEs in Thailand are classified into three categories: production, service, and trading. The SME definition for each category is given in Table 3.

Туре	Small		Medium		
	Employees	Capital (million baht)	Employees	Capital (million baht)	
Production	Not more than 50	Not more than 50	51-200	51-200	
Service	Not more than 50	Not more than 50	51-200	51-200	
Wholesale	Not more than 25	Not more than 50	26–50	51-100	
Retail	Not more than 15	Not more than 50	16–30	31–60	

Table 3. Definition of SME provided by the Ministry of Industry, Thailand

In business practices, the definition of SME can be extended to include the number of their shares held by parent companies. In other words, the principal criterion for classification as an SME is an enterprise's independence. This characteristic indicates that not more than 25% of SME capital should be owned by one large, or many large, companies. At present, there are many multinational companies in the form of franchise companies and joint ventures between Thai and overseas companies. As such, some of these companies should not be classified as Thai SMEs.

Features and characteristics of SME Policies

Focusing on Promotion of Innovation

The organization that has played a central role in innovation promotion [5] for Thailand is the Thailand Science Park (TSP). The TSP is considered a critical component in Thailand's efforts to strengthen its capabilities in research and innovation. It is the important infrastructure that helps support and promote innovation and research activities, especially in the country's technology-intensive sectors. In addition to its state-of-the-art facilities and business space, the TSP also offers a comprehensive range of value-added services to support technology businesses. The TSP serves all types of enterprises, large or small.

The TSP is currently home to the National Science and Technology Development Agency (NSTDA) headquarters, the Technology Management Center (TMC) and the four national research centers, namely the National Electronics and Computer Technology Center (NECTEC), National Center for Genetic Engineering and Biotechnology (BIOTEC), National Metal and Material Technology Center (MTEC), and National Nanotechnology Center (NANOTEC).

The TSP is also located close to three of Thailand's leading universities: Asian Institute of Technology (AIT), Thammasat University (TU), and Sirindhorn International Institute of Technology (SIIT).

In order to facilitate foreign companies to do business in Thailand, the TSP is an affordable and reliable choice for companies looking to set up a presence in Asia in order to tap into the growing market opportunities in the region.

In addition, TSP tenants benefit from a full range of services and support. For instance, technology and technical support under the Industrial Technology Assistance Program (ITAP), financial support under the Company Directed Technology Development Program (CD), intellectual property services provided by the Technology Licensing Office (TLO), contract research and collaborative research support from the Science and Technology Knowledge Services (STKS), revenue tax exemption supported by the Research and Development Certification Committee Secretariat (RDC), and joint investment funds administered by the NSTDA Investment Center (NIC). TSP tenants will also enjoy the privileges and incentives for companies operating in BOI Zone 3 – the most attractive of all BOI incentive schemes.

Finally, the TSP is able to support R&D and business activities of technology companies of all sizes. The first group, young technology start-up companies, can be assisted to accelerate

their early stage growth by tapping the comprehensive business support services and subsidized facility support. The second group, small and growing technology companies, can rent space in the incubation building at a subsidized rate to carry out their research activities. The final group, more established and larger technology companies, can choose to either rent space in existing facilities or lease a plot of land to build their own facilities.

Role and Function of TSP

As part of Thailand's efforts to become the preferred venue for strategic R&D investments in Asia, the TSP was established to meet the exacting needs and requirements of both local and foreign R&D-based companies. The park offers:

- *Robust Infrastructure and Comprehensive Support*, which meets R&D needs, pilot plants, green houses and design service centers while facilitating and making space suitable to technology companies of different sizes.
- *World-class R&D facilities and skillful manpower*, which would share use of advanced laboratories and equipment at national research centers and provide access to a large pool of 600 full-time scientists and researchers.
- *Resources to boost R&D activities*, which would leverage on joint and contracted R&D activities with NSTDA and provide access to the R&D database.

Finally, TSP offers prospective investors access to unique privileges and incentives from the government. Board of Investment of Thailand (BOI) privileges consist of import tax exemption for machinery, corporate income tax exemption for eight years, 50% corporate income tax reductions for five more years after the tax exemption period ends, and work permit and visa facilitation for foreign specialists and researchers. The Revenue Department incentives comprise measures such as accelerated depreciation rate for R&D machinery and equipment and 200% tax deduction for R&D expenses.

LEVEL OF INNOVATION-RELATED ACTIVITIES: MARKET-DRIVEN AND TECHNOLOGY-DRIVEN

This section explains the role of innovation in the development of SMEs. According to Zahra, Nielson and Robertson [6], from electronic commerce to software development, innovation plays an influential role in the establishment of Thai SME business. In the Internet era, this is done by leveling the playing field and customizing products and services to cater to the unique demand from each customer. The scope of SME businesses ranges from back-end (related to logistics system) to front-end (dealing with sales and marketing)

activities. In general, its impact is unprecedentedly profound and widespread throughout each economic sector.

This topic has four parts. The first part strives to answer two questions: which *type* of firm and *what business function* is mostly innovated? The former is categorized into manufacturing-, new media-, and service-type of firms. The latter is categorized into selling, production, and services. The second part answers the question of whether the "product" or "process" is primarily the source of innovation.

The third part focuses on innovation in the "software" industry. The analysis focuses on the stage in which software development is most innovated and what size of company is most innovated in the area of software development.

The final part of the topic specifically identifies the degree of innovation each Thai economic sector has attained.

Innovation Classified by Type of Firm and Function

Picture of Electronic Commerce in Thai SMEs

The role of e-commerce in the essential elements and mechanisms of SMEses is mainly divided into two parts: back-end and front-end. Firstly, at the back-end, to fulfill demand, suppliers provide goods and service to customers by taking orders via e-commerce. E-commerce can be utilized to satisfy orders on purchasing raw material, coordinate with various members of the value chain network, and facilitate obtaining final goods and services in a more efficient and economical way.

Secondly, e-commerce can help firms maintain efficient inventory management. E-commerce can assist manufaturers, wholesalers, and retailers in serving customers without the burden of having a large amount of inventory stock. This leads to a significant reduction in the cost of production and processing.

Finally, in order to supply SMEs with raw materials and intermediate goods, the Enterprise Resource Planning (ERP) system can be utilized via e-commerce, which cuts back on idle time and unnecessary space. Moreover, SMEs implement logistics systems via e-commerce channels to transport goods to customers in the most economical way.

In terms of functionality, on the back-end there are two major functions: selling and servicing. Selling is done through utilizing e-commerce channels as the point of sale for various groups of customers and is compatible with the lifestyle of today's population.

