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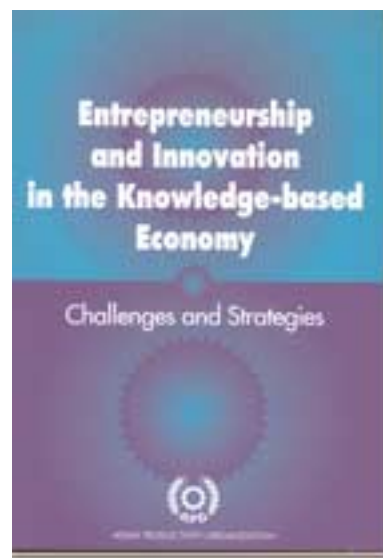
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## **Entrepreneurship and Innovation in the Knowledge-based Economy: Challenges and Strategies**

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**Report of the APO Symposium on  
Entrepreneurship in Knowledge-based Industry**  
*Taipei, Republic of China, 23 – 26 July 2002*

Edited by Prof. Tan Wee Liang.



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# **Entrepreneurship and Innovation in the Knowledge-based Economy**

Challenges and Strategies



ASIAN PRODUCTIVITY ORGANIZATION



## ASIAN PRODUCTIVITY ORGANIZATION

### **Objective**

The Asian Productivity Organization (APO) is an inter-governmental regional organization established by Convention in 1961 to increase productivity in the countries of Asia and the Pacific through mutual cooperation.

### **Membership**

APO membership is open to all Asian and Pacific Governments that are members of the Economic and Social Commission for Asia and the Pacific (ESCAP) of the United Nations. Governments outside Asia and the Pacific may become Associate Members.

APO member countries are: Bangladesh, Republic of China, Fiji, Hong Kong, India, Indonesia, Islamic Republic of Iran, Japan, Republic of Korea, Lao PDR, Malaysia, Mongolia, Nepal, Pakistan, the Philippines, Singapore, Sri Lanka, Thailand and the Socialist Republic of Vietnam.

### **Organization**

The supreme organ of the APO is the Governing Body. It comprises one Director for each member country designated by their respective governments. The Governing Body decides on the policies and strategies of APO programs, and approves its budgets, finances, and matters relating to membership.

The Secretariat, based in Tokyo, comprises the Secretary-General and Secretariat staff who execute the annual programs approved by the Governing Body. It has established operational networking with the designated National Productivity Organizations (NPOs) which act as national change agents for productivity promotion and as implementing agencies for APO programs in member countries. It also has close working relationships with other international organizations.

### **Roles**

The APO serves as think tank, catalyst, regional advisor, institution builder and clearing house for productivity information to member countries. It assists member countries through human resource development, technical expert assistance and dissemination of knowledge and know-how on productivity.

### **Programs and Activities**

APO's programs cover the industry, service and agriculture sectors, with special focus on socio-economic development, small industry development, human resources management, productivity measurement and analysis, quality management, production and technology management, information technology, development of NPOs, green productivity, integrated local community development, agribusiness, agricultural development and policies, resources and technology, and agricultural marketing and institutions.

Its activities include basic research studies, surveys, symposia, study meetings, training courses, seminars, fellowships, technical expert services, study missions, publications, and audio-visual training materials.

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Report of the APO Symposium on Entrepreneurship in Knowledge-based Industry held in Taipei, Republic of China, 23 - 26 July 2002  
(02-RP-GE-SYP-07-B)

This report was edited by Prof. Tan Wee Liang

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## FOREWORD

Some years back, the Asian Productivity Organization (APO) realized that the knowledge-based economy would gather momentum and become a reality. We therefore made it one of the key areas for the attention of national productivity organizations.

The knowledge-based economy is characterized by change and a turbulent business environment. Productivity and competitiveness now depend on nations being ready for the knowledge-based economy. Advances in telecommunications, information technology, and the Internet have transformed the global business environment. The bases of economic life and business have been extended to the realm of knowledge. Knowledge assets, knowledge workers, and knowledge ventures have become the foci of attention. This new environment brings new challenges to entrepreneurship both at the individual (new start-up) and corporate (internal corporate venture) levels. The e-business environment, as it is referred to, creates opportunities for new business models, new ways to create value, and access to new markets on a global stage. Knowledge has become one of the most important forms of intellectual capital in starting and running a business today. R&D and innovation will naturally become the primary focus of an enterprise in the process of value creation.

These developments have generated vibrancy in most economies, although there are accompanying challenges. An entrepreneur will need to know how to utilize the technological elite responsible for such efforts and tap the financial resources available to meet the challenges of knowledge-based business. To survive in the knowledge age, entrepreneurs must rethink how they operate, foster a new innovative culture within their organizations, and at the same time form knowledge networks or strategic alliances with others for mutual gain and competitive advantage. Policy makers also need to examine ways to prepare their countries for the knowledge-based economy and how best to foster entrepreneurship in knowledge-based industry.