As for servicing, the integration or interface between points of sale and the support system (delivery, after-sale service, customer satisfaction surveys and customer database-mining) can be harmoniously implemented in an e-commerce environment.



Figure 4. Number of Enterpreneurs using e-cCommerce in Business Source: National Statistics Office [7].

Figure 4 shows that manufacturing companies use a higher percentage of "production" functions on the back-end than the other two business functions (selling and servicing) as discussed below. The detailed innovation analysis classified by industries is shown in Table 4. According to the table, for industries in the shaded zone, SMEs mainly use e-commerce for "production" of goods such as printing, food and processing, paper, ceramics, furniture, and metal. The reason for this is that under the selling function, relatively mature customers in these industries have no need for e-commerce channels primarily due to the fact that such products are normally used everyday. However, since distribution and logistics systems throughout the country are both time- and budget-consuming tasks, e-commerce plays a relatively key role the for these groups in relation to the manufacturing of products, including rubber, plastics, printing, foods and processing, paper, ceramics, furniture and decoration, goods, metal, and related products.

Table 4. Number of Enterpreneurs using e-Ccommerce in Business

		SM	IE	
	Production	Selling	Servicing	Total
Agricultural and Fisheries	3	5	1	9
Construction	10	6	9	25

(...continued)

		SM	IE	
	Production	Selling	Servicing	Total
System Integrator	0	2	1	3
Electrical Appliance	26	36	9	71
Movie / Song	6	7	3	16
Hand-made, Cloth, and Leather	40	41	4	85
Rubber and Plastics	19	6	2	27
Office Supply and Stationery	2	10	2	14
Perfume and Beauty	10	35	1	46
Medicine and Healthy Products	4	9	4	17
Education and Related	2	2	5	9
Printing	26	13	20	59
Foods and Processing	33	20	8	61
Paper	13	0	0	13
Sports	3	5	3	11
Jewelry	15	19	0	34
Ceramics	12	2	4	18
Furniture and Decoration Goods	23	5	2	30
Pets	0	4	2	6
Scientific Equipments	1	5	0	6
Toys	0	7	0	7
Metal and Related Products	19	7	0	26
Chemical Products	5	6	3	14
Others	3	12	2	17
Total	275	264	85	624

For industries whose products belong to specific customer groups such as perfume, health products, and jewelry, the key success factor is to access and satisfy every aspect of customer demands. The reason for this is that while the number of prospective, high-end customers is not as sizable as that of customers for indispensable products in the first group, the profit margin for each dollar of sale for these particular products is very high. In addition, high-end customers do not shop in stores as regularly as those of the first group due to the fact that the products from the latter group are not dispensable. Moreover, stores cannot stock high-end

products for a very long period on spacious shelves because their customer base is not large enough to cover the associated costs. As a result, the role of e-commerce as a selling channel becomes most important for these specialized products.

Figure 5 provides a schematic diagram of essential elements and mechanisms of the electronic market.



Figure 5. Diagram of Essential Elements and Mechanisms of the Electronic Market

After "production", the "service" function is the next most prevalent form of e-commerce facility. This is related to the very wide scope of e-commerce applications, ranging from payment clearing between customers and sellers, e-auctions, e-catalogues, payment among resellers, and search engines to product shipment. As a result, many service-oriented companies, such as new media business, utilize these applications to gain more efficiency in the business value chain. As the Thai economy turns to the new economy, the majority of businesses resort to catering to people seeking convenient lifestyles rather than just satisfying basic needs. In Figure 6, among service firms, e-commerce applications fulfilling a service function outnumber the other two functions by a factor of 10.



Figure 6. Number of Enterpreneurs using e-Commerce Business for Service Firms

Specifically, a larger proportion of businesses are involved in service businesses and deal with a higher number of interactions among sellers, customers, and banks. This is all related to the usage of e-commerce regarding interaction among different agents. In particular, for the hotel and travel industry, the service function of e-commerce is largely dominant. Even in new media business companies, the service function is also prevalent since service has become such an important part of their business.

Moreover, one of the major reasons that SMEs play an influential role in the "service function" is that the cost of running SME businesses has reduced increasingly. There are low-cost yet sound quality services that let SMEs do business on the same level with the multinational companies.

For example, Amazon Elastic Compute Cloud (Amazon EC2), a cloud-computing platform, provides resizable computing capacity for client companies. It is designed to facilitate quicker and more affordable web-scale computation for SME developers. By doing this, Amazon EC2's simple web-service interface allows SMEs to obtain and configure capacity with minimal friction. It also provides SMEs with complete control of their computing resources and lets them run on Amazon's proven computing environment.

Moreover, Amazon EC2 reduces the time required to obtain and boot new server instances to minutes, allowing SMEs to quickly scale capacity, both upward and downward, as their computing requirements change. It can also provide developers with the tools to build failure- resilient applications and isolate themselves from common failure scenarios. Through this service, an SME user can create, launch, and terminate server instances as

needed, paying by the hour for active servers. Moreover, Amazon EC2 provides users with control over geographical locations.

Finally, e-commerce is now probably the most effective channel for the selling function. The prime example is the iPhone. This is why selling is the business function of SMEs in which e-commerce has played a significant role. In terms of numbers, the selling function amounts for more than one-third of e-commerce usage among all types of businesses. E-commerce helps not-so-popular products to generate quite a significant portion of revenue for companies due to granularly-differentiated products and services serving each and every customer around the world on an unprecedently refined scale, as illustrated by Anderson [83].

Business-to-Business and Business-to-Customer e-Commerce

Type of Business	B2B	B2C	B2G	More than one Type	Total
Agriculture and Fishing	2	5	0	2	9
Construction	10	11	-	4	25
Real Estate and Leasing Service	3	7	-	_	10
Logistics	4	6	-	3	13
Travel and Airfare/Accommodation Ticketing	8	92	-	24	124
Hotel/Resort/Guest House	5	114	-	10	129
System Integrator and Software System	13	5	_	_	25
Website Design/Website Space Rental and e-Commerce	42	74	2	46	162
Digital Products, e.g., Game Online and Ringtone	1	17	_	2	20
Communications Equipment, e.g., Mobile Set	0	16	_	3	19
Telecommunication Service	1	11	_	3	15
Computer and its related electronic Equipments	24	53	3	24	104
Electric and Electronic Appliance	19	38	-	14	71
Music and Movies	2	12	-	1	15
Professional Services, e.g., Accounting and Law	6	5	1	3	15
Public Relation Services	7	14	-	6	27
Garment, Hand-Made Products, and Leather	16	67	_	13	96
Rubber-related Products and Plastic	20	5	_	1	26