To explore these challenges, the APO organized a forum of experts chaired by Professor Tan Wee Liang from the Singapore Management University to discuss the following themes at a symposium:

- e-business trends and new venture initiation in knowledge-based industry;
- entrepreneurs' role in knowledge-based industry;
- appropriate business models, management strategy, and tactics including value creation methods, marketing, and branding that harness the possibilities that abound in knowledge-based business;
- the role of venture capital in knowledge-based industry;
- entrepreneurship and innovation; and
- initiating ventures within corporations by motivating and retaining knowledge assets.

This present volume is a compilation of the papers and views presented at the symposium. The APO greatly appreciates the efforts of Professor Tan in editing this volume. We hope that it will aid policy-makers, entrepreneurs, and enterprises in identifying ways to move from capital-based industry to industry that is based on

knowledge in the new globalized arena, determining the knowledge in available in companies, utilizing the knowledge in new ways, and introducing mechanisms to harness knowledge in their enterprises.

TAKASHI TAJIMA  
Secretary-General

Tokyo, July 2003

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# INTEGRATED SUMMARY

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**Prof. Tan Wee Liang**  
*Singapore Management University*  
*Republic of Singapore*

## BACKGROUND

The advances in telecommunications, information technology, and the Internet have transformed the global business environment. The bases of economic life and business have been extended to the realm of knowledge. Knowledge assets, knowledge workers, and knowledge ventures have become the foci of attention. This new environment brings new challenges to entrepreneurship both at the individual (new start-up) and corporate (internal corporate venture) levels. The *e*-business environment, as it is referred to, creates opportunities for new business models, new ways to create value, and access to new markets on a global stage. Knowledge has become one of the most important forms of intellectual capital in starting and running a business today. R&D and innovation will naturally become the primary focus of an enterprise in the process of value creation.

These developments have generated vibrancy in most economies, although there are accompanying challenges. An entrepreneur will need to know how to utilize the technological elite responsible for such efforts and tap the financial resources available to meet the challenges of knowledge-based business. To survive in the knowledge age, entrepreneurs must rethink how they operate, foster a new innovative culture within their organizations, and at the same time form knowledge networks or strategic alliances with others for mutual gain and competitive advantage. All of the following issues emerged as the main themes in the symposium:

- 1) *e*-business trends and new venture initiation in the knowledge-based industry;
- 2) entrepreneurs' role in knowledge-based industry;
- 3) appropriate business models, management strategy, and tactics including value creation methods, marketing, and branding that harness the possibilities that abound in knowledge-based business;
- 4) the role of venture capital in knowledge-based industry;
- 5) entrepreneurship and innovation; and
- 6) initiating ventures within corporations by motivating and retaining knowledge assets.

## PROCEEDINGS OF THE SYMPOSIUM

### **Presentations by Resource Persons**

#### ***Corporate Entrepreneurship and Innovation: Key Thrusts in the Knowledge-Based Economy***

The main part of the symposium began with Professor Tan Wee Liang, APO resource person, leading the participants in a period of discussion on the theme "corporate entrepreneurship and innovation" by examining the following questions:

- a. What are the participants' expectations of the program?
- b. What characterizes knowledge-based industry? What does that term mean?
- c. What is entrepreneurship?



The first question, he said, was important for the symposium to address the expectations of the participants so that it would be meaningful to them. The next two questions were posed to establish a common understanding of the terms as reflected in the symposium's title before dwelling more deeply on the issues of entrepreneurship.

The participants agreed that there are two possible groups of expectations: to learn and to contribute. Under learning, they hoped to understand more about each of the aspects of the symposium, which are outlined under the discussion of the next two questions. Under the expectations for contributing, they agreed to contribute to mutual learning and to the APO by identifying issues and making recommendations for future work.

The host of observations about knowledge-based industry was characterized by a lack of common agreement. However, the observations had the common element of the key role of knowledge. Some observations are reproduced below.

"We have moved from capital-based industry to industry that is based on knowledge in the new globalized arena."  
"The question is how to identify the knowledge in companies and to utilize the knowledge in new ways."  
"This knowledge may have already been in existence. It may not have been called knowledge before, but it should be identified as assets."  
"There is a need to understand how to harness knowledge as intellectual property rights."  
"We need mechanisms to enable us to share and exchange knowledge within organizations. It is pointless to have knowledge if it is not widely distributed."  
"Knowledge management is no different from the some of traditional elements."  
"Innovations will be important in this knowledge-based industry."

Professor Tan highlighted two other elements that the participants had not raised. First, he pointed out that there were uncertainty and fear concerning knowledge-based industry and the knowledge-based economy (KBE). The fear arises from a lack of understanding of what knowledge is, where to find it, and how to use it. Second, there is a need to remember that knowledge resides in people. It is for this reason that entrepreneurship is important as it is through entrepreneurs in the marketplace and internal corporate entrepreneurs in organizations that knowledge can be transformed into business models, innovations, inventions, and new products and services that can create value.

Professor Tan then shared Raymond Kao's definition of entrepreneurship: Entrepreneurship is the process of doing something new or different so as to create wealth for oneself and to add value to society (Kao, 1993; 1995). He elaborated on how a mindset change is involved if one employs this definition. The advantage of this definition over others is the reliance on the new mindset and the identification of entrepreneurship as a process rather than as characteristics. What organizations and societies need is individuals who are willing to take the step of doing something new or different. In the case of corporations, they need to have more ideas. He introduced the symposium to the various forms of corporate entrepreneurship.

- In administrative entrepreneurship, the firm has a center that handles R&D or business development.

- In imitative entrepreneurship, the firm imitates the innovations of others by reverse engineering or with technology innovations of its own.
- Acquisitive entrepreneurship takes the form of mergers with and acquisitions of other firms that may have relevant inventions and innovations.
- Incubative entrepreneurship is encouraged by fostering teams and providing internal financing and resources for innovations and inventions within the firm.
- Holistic entrepreneurship transforms enterprises into communities of entrepreneurs.

The last type of corporate entrepreneurship requires organizational change beginning with the redefining of the enterprise, the articulation of a clear vision and philosophy for action, the identification of core values, the eradication of bad sub-cultures and the inculcation of a corporate culture supportive of entrepreneurship, and training and equipping staff, accompanied by reward systems to motivate entrepreneurial activity.

### ***Entrepreneurship Development Program in Higher Education Institutes in the ROC***

Professor Yue-Shan Chang provided an overview of the economic development of the Republic of China from the 1950s through the 1990s to illustrate the setting for the Entrepreneurship Development Program. In the 1990s, structural reform of the economy took place with the government passing the main influence over the economy to the market, moving from industrial policy to competition. The government thus introduced competition, privatization, and liberalization policies. Most recently, in the 2000s, the Republic of China has sought integration into the global economy by joining the World Trade Organization.

The challenges facing Asian economies were described by Professor Chang as:

- Globalization creates increasing competition from less-developed countries in manufacturing, and this is no longer a way forward.
- Cost considerations have caused traditional industries in the Republic of China to relocate to cheaper locations with fewer capital and other requirements.

Thus, the Republic of China had to abandon the old economic development model. The Knowledge Economy Development Program was created against this background. The program is based on a national initiative to encourage innovation and creatively utilize information technology infrastructure in the field of education. The government has a series of policy papers that the institutes of higher education must follow. The main points of the Knowledge Economy Development Program are to:

- establish mechanisms to encourage innovation and creativity;
- establish infrastructure for Internet access and applications;
- Expand IT and Internet applications in production and other practices in daily life;
- evaluate the education system to encourage innovation and entrepreneurship; and
- restructure government to become more responsive and service oriented.

The National Sun Yat-Sen University (NSYSU) is one such institutes of higher education and it wants its students to engage in viable projects. It has set up an Entrepreneurship Development Center as an interface between academia, industry, and government. The NSYSU is establishing *e-learning* platforms and fostering entrepreneurship through self-financing projects.

### ***Entrepreneurship and Innovation Toward the Application of Knowledge Management in Malaysia***

Dato' Mustafa Mansur shared the National Information Technology Agenda vision of a "knowledge Malaysia" by 2020. He described the key thrusts of Malaysia's plans to become a KBE as:

- building the knowledge manpower base through the introduction of a system for lifelong learning and a brain gain program;
- intensifying science and technology and R&D initiatives to strengthening the national innovation system;
- accelerating the development of "infostructure" to facilitate the development of the KBE;
- restructuring the financial system to provide appropriate types of financing for knowledge activities, make available the tools for macroeconomic management, and withstand the challenges associated with the KBE;
- raising the knowledge content in the agriculture, manufacturing, and service sectors;
- encouraging the private sector to prepare with greater urgency for the KBE as well as identifying and exploiting the opportunities that will be generated; and
- reinventing the public sector to become more proficient in the acquisition, utilization, dissemination, and management of knowledge.

He also outlined the 14 awards that the government is using to spearhead change. These award schemes employ the criteria of benefits to the state/region, innovation, quality, recognition, local content, and potential leading edge. Another initiative is the Technopreneurship Development Program of the Multimedia Super Corridor, launched in November 2001. It seeks to achieve four objectives: 1) spawn a critical mass of SMEs and start-ups involved in information and communications technology (ICT), biotechnology, and other life sciences; 2) nurture potential world-class companies; 3) create the nuclei for the physical roll-out of the Multimedia Super Corridor nationwide; and 4) spur the growth of the venture capital industry.

### ***Grasping a Knowledge Management Model for SMEs in the Knowledge-based Economy***

Dr. Moon-Kyum Kim guided the participants through the various concepts behind knowledge management before drawing applications for SMEs. He explained the current thinking on knowledge management, the distinctions between knowledge and know-how and between knowledge and learning, and other concepts.

To use knowledge as a competitive force, it is necessary to interpret "knowledge" from the firm's perspective. A firm is an organization that constantly makes decisions on various business activities and tries to operate efficiently to make profits. In this context, knowledge is useful for business decision making and business operation. Thus knowledge can be defined as a collection of facts, know-how, patterns, and systems that are embedded in individuals or the organization itself, which can be utilized in the process of decision making and business operation. Facts include "know-what" and "know-why" and are obtained from experience and learning. Know-how is firm-specific production technology or management skills. Patterns imply an internal process of performing jobs, while systems refer to a company's by-laws, rules, and organizational culture. Knowledge that is firm specific is difficult to transfer, imitate, and trade, and its value can be vastly reduced when it is applied outside the firm.