Table 5. Type of Business classified by Business-to-Business and Business-to-Customer e-Commerce

(...continued)

Type of Business	B2B	B2C	B2G	More than one Type	Total
Office Equipment and Stationery	3	5	_	5	13
Perfume, Cosmetics, and Beauty Products	2	40	_	4	46
Medicine and Healthy Service	1	12	_	4	17
Financial Exchange	1	4	-	1	6
Education and Related Service	1	7	-	1	9
Insurance, Broker, and Agent	0	6	0	0	6
Printing and Newspapers	13	37	1	8	59
Food, Food Processing, and Beverages	20	37	0	3	60
Paper Product	7	4	0	2	13
Automobile, Machinery, and Parts	54	42	0	5	101
Sports and its associated Equipments	1	7	_	3	11
Jewelry and Ornaments	5	25	_	3	33
Flowers and Funeral Products	4	12	_	4	20
Other Service Business	11	27	_	2	40
Ceramics	6	5	_	4	15
Furniture and Home Decoration	15	11	_	4	30
Pet Farms, its Associated Equipment, and Scientific Instruments	1	7	_	4	12
Educational and Child-Developing Toys	0	5	_	2	7
Metal and its Derivatives	15	9	_	2	26
Chemical Products	4	6	_	4	14
Gifts and Souvenir	5	5	_	2	12
Others	0	15	-	3	18
All	352	880	8	233	1473

On the front-end, it is useful to compare this function with the interaction of business agents in the value chain. It can be seen in Table 5, that the number of B2C e-commerce transactions outnumbers that of B2B by nearly three times on aggregate. In esthe service sector, which includes businesses such as hotels and airlines, almost all e-commerce transactions pertain to B2C activities. On the other hand, manufacturing businesses such as printing, food processing, and automobiles, B2C represents roughly 70% of e-commerce applications.

As the majority of Thai SMEs' businesses pertain to the service and retail industry, in which B2C business activities are the predominate application of e-commerce, B2C is the primary e-commerce source that Thai SMEs have applied for, as shown in Table 5. In addition, the nature of the niche market occupied by Thai SMEs precludes them from using B2B e-commerce or applications on a business-to-business basis since in niche or specific-customer-group markets, every bit of information becomes critical for each firm in the competitive landscape. As such, the benefits of e-commerce have been largely realized through more convenient access to a variety of customers via B2C rather than B2B.

This means that selling through e-commerce channels becomes critical for all types of businesses, ranging from those involved in shopping to auctions. In brief, since an increasing number of people have recently opted for a mobile lifestyle, the contact points between customers and sellers have gradually shifted to e-commerce. This is both an economical and effective way of doing business from the viewpoint of sellers.

Finally, as the degree of influence in today's mass media (diversified media technologies that are intended to reach a large audience by mass communication, such as newspapers, books, pamphlets, and billboards) has dwindled, B2C e-commerce has become the major marketing platform for business, especially among SMEs.

Usage of B2C e-Commerce

For SMEs, the optimal way to meet today's extremely diverse demand, from various types of customers, is to be both cost-effective and genuinely creative. Figure 7 illustrates the prevalent usage of new media firms to capitalize on the service function in doing business.



Figure 7. Number of Enterpreneurs using e-commerce in New Media Business

To demonstrate more illustratively how SME business can utilize e-commerce to do business, according to Anderson [63], one such technique is the "Max" strategy, which can be summarized as follows:

At present, there are very few products that have been sold through only a single marketing channel and nearly all firms have opted for the "complementary" marketing choice. According to Smith and Brynjolfsson [9], for the SMEs to become "the big hits" in the eyes of the public, they have to adopt strategies such as building commercial blogs to draw public attention, advertising the blogs using Ad-sense or Ad-word, the web advertisement service from Google, or local web-advertising channels to put their product content before the eyes of target customers, complementary with the usage of social networking services such as Facebook or Twitter. In parallel, demonstrations of each step that vividly explains how to use or install a product can be uploaded to Youtube concurrently using several promotion techniques to promote these demo videos through a variety of media outlets.

After the customers recognize the firm's "identity" with its associated products and business, an innovative yet simple website would be launched to show the full range of products together with a secure and simplified payment method

To assess customers' responses after they have used the products or services in question, follow-up attempts are conducted to detect and assess post-purchase satisfaction, which can be pursued mainly through social networking interaction, including "give-away" promotions on the business website. The data received from these can be utilized to conduct a thorough database analysis. From the database marketing standpoint, there are a lot of inexpensive snf efficient ways for SMEs to do data-mining analysis, such as Google Analytics, in order to classify and identify upcoming demand from existing or prospective customers.

Segregation of Innovation: Project Mapping for Thai SME companies.

One of the useful tools for identifying the sources of innovation is the so-called project map diagram. It can be used to map SMEs' R&D portfolios according to levels of risk, resource commitment, and timing of cash flow. Firms can use this map to compare the product map characteristic of projects with those of their own. It can also be used to assist them in identifying capacity constraints and allocating resources better.

In general, companies may use the project map to aid the preparation of a strategy formulation mechanism. There are four types of development project commonly shown in this map: advanced R&D, breakthroughs, platforms, and derivative projects. Over time, a particular type of technology may migrate through different types of project. The nature of each type of project is illustrated as follows:

First, "advanced R&D projects" are the precursor to commercial development projects and have become essential to develop cutting-edge strategic technologies. Secondly, "breakthrough projects" involve development of products that incorporate the making of revolutionary new product and process technologies. Thirdly, "platform projects" deal with offering fundamental improvements in the cost, quality, and performance of a technology over preceding generations. Finally, "derivative projects" involve incremental changes in product and/or process. In comparison, while a platform project is designed to serve a core group of customers, derivative projects represent modifications of the basic platform design to serve for different niches within the core group.

The following data on intellectual property rights granted in Thailand is collected from the Thailand National Patent System in the Department of Industrial Promotion.

The project map diagram in Figure 8 shows that the IP rights granted in Thailand are awarded for "process" innovation, more than to "product" innovation. Numerically, while almost 80% of intellectual property rights are classified as "new core" processes and "next generation" processes, only 28% are rated as "new core" products and "next generation" products.



Figure 8. Project Map Diagram

In terms of innovation degree, more than 90% of innovation has contributed to incremental change of innovation, while less than 10% has resorted to "new product/process" innovation.

This would imply that SMEs in Thailand have been more adept at product or service enhancement rather than in creating novel lines of new products. From the above data, more efficiency in the business process is the main focus for Thai SMEs, not the creation or construction of new ideas or concepts of business processes for both production and service industries. This should be understandable since Thai SMEs mostly play a major role in the downstream value chain. As such, the utilization of the output from upstream industries is the key ingredient for generating revenues or gaining competency, and process, not product, innovation therefore becomes a dominant force for such contributions.

Figure 8 shows that from a total of 50 property rights in Thailand, breakthrough projects have a share of 2%, platform projects consist of 8% of all projects and 90% of all projects contribute to derivative projects. As a benchmark, respondents in a recent survey administered by the Product Development and Management Association in the USA indicated that roughly 8% of their projects were breakthrough or advanced R&D projects, 17% were platform projects, and 75% were derivative products.

Accordingly, in comparison with that of the USA, innovation in Thailand is more concentrated on derivative projects than in breakthrough or platform projects. From the customers' perspective, the platform projects are designed to serve a core group of customers, whereas derivative projects represent modifications of the basic platform to appeal to different segments in the core group. This would be justifiable because, from the multinational company's perspective, the products under breakthrough or platform projects are not economically profitable in the Thai market. Take a recent example from Apple. The iPad and iPhone was launched in Thailand as the last stage of worldwide market distribution. From this, it is evident that cutting-edge technology would not be located in Thailand because it is not serving the "core" customers. That's why 90% of derivative projects have catered to derivative customers, that is, the target group in the Thai market.

From the worldwide marketing point of view, the reason that Thailand is just a secondary market for worldwide product launches is that Western companies view the Thai market as a source of revenue and not a first-rate technology adopter. In other words, foreign companies have classified Thailand as a revenue-generation source as they tap into this market only for expanding their customer base.

In terms of nationality origin as shown in Figures 9–11, European companies have paid more attention to process change with more than 90% of their intellectual property IP contributing to process change for the new core process and next-generation process categories. On the other hand, Asian companies are more adept at product change with 42% of all IP subscribing to new core products and next-generation products, compared with 28% for all countries registered.



Figure 9. Process Versus Product Change in Europe



Figure 10. Process Versus Product Change in Asia



Figure 11. Process Versus Product Change in the USA

This can be partially explained by the role of European companies in Thailand being only a small piece of the jigsaw of worldwide companies. While Thai-European joint-venture SMEs have acted in a subsidiary role for the mother or main company, they play a crucial role in R&D for the whole company. In Europe, the role of subsidiaries in the overall structure of a corporation is to support the core functions at the corporation's headquarters. As a result, Thai-European SMEs in Thailand are oriented toward the auxiliary mode or process innovation.

In other words, the role of European countries and the USA in terms of innovation is oriented more toward "built-and-transfer" rather than co-creation between source and recipient countries. On the other hand, Asian companies, probably due to cultural factors and economies of scale, have more in common with Thai companies in instilling the new wave of innovation. Consequently, this results mainly in Thai-Asian SMEs being more oriented toward focusing on product innovation due to the role of the headquarters in implementing R&D development of the core product for the Asian market.

The most interesting point is that, according to Kotler and Armstrong [10], as the next generation of goods and services is gearing toward co-creation of values between firms and customers to satisfy the customized customer demands, the existing pattern of European countries and the USA for developing innovation in Thailand would consequently erode their competitive advantage in catering for Thai market customers. As a result, this would likely become beneficial for Thailand in terms of innovation development in the near future

because breakthrough and platform projects would be much more abundant from these Western countries, in order maintain their presence in the Thai market.

The prime example of such adaptive behavior from these Western companies is by Telenor, a European company that will be the new major owner of Dtac, the telecommunications company with the best prospects in Thailand at present.

According to Chaikankaew [11], in the Thai mobile phone market seven to eight years ago, people still used only voice services, as only a small percentage of Thai people had their own mobile phones. The strategy of telecommunications companies in penetrating the Thai market during that period was to build and expand the mobile cellular network to capture a share of voice services. As a result, innovation in the telecommunication industry then was in a passive mode. The reason for this was that that as long as cellular signal transmission equipment was built to cover the entire country as far as possible, the market share of the company would increase. As a result, "process" change became the primary source of innovation in Thailand during that period.

At present, the business game-plan in Thailand has drastically changed from the "voiceservice-dominated" era of seven to eight years ago. Now, almost everyone uses a mobile phones as part of normal everyday life, with a large proportion of people also surfing the Internet from their phone. There is, then, no question that "Internet" mobile services would be the business of the future. The adoption of pure technology from headquarters would not be enough for the telecommunications company to survive or grow in this business in today's market environment. In telecommunications, add-on services such as Value-Added Service (VAS) technology, is where customization to customers' lifestyles and culture is key, and become the major revenue source of the business rather than and the universal voice service.

In this line of business, the local customization of technology, mainly through product innovation rather than through slight adjustment (process change) practices, plays an influential role in competitive advantage perspective. The co-creation of value between the company and customers plays a key role in successfully doing business by the principle of "No. of Customer (N)=1, Resource to be utilized (R)= Global (G)" from Prahalad and Krishnan [12].

Their core concept is that the demand from each customer must be individually served, while the profile of each unique demand has gradually been co-created from both firm and the individual customer. To materialize the various and personalized tastes of each customer, the technology, both from headquarters and the local market, needs to be sequentially adopted, blended, and co-created throughout the market. To put this in perspective, in terms of innovation trajectory from the project map diagrams, Thai companies are more inclined to incremental and modular innovation. These types of innovation make a relatively minor change (or adjustment) to existing practices and do not significantly affect the overall configuration of the system. Most importantly, very few discontinuous technologies are demonstrated to act as the main vehicle of the core competency in business. This means that these companies rarely implement a kind of technology that fulfills a similar market need by building on an entirely new knowledge base. Instead, they just reconfigure the features or usages of product from the existing knowledge.

This is in line with the so-called "frugal innovation" trends in emerging markets, according to Wooldridge [13]. It means rethinking entire production processes and business models to reduce costs. One way to achieve such tasks is to use existing technology in imaginative new ways. One example is that all consumer products ranging from tables to computer cases were originally made from wood and steel. This has been changed recently as chemical laboratories and factories transform their chemical ingredients to plastic, which in turn, can be transformed is transfigured into any form or class of products. For instance, drinking water containers were originally in the form of a bag with a rubber band to close it and to hold it with, which was moderately popular.