After identifying the knowledge that exists, its management consists of five

elements: objective; strategy; knowledge assets; knowledge activities; and knowledge infrastructure. These are the knowledge management domains that an entrepreneur can effectively target. An entrepreneur moves around these domains by performing knowledge activity management and knowledge asset management in particular. Knowledge activity management seeks to improve the competitiveness of knowledge assets by efficiently managing such activities as knowledge creation, knowledge sharing, knowledge transfer, and knowledge learning through the knowledge infrastructure formed by the organization, human capital, and information technology. Knowledge asset management improves a firm's competitiveness by utilizing knowledge assets to achieve product leadership, operational excellence, and customer intimacy. The success of knowledge management depends upon how well the two activities of knowledge activity management and knowledge asset management are harmonized.

However, in Dr. Kim's assessment, SMEs have much scope for improvement in the area of knowledge management. The product leadership of SMEs is weak in terms of their brand power, design capability, and development of new products. The competitiveness of SMEs is generally based on low prices. SMEs are weak in utilizing explicit and tacit knowledge and tend to follow a simple "me too" strategy. SMEs have difficulties in achieving operational excellence because most still depend on labour and capital in their operations. Their focus is mainly on achieving economy of scale or increased productivity while they neglect value creation from the utilization of knowledge. The tasks that they should engage in for knowledge management include:

- 1) Determine the knowledge necessary, for example, by brainstorming sessions, the development of scenarios, or interviewing clients, suppliers, or colleagues.
- 2) Determine the knowledge available, for example, by sharing successful acquisitions or projects (also called best practices), maintaining a file of personnel, or organizing experience-swapping sessions.
- 3) Determine the knowledge gap, i.e., the difference between the necessary and available knowledge.
- 4) Develop knowledge via R&D, through education and training, or by conducting customer satisfaction studies.
- 5) Acquire knowledge by employing specifically qualified personnel, purchasing licenses or patents, or purchasing market research or strategic reconnaissance results.
- 6) Lock in knowledge, that is, transform the purchased or developed knowledge into a structural and systematic form whereby it is determined (codified) and available to everyone. Examples of forms of knowledge that can be locked in are requests for patents, maintenance of project files, or installing an intranet.
- 7) Share knowledge by making project or fact sheets available, practicing job rotation, and holding lunchtime meetings.
- 8) Utilize knowledge, chiefly stimulated and motivated by the management.
- 9) Evaluate (utilized) knowledge within the organization. The evaluation of the (utilized) knowledge should then be reused as input for the determination of available and necessary knowledge. Evaluation can be done through project evaluations, internal and external audits, conducting customer satisfaction surveys, or benchmarking.

***The Internet as the Driving Force for Transition to a Knowledge-based Society***

Dr. Chingten Hsiao, Vice President of Yam Digital Technology, evaluated the

impact of the Internet and offered the participants with his insight into the future of the ICT industry. He noted that “The show has just begun; big games are yet to come.” Many elements are evolving rapidly with new business models, new devices and applications, and changing user behaviour.

He provided numerous examples. ICT usage is different at the desk, on the road, or on the couch. Usage by enterprises and individual customers also differs. There will be a convergence between computers, TVs, and telephones. General-purpose processors, which can handle more volume and are superior to special-purpose processors, are being developed. The industry is grappling with competing directions, for example, whether PCs should be set-top boxes controlling information appliances in homes (Microsoft) or whether network servers should control information appliances in homes (Sony). The challenge is how to resolve these contradictions.

According to a IDC<sup>1</sup> research, by 2003, one-sixth of the world population will subscribe to mobile phones (the number in 2002 is 1 billion). By 2005, 40% of traffic over the Internet is expected to come from non-PC devices. Demand for Internet-enabled mobile phones and services will flourish. WPAN and WLAN will gain in popularity, along with multimedia messaging services. All of these will result in changes and new opportunities.

### ***The Role of Venture Capital in Knowledge-based Industry***

Mr. Gilbert Ma of the Fortune Venture Investment Group briefed the participants on the major roles of venture capitalists, which included:

- 1) providing cash and value added;
- 2) building up a company's conventional value in financial assets (cash and equity) and physical assets (technology, land, and equipment);
- 3) building up a company's intangible value in organizational areas such as intellectual property, brand name, strategy, culture, suppliers, and employee teams; and
- 4) increasing the future value compared with the current value to meet challenges in new technology, new designs, new products, new channels, and new strategic partners.

The future direction of venture capitalists in the Republic of China is moving toward knowledge-based ventures in other areas of Asia, such as the Republic of China and the Pacific Rim.

## **SUMMARY OF ISSUES**

### **Issues Arising from the Presentations by Resource Persons**

In any company, there is a need to identify the knowledge that exists, which may be tacit, i.e., not just intangible but not codified and residing in people. Knowledge then needs to be harnessed. This process of harnessing knowledge requires the development of intellectual property rights, the necessary legal systems to safeguard them, and respect for them among the public. At the firm level, Dr. Kim outlined the steps that a company should embark on to manage knowledge creation, development, and utilization. Entrepreneurship is needed in a country and in organizations because entrepreneurial

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<sup>1</sup> IDC is a provider of technology intelligence, industry analysis, market data, and strategic and tactical guidance to builders, providers, and users of information technology

leadership is the glue that brings knowledge assets and knowledge activities together to achieve desired outcomes. Dr. Kim reinforced this point in his presentation, substantiating the symposium's discussion on entrepreneurship. Countries need entrepreneurship at all levels, as do companies. Successful companies, as in the case of the Republic of China, include a corporate venture capital section, as noted by Mr. Gilbert Ma.