Moreover, the emphasis on process change rather than product change, is more evident in the recent tendency to undertake the so-called "reverse M&A", according to Wooldridge [13]. The idea is not about cutting costs through synergies, greater efficiency and lower head count since this is easily available in Thailand, but rather about using the skills, brands and distribution channels that will bring SME companies to the level of world-class companies. The "reverse M&A" idea is more compatible with "process change" than with "product change" as Figure 9 suggests. The innovation transferring from Western companies into emerging markets can be a route for acquisition of know-how. On the other hand, the refinement in the variety of features for both products and services has to be channelled only through "process change" administered in Thailand.

To explain this idea, a company called Infosys may be taken as a prime example. The purchase of sophisticated machinery or equipment from the West also requires sowing talent from local market, to improve technology. The new motto of India, "No caste, no creed, only merit" reflects the state of mind to absorb Western technology. Infosys competed with renowned Western companies such as IBM to recruit the "best and brightest" by going public and providing employees with stock options, which give the employee a better chance of becoming rich than if they work for foreign multinationals.

Level of Technology Commercialization analysis via Thai Computer Software Registration Classified by Software Type and Business Size

From the viewpoint of innovation in the application of computer software, the four most active fields of software innovation are database system, industry system, registration system, and accounting system, respectively. From Table 6, we can observe that:

		Business S	Size		Education	Total	Percentage
Software Type	Small	Medium	Big	Individual	Government		
Computer-Aided Instruction System	2			1		3	3.75%
Registration System	11					11	13.75%
Banking and Finance System	3					3	3.75%
Industry System		4	9		2	15	18.75%
Database System	5	4	8	4	3	24	30.00%
Office Automation System	1					1	1.25%
Organizational Resource System	3		1	1		5	6.25%
Accounting System	1			6	1	8	10.00%
Operations System	1					1	1.25%
Multimedia and Design System	1				1	2	2.50%
Document Support System	2					2	2.50%
Specialized Task System	1					1	1.25%
Unidentified	1			1	2	4	5.00%
Total	32	8	18	13	9	80	100.00%

Table 6 Thai Com	uiter Software Registra	tion Classified by Soft	ware Type and Size
rable 0. rhai Com	Julei Soliwale Registia	alon Classifica by Soli	wate Type and Size

Source: Department of Intellectual Property [14].

First, innovation by large-scale industries such as banking and finance, where economies of scale work particularly well, is not prevalent in Thailand since their sizes in developed countries are much bigger than those in Thailand.

Secondly, by classifying the components of each system by firm size, more than 70% of Thai software registration in the business sector is attributed to small firms. From the data, it is evident that the registration system is pioneered by the small companies; the industry system software database system software is primarily registered by a combination of medium and big companies with more concentration in the latter. This result is not unexpected as only relatively large firms are capable of applying industry systems and database systems into their business. Finally, innovation in accounting system softwares has been pioneered solely at the individual level.

Note that educational institutions and government agencies play a relatively important role in software innovation in the industry and database systems. On the other hand, individual firms generally play a prominent role in the accounting systems.

In summary, while big firms have opted for database and industry systems, SMEs play an important role in software innovation with a 40% share of new software initiatives. SMEs are most active in software innovation relating to registration, organizational resource and document support systems.

This point would be more pronounced when it is considered that most of e-commerce activities by Thai SMEs have more applications in the selling and servicing areas.

Prahalad and Krishnan [12] explain that the strategy the firm relies upon is the N=1, R=G principle (where resources from all over the world serve each customer's unique demand). For technical architecture, SMEs would need to construct multiple layers to satisfy such various diversifying demands. However, web-sites like Alibaba.com and ec21.com in the ROK or weloveshopping.com in Thailand make a short-cut multiple layer requirements by providing free software to install all these requirements on personal computers. SMEs currently need only add-on software to customize standard software to satisfy their own segment of customers. The mapping between these two architectures is shown in Table 7.

Aspect	Social architecture	Technological architecture
Customer		
- Health	New Generation of babies have more variety of size as they are born by today's older mother.	More space or capacity in database required for storing the higher amount of data captured
- Lifestyle (Working Condition)	Both husband and wife go out to work, so the associated product needed to be fool-proof and more care taken before usage for a nanny to use it.	Refund and exchange has to be both automated and predictive. The interface between database and product handling becomes more integrated and interactive.
- Lifestyle (Living Condition)	The location of building of residence, shopping complex, and pre-schools is so diversified, that equipment and product have to consider both spatial and weather factors.	The design and customization of products in response to diversified customers are taken care of by database and product/customer correlation. IT has to take care of this.
Product		
- More Variety	Globalization and integrated supply chain management enables variety of both type and quantity of products	IT capability has to be advanced and spacious to handle the variety of both type and quantity of products.

Table 7.	Mapping between	Social and	Technological	Architecture	for the	lookzworld.	com
	11 0		U				

By mapping these two architectures, SMEs can implement product positioning, product differentiation, and build up their own brand name with relatively low cost. This would, therefore, enable the SME to create its own market segment with today's changing lifestyle and social architecture.

In practice, nowadays, SMEs are not implementing this step-by-step multilayer scheme in laying out the foundation for their IT infrastructure. Instead, the purchase of inexpensive software packages for setting up online stores with media hubs such as Alibaba.com or ce21. com has become more popular among SMEs. Specialization and economies of scale and scope are the driving forces both to reduce costs and bypass the learning curve in setting up the new online store from scratch.

For instance, in Thailand, with a very low start-up cost of only USD23, an on-line store can be established within one hour, which can simultaneously utilize all necessary resources that multinational companies require for worldwide business operations.

This is one reason why the database system has gained the highest rank in terms of innovation in Thailand. Currently, the key determinant of success in implementing e-commerce is resorting to customization of ready-made IT and e-commerce packages to fulfill the refined requirements of several types and scales of SMEs. As such, SMEs use database and registration systems to transfer standard packages from market hub websites such as Alibaba.com into the customized programs running on compatible protocols for the smooth running and maintenance of their online stores.

The Analysis of Innovation Degree across each Industry

Table 8 shows that while SMEs play a relatively minor role in terms of invention under the utensil, textile/paper, construction, and physics industries, they have become relatively more innovative in chemical/meteorology, mechanical engineering, and electricity.

Cada	Tuno	SME				
Coue	Туре	Number	Percent	Number	Percent	
А	Utensils	209	39.7%	18	21.2%	
В	Production/Logistics	121	23.0%	17	20.0%	
С	Chemistry/Meteorology	70	13.3%	28	32.9%	
D	Textile/Paper	8	1.5%	1	1.2%	
Е	Construction	23	4.4%	3	3.5%	
F	Mechanical Engineering	57	10.8%	11	12.9%	
G	Physics	15	2.9%	1	1.2%	
Н	Electricity	23	4.4%	6	7.1%	

Table 8.	Number of	Property	Rights	classified by	Industry	Groups	(International	Classification)
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Source: National Statistics Office [7].

Because the mining/chemical industry output of SMEs compared with total mining output is very high, innovation in this field should be relatively high among SMEs to serve the expansion in this area. Specifically, the know-how and techniques to retrieve minerals from land is crucial for competitive advantage and to help increase production efficiency. One justification is that most mining-exporting countries tryied to diversify their business to avoid idiosyncratic risk or regulatory risk, e.g., tax increase in Australia, and have a strategy of contracting out their operations into emerging market countries, particularly into SMEs, due to their adaptability to rapid changes in the industry. Therefore, their innovation becomes a key success factor among SMEs within this industry.
According to Wooldridge [13], the most popular innovation scheme in emerging market countries is called "frugal innovation". He theorizes that there are three ways for reducing costs and increasing efficiency. The first is to use existing technology in imaginative new ways. An example is that, in the past, all consumer products in Thailand, ranging from tables to computer cases, were made from wood and steel. This has changed recently as chemical laboratories and factories transform their chemical ingredients to plastic, which in turn is transformed into any forms or class of products.

For the chemical/meteorology or mining industries, the production or value-creation process requires a high percentage of tacit knowledge in synthesizing final products from the preliminary ingredients, in which, unlike other homogeneous-goods-producing industries, the short-cut alternative for implementation via imitation is not generally successful in generating final outputs. As a result, the copy or reproduction of such techniques or know-how would require a lot of effort or, in many cases, be nearly improbable. As such, it would provide the players in these industries with strong incentives to strive to contribute a lot of innovation to the business.

Codo	Type	SME					
Coue	Туре	Number	Percent	Number	Percent		
А	Utensil	85	38.5%	8	40.0%		
В	Production/Logistics	47	21.3%	4	20.0%		
С	Chemistry/Meteorology	31	14.0%	1	5.0%		
D	Textile/Paper	7	3.2%	0	0.0%		
Е	Construction	15	6.8%	2	10.0%		
F	Mechanical Engineering	24	10.9%	2	10.0%		
G	Physics	5	2.3%	1	5.0%		
Н	Electricity	5	2.3%	1	5.0%		
	Unidentified	2	0.9%	1	5.0%		

Table 9. Property Rights classified by Industry Group (International Classification): 1998-2006

Source: National Statistics Office [7].

When analyzing across time, chemistry and meteorology were originally the industries in which SMEs played a relatively crucial innovation role based on the high number of property rights. According to Table 9, utensils have recently become the most important industry for SMEs in contributing to innovation. The rationale for this changing pattern of innovation is as follows: More than 30 years ago, as industrialization took off, Thailand constructed and rapidly expanded chemistry and meteorology plants. When the industrialization cycle for the Asian region started in the late 1960s, several Japanese companies, at the instigation of the Japanese government, selected Thailand as a major manufacturing base in the Southeast Asian region due to the very low cost of input factors for production. Japanese firms chose basic industries such as automobiles, textiles, etc.

Because these industries required a certain level of technology characterized as non-tacit knowledge and "build-and-transfer" to produce the basic goods, all R&D activities were developed in their Japanese headquarters. As a result, there were not so many patents or property rights in these industries registered in Thailand. Only certain industries such as chemical and mining industries, in which knowledge and know-how are tacit or region-specific, had their research and development activities developed in the headquarters and then relocated to Thailand.

This practice has continued for more than 30 years until recently. The paradigm shift started to happen as demand for goods and service for the new generation of consumers has become increasingly more sophisticated and differentiated [6]. Chemical and mining industries were also reaching a mature stage in the similar period.

As consumers started demanding more sophisticated products in terms of value-added features, heavy industries, which had reached saturation point, responded by transforming chemical parts and metal ingredients into ready-to-sell products. Thus, competition became increasingly fierce in consumer-oriented industries (downstream industries). Henceforth, innovation has become a necessary condition or attribute for all companies who strive to become dominant players in such active and dynamic markets.

Note that it is in the production/logistics industry where SMEs generally play a relatively active role in terms of innovation. The reason for this is that these industries act like a staple part of manufacturing in the economy.

Finally, due to more technical and scientific advancement in building-and-construction techniques, SMEs have recently paid increasing attention to the construction industry because the economies of scale are likely to be a key factor of success in this industry.

Table 10 shows aggregate data for assessing the degree of innovation within each major sector.

Table 10. SME Domestic GDP at Current Price by Economic Activity (Million Baht)SME Domestic GDP at Current Price by Economic Activity (Million Baht)

SMEs	2003	Output per Patent	2004	Output per Patent	2005	Output per Patent
SME Sector	2,367,209	_	2,598,668	_	2,816,639	_
Mining	26,921	385	31,636	452	40,159	574
Production	682,640	3,396	755,130	3,757	830,247	4,131
Construction	146,830	6,384	164,043	7,132	184,051	8,002
Trade and Repairing	722,651	3,458	783,347	3,748	841,407	4,026
Service	781,905	_	857,902	_	913,893	_
- Private	781,905	_	857,902	_	913,893	_
- Government	_	_	_	_	_	_
Electricity, Gas and Water Supply	6,262	272	6,610	287	6,882	299

SMEs	2006	Output per Patent	2004	Output per Patent	2007	Output per Patent
SME Sector	3,041,996	_	3,236,634	_	3,446,688	_
Mining	46,545	665	49,902	713	57,073	815
Production	921,924	4,587	992,617	4,938	1,101,480	5,480
Construction	197,448	8,585	205,471	8,934	212,283	9,230
Trade and Repairing	889,618	4,257	937,861	4,487	981,979	4,698
Service	978,561	_	1,043,155	_	1,085,682	_
- Private	978,561	_	1,043,155	_	1,085,682	_
- Government	_	_	_	_	_	_
Electricity, Gas and Water Supply	7,900	343	7,628	332	8,190	356

(...continued)