Professor Tan highlighted the need for entrepreneurship at all levels of society with an emphasis on the need for innovation and internal corporate entrepreneurship (intrapreneurship). The discussion showed the importance of top management being supportive and driving the organizational change needed to implement innovation and entrepreneurship. When an organization is large, change may need to begin small. As success is achieved in one unit and the news spreads, other units may also embrace change.

Another issue is the need for established enterprises to continue to innovate, as the basis for competition in the KBE is knowledge. Thus, companies need to identify the areas in which they can excel by applying the knowledge they have or can develop. Innovations in processes, products, or services are needed. For innovation to take place, companies need to encourage internal corporate entrepreneurship and innovations. To encourage corporate entrepreneurship and innovations, business owners and leaders need to be prepared to change their organizations. It may be a difficult and painful process but even in a large conglomerate can be achieved by starting in one unit so that it can "infect" the whole.

Countries need to recognize and embrace the KBE and the need to develop knowledge-based industries. This may require a national plan and campaign, as in the case of Malaysia, as Dato' Mustafa Mansur described. A country needs to put infrastructure in place, both in terms of hardware and software (which include softer resources such as training and equipping). The infrastructure elements needed for innovations and knowledge-based industry identified in Malaysia led to the development of the Multimedia Super Corridor. Over and above the infrastructure, there is a need for public education through award schemes and other modes of profiling successful entrepreneurs and enterprises.

The Republic of China has taken this further by introducing policy measures to encourage entrepreneurship in the knowledge-based economy through its Knowledge Economy Development Program. It has mandated that educational institutes must introduce innovation, creativity, information technology, and computer technology as a means of delivering their curricula. Professor Chang explained what the National Sun Yat-Sen University has been attempting to do through its Entrepreneurship Center.

One of the key infrastructure elements identified by the speakers was venture capital. Appropriate financing and value-added services from professionals who have the skill set and knowledge that enterprises may lack can be provided by venture capitalists to assist new high-technology enterprises in their start-ups.

## **Issues Raised by the Participants**

### ***Entrepreneurship Development***

#### *a. Context of individual countries:*

It was pointed out by the participant from India that some countries are still agrarian societies characterized by low literacy rates, low exposure and mobility, and rural or nomadic populations, and are also often steeped in traditional cultural, racial, and religious beliefs that may not be conducive to attempts to introduce entrepreneurship.

- b. *Lack of technical knowledge and practical experience:*  
Developing countries in Asia have a low penetration of technical education. Technical education is costly and often beyond the reach of deserving students. There is also a brain drain in those countries because technically proficient personnel seek employment and venture opportunities in developed countries.
- c. *Lack of industrial and social infrastructure:*  
Some Asian countries do not have the industrial infrastructure and R&D facilities for product selection and development. There may be cumbersome government rules and procedures that need to be amended. To groom global firms, the lack of knowledge of local and international laws needs to be addressed.
- d. *Access to financing:*  
SMEs find difficulty in financing their projects with exorbitant bank interest rates and low funding from venture capital funds. Financial rehabilitation schemes for SMEs are needed.
- e. *Lack of industrial incubators:*  
More low-cost industrial incubators should be developed in universities, R&D centers, and government-sponsored industrial parks to help entrepreneurs, especially in knowledge-based industry.

### ***Internal Corporate Entrepreneurship***

The issues identified in developing internal corporate entrepreneurship concern firms and can be summarized as follows:

- 1) Corporations may not be aware of knowledge management systems, which can be complex and expensive to implement in the case of larger business concerns.
- 2) Corporations must overcome cultural hurdles such as the reluctance of employees to share information and ideas.
- 3) Top management should encourage intrapreneurship.
- 4) Corporations need to allow employee-inventors to share in the intellectual property rights to their inventions and need to know how to protect intellectual assets.
- 5) Corporations should introduce transparent reward systems.
- 6) Corporations also require intrapreneur-leaders to drive projects with passion.

### ***Innovation and High-technology Entrepreneurship***

Creativity and innovation may be hereditary but individual capability, the availability of resources from governments, and families play an important role in the presence of high-technology entrepreneurs in a country. Therefore, the necessary environment for the development of such enterprises must be created.

## **RECOMMENDATIONS**

### **Entrepreneurship Development**

To overcome the issues highlighted, governments need to improve literacy rates and ensure that there is opportunity for the social mobility that education can engender. Educational systems also have to provide technical education. National governments should leverage ICT to spread the benefits of knowledge, education, and training.

There may be a need to select manpower for higher technical education, grooming them through exposure to world-class technology, and upgrading skills. At the same time, there is a need to motivate them to remain in the country to block the brain drain by

providing world-class salary structures and social infrastructure. To this end, a strong industrial and social infrastructure needs to be created; international funding may be required to build world-class infrastructure. Focal points need to be strengthened to facilitate the transfer of technology. In addition, there is a need to disseminate market information so that the entrepreneurs and enterprises can have better access to markets.