SMEs	2003	2004	2005	2006	2007	2008
Sector	100%	100%	100%	100%	100%	100%
Mining	1.14%	1.22%	1.43%	1.53%	1.54%	1.66%
Production	28.84%	29.06%	29.48%	30.31%	30.67%	31.96%
Construction	6.20%	6.31%	6.53%	6.49%	6.35%	6.16%
Trade and Repairing	30.53%	30.14%	29.87%	29.24%	28.98%	28.49%
Service	_	_	_	_	_	_
- Private	33.03%	33.01%	32.45%	32.17%	32.23%	31.50%
- Government	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Electricity, Gas and Water Supply	0.26%	0.25%	0.24%	0.26%	0.24%	0.24%
SMEs (Growth)	_	_	_	_	_	_
Sector	_	9.78%	8.39%	8.00%	6.40%	6.49%
Mining	_	17.51%	26.94%	15.90%	7.21%	14.37%
Production	_	10.62%	9.95%	11.04%	7.67%	10.97%
Construction	_	11.72%	12.20%	7.28%	4.06%	3.32%
Trade and Repairing	_	8.40%	7.41%	5.73%	5.42%	4.70%
Service	_	_	_	_	_	_
- Private	_	9.72%	6.53%	7.08%	6.60%	4.08%
- Government	_	_	_	_	_	_
Electricity, Gas and Water Supply	_	5.56%	4.11%	14.79%	-3.44%	7.37%

Based on output per patent, the most innovative industry is electricity gas/water supply and mining. The trade and repairing sectors as well as the production sectors are the laggards in terms of innovation while the construction industry is the most backward. This would substantiate the analysis in the previous section about the distribution of innovation across major industries in Thailand.

FINANCING PROGRAMS FOR INNOVATION PROJECTS

This section outlines the institutions that provide financial support to SMEs. They all have the same objective of providing financial support to build strong SMEs but each has its own focused agenda and customized strategy.

The Importance of SME Financing

In general, loans help SMEs deal with economic uncertainty. SMEs have been doing well in both individual and systemic risks as demonstrated in Figure 12. From the perspective of individual risk, SMEs are in the same range as retail loans. Evidence of this is the capital requirement in the Basel II regulations. In terms of systemic risk, SMEs and micro finance play a cushioning role to alleviate economy-wide financial difficulty.



Figure 12. Degree of Lending Risks

The following institutions provide financial support programs to SMEs: (a) The National Innovation Agency (NIA), which focuses on promoting the development of innovative technologies and commercialization of high value-added products, (b) the Small and Medium Enterprise Development Bank of Thailand (SME Bank) which focuses on small innovation business development in the venture capital industry, and Additionally,(c) the National Science and Technology Development Agency (NSTDA) which focuses on technology development in the areas of ICT, biotechnology, materials technology, and nanotechnology. It is noted that the government economic stimulus program in 2009—12 has also supported SMEs in producing more value-added creative goods for export.

In general, support for the innovation system in Thailand is implemented through the S&T infrastructure of NSTDA in the form of various schemes, as outlined below. The support of

micro foundations for major industries in Thailand is partially implemented by the National Innovation Agency (NIA), SME Bank and OSMEP which have played an auxiliary role in terms of alternative financing and loan guarantee, respectively. Finally, the economic stimulus program in 2009–12 would strengthen less competitive SMEs.

National Innovation Agency (NIA)

The NIA has focused on promoting the development of innovative technologies and commercialization of high value-added products in three areas: (1) bio-business, including biotechnology and natural products (2) cco-industry, comprising clean energy, bio-based materials, and organic agriculture, and (3) design and solution, comprising software and mechatronics, nano-solutions, and product design.

Given that Thailand's present strategic plan and the S&T action plan have placed great emphasis on the national innovation system and industrial clusters, NIA's main mission is to conduct activities that accelerate innovation in industry, business, government, and society in systematic and sustainable ways.

For the operational framework to achieve the above goal, the Strategy for Upgrading Innovation Capability (Strategy 1) has been established two strategic programs consisting of (a) strategic innovation program, which caters to bio-business and organic agriculture business and (b) industrial innovation program, which serves bio-business, eco-industry, and design and solutions.

Promoting Innovation Culture (Strategy 2) has established three strategic programs: first, stimulating a thirst for knowledge via innovation activity among the public such as innovation management course for executives, innovation forums, etc. Secondly, innovation achievement promotion via national innovation awards and supporting innovation awards for students and organizations. Finally, innovation networks via innovation news through websites and memberships.

Building Innovation Network (Strategy 3) has established two strategic programs: first, development of innovation organization and administration via innovation ambassadors and innovation acquisition services and secondly, a national innovation system via innovation policy, intellectual property management, and innovation parks.

Responsibilities of assisting innovative businesses

Having taken cognisance that innovative entrepreneurs face the risks of innovation investment and commercialization, NIA has offered a range of financial programs to help

entrepreneurs manage risks and drive innovations. The first of these is the provision of interest-free loans for an innovation project up to a maximum of USD160,000 for the first three years. The second is the provision of grant support (75% of total expenses) up to USD160,000 for a maximum of three years. The third is by supplying full grant support for cluster platform-based innovation projects up to USD160,000 for a maximum of three years. Finally, the NIA provides grant support for joint-ventured innovation projects up to USD800,000 for a maximum of seven years.

Small and Medium Enterprise Development Bank of Thailand (SME Bank)

SME Bank has played a major role in assisting young entrepreneurial firms since 2002 by mitigating the risks faced by SMEs. This has been done by assisting them with access to sources of funds, business plan preparations, and advice on operational issues.

The most critical factor for the entrepreneurs is how to acquire enough capital for commercializing their innovative ideas. Public provision of venture capital to SMEs is therefore a key first step in supporting venture capital-backed spin-offs.

Commercial banks have mostly tried to avoid lending to SME businesses because of adverse selection problems. Therefore, SME Bank partly fills this gap by relaxing some restrictions on certain areas that SMEs cannot meet when applying for loans with commercial banks such as verified evidence on accounting documents as well as profit and loss statements. However, this may lead to the SME Bank absorbing a greater degree of risk. To alleviate this burden, SME Bank has tried to select and lend to projects that are in line with government stimulus projects such as the industrial and agricultural restructuring programs, the village fund and social investment schemes.

There are two types of risky projects the bank needs to manage optimally. The first type of risk is whether a project, which seems to be a questionable prospect, will become a commercial success. Some examples are biochemical or genetic-type businesses. Such new technology-based business is still beyond the credit risk framework of commercial banks. On the other hand, some industries may be interpreted as rising stars but they are still in an early stage of growth and this pertains especially to SMEs. The second type of risk is the shaky financial status of loan applicants that deters commercial bank lending.

Supported by many forms of cooperation with the government and private sector organizations as well as financial institutions such as KfW (Germany's state-owned development bank), and various financial institutions in Japan, India, the ROK, and and China, as well as other Asian countries, SME Bank has adopted a cooperative approach to support and strengthens SMEs with early- and expansion-stage capitalization through equity financing.