To address access to financing, governments could make available interest-free or soft loan to first-generation entrepreneurs and assist in the financial rehabilitation of ailing SMEs. A venture capital industry should be encouraged. Incubators should be established to aid aspiring young entrepreneurs with the necessary technology and skills. Incubators should be developed in universities, R&D centers, and government-sponsored industrial parks to help entrepreneurs, especially in the knowledge-based industry.

### **Internal Corporate Entrepreneurship – Recommendations for Firms**

Firms need to:

- 1) form venture teams comprising small groups from marketing and other functions to encourage entrepreneurship (cross-functional venture teams);
- 2) develop the appropriate support systems to facilitate the exchange of knowledge and sharing of knowledge;
- 3) promote internal innovation and entrepreneurship and provide the requisite resources such as training in business plan preparation, venture financing, etc.;
- 4) introduce appropriate corporate policies on employee involvement in internal corporate ventures and encourage calculated risk-taking;
- 5) provide incentives, e.g., 20% of net profit for patent applications, allow joint registration of patents with employees, and encourage spin-offs and co-ownership in the resulting ventures; and
- 6) reduce the fear factors in intrapreneurship through a process of secondment to the new corporate venture instead of a total spin-off for the first year, co-invest in the spin-offs through internal corporate venture funds, guarantee to a buy-back of shares from spin-offs if the value decreases by 50%, and undertake to re-employ the intrapreneurs in the parent corporation.

National governments need to train their corporations in corporate entrepreneurship and knowledge management systems.

### **Innovation and High Technology**

#### ***National Governments***

Government assistance will be required in the following areas: R&D financing (future technology); tax benefits; changes in the national education system; free technical education; creation of research labs/incubators; and the search for potential (nationwide talent search). Creativity, innovation, and high-technology entrepreneurship are dependent on the education system of a society/country. Schools should produce innovative entrepreneurs for the future knowledge-based society.

#### ***Recommendations to the APO***

Several recommendations for implementation by the APO were made at the symposium.

- 1) Continue the process of discussion and discovery begun at this symposium with subsequent symposia along similar themes, particularly best practices for corporate entrepreneurship and innovations, the design of training programs for



top management in the area of corporate entrepreneurship and knowledge management, motivation, reward, and recognition systems for corporate entrepreneurship and innovation, and the design of national innovation systems and enterprise education.

- 2) Design and implement a top management entrepreneurship development program in APO member countries through the NPO network.
- 3) Promote an APO-wide award that promotes innovations in various industries to promote recognition even in agrarian societies. Similarly, an award could be promoted to recognize corporate entrepreneurship.
- 4) Alternatively, report achievements in innovation or corporate entrepreneurship in the *APO News*.

# **A KNOWLEDGE MANAGEMENT MODEL FOR SMEs IN THE KNOWLEDGE-BASED ECONOMY**

---

***Dr. Moon-Kyum Kim***

*Soongsil University*

*Republic of Korea*

## **INTRODUCTION**

Labor, land and capital had been the most important factors of production in the economy system for the last two centuries. Knowledge, education and intellectual capital were treated as exogenous variables that existed outside the system itself. Some economists have proposed a new model that included knowledge (or technology) as an intrinsic part of the economy system to explain the cause of long-term growth with which traditional economic models had difficulty. He suggested that knowledge became the fourth factor of production in leading economies.

The features of the new theory are presented as follows. First, knowledge is the basic form of capital. Economic growth is driven by the accumulation of knowledge. Secondly, new technological developments can create technical platforms for further innovations, and that this technical platform plays a key role of driving economic growth. Thirdly, technology can improve the return on investment to the extent that could not be attained only with labor and material resources, which leads to increasing marginal rate of returns on technological investment. Lastly, contrary to traditional economy, investment and technology make each other more valuable, which leads to increasing a country's growth rate permanently. An investment on R&D for technological innovation provides an opportunity that can enjoy the returns from monopoly.

A knowledge-based economy is one in which the above-mentioned features are revealed distinctly. The term "knowledge-based economy" results from a full recognition of the role of knowledge in economic growth. In a knowledge-based economy, the generation and exploitation of knowledge play the predominant role in the creation of wealth. Many advanced nations such as the US and OECD countries are more strongly dependent on the use of knowledge than ever before. Output and employment are expanding the most rapidly in high-technology industries like computers, electronics and information technology. Knowledge-intensive service industries such as education, communications and financial services are growing even faster as well. Those countries have experienced that the share of high-technology sector in Gross Domestic Product (GDP) has been more than doubled over the past decade. The employment is growing in high-technology sector as well as knowledge-intensive service sector. Indeed, non-production or knowledge workers are in most demand in a wide range of activities from computer technician, architect to financial specialist. In advanced economies such as the US, more than 60 percent of workers are knowledge workers.

With the advent of information and communication technologies like the Internet, manufacturers and consumers can now move around any market in the world. Consumers can inspect the prices offered by all vendors over the world for any product while manufacturers can sell their products at the world market with unlimited size. This phenomenon is called "globalization". Globalization is facilitated by the knowledge and

technology while globalization works as the main driver of the emerging knowledge-based economy. Competition is fostered by the increasing size of the market opened up by globalization. Products with a high knowledge component generate higher returns and a greater growth potential in the global market. Knowledge and technology spreads more quickly, but products and processes can be swiftly imitated and competitive advantage can be swiftly eroded as well. A firm (or country) that wants to maintain its competitive power must be able to innovate even more quickly than its competitors.

### DEFINITION OF KNOWLEDGE

Knowledge can certainly not be assumed to be equal to data. Above all, knowledge cannot be considered equal to information. Knowledge can primarily be described as something that makes both data and information manageable and meaningful.

Knowledge can be classified into different types, which is necessary to understand knowledge-based economy: know-what, know-why, know-how and know-who. Knowledge is a much broader concept than information which is generally related to the “know-what” and “know-why” components of knowledge. These are the explicit knowledge that can be expressed through language. Thus, the explicit knowledge is relatively easy to codify and transfer to others. Other types of knowledge – particularly know-how and know-who – are tacit knowledge that is acquired mainly by experience and are more difficult to codify, measure and transmit.

- 1) **Know-what** refers to knowledge about “facts”. Answers to such questions as “What is the revenue of 2001?” “How many employees in your company?” “How to use a word processor?” are examples of this kind of knowledge. Here, knowledge is close to what is normally called information. In dealing with some complicated matters, experts like lawyers and analyst must have a lot of know-how (information) to perform a specific job.
- 2) **Know-why** refers to scientific knowledge of the principles and laws of nature. This kind of knowledge underlies development of technology, products or processes in industrial area. The acquisition of know-why is accomplished in specialized organizations such as research laboratories. To get access to this kind of knowledge, firms have to interact with these organizations either through employing trained specialists or through purchasing necessary knowledge and sponsoring joint activities.
- 3) **Know-how** refers to skills or the capability to do something. Businessmen judging market prospects for a new product or a personnel manager selecting and training staff have to use their know-how. The same is true for the skilled worker operating complicated machines. Know-how is typically a kind of knowledge developed from experiences and kept within a specific individual or a specific firm. This kind of knowledge is hard to codify in language. A firm may establish industrial networks to share and combine elements of know-how or adopt out-sourcing to efficiently utilize others’ know-how.
- 4) **Know-who** refers to information about who knows what and who knows how to do what. It involves the formation of special social connections, which make it possible to get access to experts and use their knowledge efficiently. Know-who is important in economies where information is widely dispersed and imbalanced because of a highly developed division of work forces and a rapid change (or an advance) of technology.

While know-what and know-why can be obtained through reading books, attending lectures and accessing databases, the other two kinds of knowledge are rooted primarily in practical experience. Know-how will typically be learned in situations where an apprentice follows a master and inherit know-how from a master. Know-who can be earned in social practice and sometimes in specialized educational environments. One reason why firms engage in basic research is to acquire access to networks of academic experts crucial for enhancing their innovative capability. Know-who is socially embedded knowledge, which cannot easily be transferred through formal channels of information.

The development of information technology may be a result of seeking a means of storing and transmitting the know-what and know-why portions of knowledge more effectively. Conversely, the advent of information technology and communication infrastructures gives a strong impetus to the process of codifying knowledge. All knowledge which can be codified can now be transmitted over long distances with very little costs. This trend have led the current era to be characterized as “the information society” – a society where a majority of workers will soon be producing, handling and distributing information or codified knowledge.

The digital revolution has intensified the move towards knowledge codification and altered the share of codified vs. tacit knowledge in the knowledge stock of the economy. Electronic networks now connect a vast array of public and private information sources. Due to codification, knowledge is acquiring more of the properties of a commodity. Market transactions are facilitated by codification, and diffusion of knowledge is accelerated. In addition, codification is reducing the importance of additional investments to acquire further knowledge. It provides bridges between fields and areas of competence and reduces the “dispersion” of knowledge. These developments promise an acceleration of the rate of growth of stocking accessible knowledge, with positive implications for economic growth. They also imply increased change in the knowledge stock due to higher rates of scrapping and obsolescence, which will put greater burdens on the economy's adjustment abilities. While information technologies are speeding up the codification of knowledge and stimulating growth in the knowledge-based economy, they have implications for adaptability or rapid response to the rapid changing environments.

## **KNOWLEDGE AND LEARNING**

While information technologies may be moving the border between tacit and codified knowledge, they are also increasing the importance of acquiring a range of skills or types of knowledge. In the emerging information society, a large and growing proportion of the labor force is engaged in handling information as opposed to more tangible factors of production. Computer literacy and access to network facilities tend to become more important than literacy in the traditional sense. Although the knowledge-based economy is affected by the increasing use of information technologies, it is not synonymous with the information society. The knowledge-based economy is characterized by the need for continuous learning of both codified information and the competencies to use this information.

As access to information becomes easier and less expensive, the skills and competencies relating to the selection and efficient use of information become more crucial. Tacit knowledge in the form of skills needed to handle explicit knowledge is more important than ever in labor markets. Codified knowledge might be considered as the material to be transformed, and tacit knowledge, particularly know-how, as the tool for handling this material. Capabilities for selecting relevant and disregarding irrelevant

information, recognizing patterns in information, interpreting and decoding information as well as learning new and discarding old skills are in increasing demand.