In facilitating high-technology SMEs to have sufficient funds to compete with other established businesses, SME Bank has implemented a strategy focusing on turning R&D into innovation. This enables small technology businesses to make use of their copyright, patent, or trademark assets by transforming them into capital in order to increase the size of their loan for business or working capital purposes. There is a working team to undertake the valuation process, as the equity interest represents ownership in technology-based patent assets.

In 2006, SME Bank undertook the challenge of setting up SME Bank Venture Capital (VC) Corporation, a separate VC arm of SME Bank, to enhance the growth prospects of VC-backed businesses, particularly early stage hi-tech companies. Venture investments of USD160 million (50 SMEs with USD3.2 million each) assisted start-up technology companies (with less than USD6.4 million of fixed assets) to grow and generate innovation to fuel economic growth.

The major industries to be assisted include: 1. Foods, 2. Textiles, 3. Shoes and Leather, 4. Woods and Furniture, 5. Medicine and Chemicals, 6. Rubber, 7. Plastics, 8. Ceramics and Glass, 9. Electrical Appliances, 10. Automotives, 11. Jewelry, 12. Steel, 13. Petrochemical, 14. Regional Products, and 15. R&D-related industry

In 2007, SME Bank launched full network services from incubation, financing, mentoring and strategic alliances to capital offerings on the stock market (initial public offering or IPO support). In addition, SME Bank also supported less creditworthy SME businesses through the low-interest program called "Fast Track Loan program".

The Fast track loans take 3–21 days to process, and loans can be withdrawn within three days, in response to the government's policy to help provide SMEs with sufficient funds and at high speed.

National Science and Technology Development Agency (NSTDA)

Innovation policy in Thailand has shifted from a narrow range of scientific and technological foci to a broader policy context through the following government policies:

- The Ninth Economic and Social Development Plan Years 2002–06;
- Thailand Strategic Planning Years 2002–06;
- National Vision Years 2000–20;
- National Research Policy No. 6 Years 2002-06; and
- Public Administration Master Plan Years 2005–08.

In the move towards a knowledge-based economy, NSTDA, under Ministry of Science and Technology, has enacted a framework for Science and Technology (Years 2004–13) focusing on technology development in the fields of ICT, biotechnology, materials technology and nanotechnology. It is hoped that the policy-making activities based on this framework will have a significant impact on the nation's economic, industrial and technological development. NSTDA has set a budget of THB3,080,000,000 (USD77 million) to support its cluster-oriented economic policy.

Moreover, NSTDA has played the role of champion for R&D collaboration between industries and universities. Finally, the stimulus program from the Thai government for culture and art categories in 2009 has been implemented to counter the world economic recession.

CONCLUSION AND RECOMMENDATIONS

The Thai economy has grown tremendously over the past 30 years. From 1980 to 2000, Thailand's GDP relative to Japan's jumped from 4.8% to 9.5%. Among ASEAN countries, Thai income per capita was the third highest while it ranked second in terms of GDP.

In addition, in terms of diversification of industry, Thailand has the lowest variability of industry composition (composed of agriculture, manufacturing, services, and other industries) in terms of total value added in 2006, resulting partially from the presence of SMEs. This is considered a resiliency attribute or ability to guard against external economic shocks. Finally, it should be noted that SMEs contribute nine million jobs, or 78% of total employment, in Thailand (OSMEP, 2010).

However, revenue from SMEs accounts for no more than 40% of GDP, while the SMEs contribute only 30% of total exports.

This paper recommends five suggestions for enhancing the role of SMEs for Thai economy:

- 1. In terms of e-commerce applications for SME products: the production and selling function should be applied toward basic (staple) and luxury products, respectively.
- 2. For SME service firms: usage of e-commerce should focus on the selling function. On the other hand, for business platforms, B2C e-commerce is more popular among SMEs than B2B.

- 3. SME innovation is likely to originate from process innovation and derivative projects, according to the number of IP registrations.
- 4. In terms of company size, the innovation in registration systems, database and industry systems, and accounting systems mostly originates from small companies, large companies, and individuals, respectively.
- 5. In terms of industry, SMEs have played a key role in innovation for the chemical and mining industries. Consumer products are seeing more innovation by SMEs.

Finally, the institutions providing financial support programs to SMEs are the following: (a) NIA, focusing on promoting the development of innovative technologies and commercialization of high value-added products, (b) SME Bank focusing on small innovation business development in the venture capital industry and, (c) NSTDA focusing on technology development in the fields of ICT, biotechnology, materials technology, and nanotechnology.

ANNEX TABLES

Annex Table 1. 2009–12 Stimulus Program for Culture and Art (As of March 2010)

No.	Project	Organization	Project Started	Project Finished	Budget Approved (million baht)	Budget Contracted (million baht)	Withdrawal
	Total				1,330.60	798.27	142.96
1	Digital Media Asia 2010	Software Industry Promotion Agency	52	53	200.00	167.73	63.36
2	Research on Development in Food Innovation	National Science and Technology Development Agency	53	55	50.00	35.62	3.82
3	The City Antique Door Repairing Project at Sukhotai	Department of Public Works and Town & Country Planning	52	53	28.00	0.00	0.00
4	Creative Art and Cultural Festival Project	Ministry of Culture	52	53	55.00	54.67	5.73
5	Buddhism Common Knowledge Project	Department of Religious Affairs	52	53	75.00	14.91	2.00
6	Rehabilitation of Canal and City of Sukhotai	The Fine Arts Department	52	53	15.00	14.62	0.01
7	Electricity and Lightning Decoration Project for Natural Museum of KhamPangpetch	The Fine Arts Department	52	53	14.00	13.75	0.02

(...continued)

No.	Project	Organization	Project Started	Project Finished	Budget Approved (million baht)	Budget Contracted (million baht)	Withdrawal
8	Conservation and Rehabilitation of World Heritage in emergency Stage Project	The Fine Arts Department	52	53	141.00	0.00	0.00
9	Conservation of Lanna Civilization Project for World Heritage	The Fine Arts Department	52	53	112.60	109.93	0.00
10	Supporting and Promoting of Movies and Videos Project	Office of Contemporary Art and Culture	_	_	200.00	0.00	0.00
11	Thailand Food forward Project	Ministry of Culture	52	55	100.00	88.84	0.00
12	Supporting and Promoting Operational Plan for SMEs Project	Office of Small and Medium Enterprise Promotion	52	53	300.00	298.20	68.02
13	Biological and Wildlife Knowledge Exhibition Project	Zoological Park Organization	52	53	40.00	0.00	0.00

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