The accumulation of tacit knowledge needed to derive maximum benefit from explicit knowledge codified through information technologies can only be done through learning. Without investments in both explicit knowledge and tacit skill development, informational constraints may be a significant factor degrading the allocation efficiency of market economies. Workers will require both formal education and the ability to acquire and apply new theoretical and analytical knowledge; they will increasingly be paid for their explicit and tacit knowledge skills rather than for manual work. Education will be the center of the knowledge-based economy, and learning the tool of individual and organizational advancement.

This process of learning is more than just acquiring formal education. In the knowledge-based economy “learning-by-doing” is paramount. A fundamental aspect of learning is the transformation of tacit into explicit knowledge and the movement back to practice where new kinds of tacit knowledge are developed. Training and learning in non-formal settings, increasingly possible due to information technologies, are more common. Firms themselves face the need to become learning organizations, continuously adapting management, organization and skills to accommodate new technologies. They are also joined in networks, where interactive learning involving producers and users in experimentation and exchange of information is the driver of innovation.

## **KNOWLEDGE NETWORKS**

The knowledge-based economy places great importance on the diffusion and use of information and knowledge as well as its creation. The determinants of success of firms, and of national economies as a whole, is ever more reliant upon their effectiveness in gathering and utilizing knowledge. Strategic know-how and competence are being developed interactively and shared within sub-groups and networks, where know-who is significant. The economy becomes a hierarchy of networks, driven by the acceleration in the rate of change and the rate of learning. What is created is a network society, where the opportunity and capability to get access to and join knowledge- and learning-intensive relations determines the socio-economic position of individuals and firms (David and Foray, 1995).

The network characteristic of the knowledge-based economy has emerged with changes to the linear model of innovation. The traditional theory held that innovation is a process of discovery which proceeds via a fixed and linear sequence of phases. In this view, innovation begins with new scientific research, progresses sequentially through stages of product development, production and marketing, and terminates with the successful sale of new products, processes and services. It is now recognized that ideas for innovation can stem from many sources, including new manufacturing capabilities and recognition of market needs. Innovation can assume many forms, including incremental improvements to existing products, applications of technology to new markets and uses of new technology to serve an existing market. And the process is not completely linear. Innovation requires considerable communication among different actors – firms, laboratories, academic institutions and consumers – as well as feedback between science, engineering, product development, manufacturing and marketing.

In the knowledge-based economy, firms search for linkages to promote inter-firm interactive learning and for outside partners and networks to provide complementary assets. These relationships help firms to spread the costs and risk associated with

innovation among a greater number of organizations, to gain access to new research results, to acquire key technological components of a new product or process, and to share assets in manufacturing, marketing and distribution. As they develop new products and processes, firms determine which activities they will undertake individually, in collaboration with other firms, in collaboration with universities or research institutions, and with the support of government.

Innovation is thus the result of numerous interactions by a community of actors and institutions, which together form what are termed national innovation systems. Increasingly, these innovation systems are extending beyond national boundaries to become international. Essentially, they consist of the flows and relationships which exist among industry, government and academia in the development of science and technology. The interactions within this system influence the innovative performance of firms and economies. Of key importance is the “knowledge distribution power” of the system, or its capability to ensure timely access by innovators to the relevant stocks of knowledge. Efforts are just beginning to quantify and map the diffusion paths of knowledge and innovation in an economy – considered the new key to economic performance.

### **KNOWLEDGE IN FIRM AND KNOWLEDGE MANAGEMENT FOR SMEs**

It is necessary to interpret “knowledge” from the firm’s perspective of enhancing its competitive force. A firm is an organization which constantly makes decisions on various business activities and tries to operate efficiently to make profits. In this context, knowledge is the one that is useful for business decision making and business operation. Then, knowledge can be defined here as a collection of facts, know-how, patterns, and systems that are embedded in individuals or organization itself, which can be utilized in the process of decision making and business operation. [Table 1] lists the specific knowledge that a firm possesses at both organizational and individual level. Fact includes know-what and know-why that are obtained from experience and learning. Know-how is firm specific production technology or management skills. Pattern implies internal process of doing jobs while institution refers company’s by-law, rules and organizational culture. Knowledge that is firm specific is hard to transfer, imitate and trade, and its value can be vastly reduced when it is applied outside the firm.

In knowledge-based economy, firms tend to be faced with much more capricious and diverse consumer preferences than ever and more demanding consumers thanks to the advance of information technology. These consumers are increasingly interested in status, reputation, brand names, design, satisfaction, and post-sales service. Also, life span of products and services is shortened.

In general, the advance of information technology and the advent of knowledge-based economy as the result of IT make the business environment of the average entrepreneur more complex. Knowledge can be used to reduce these complexities. Knowledge is the factor with which entrepreneurs can distinguish themselves from their competitors. Knowledge is the means for SMEs to overcome poor business environment and change the complex business environment to be manageable. Knowledge allows SMEs to be able to interpret the complexity and extract implications from that.

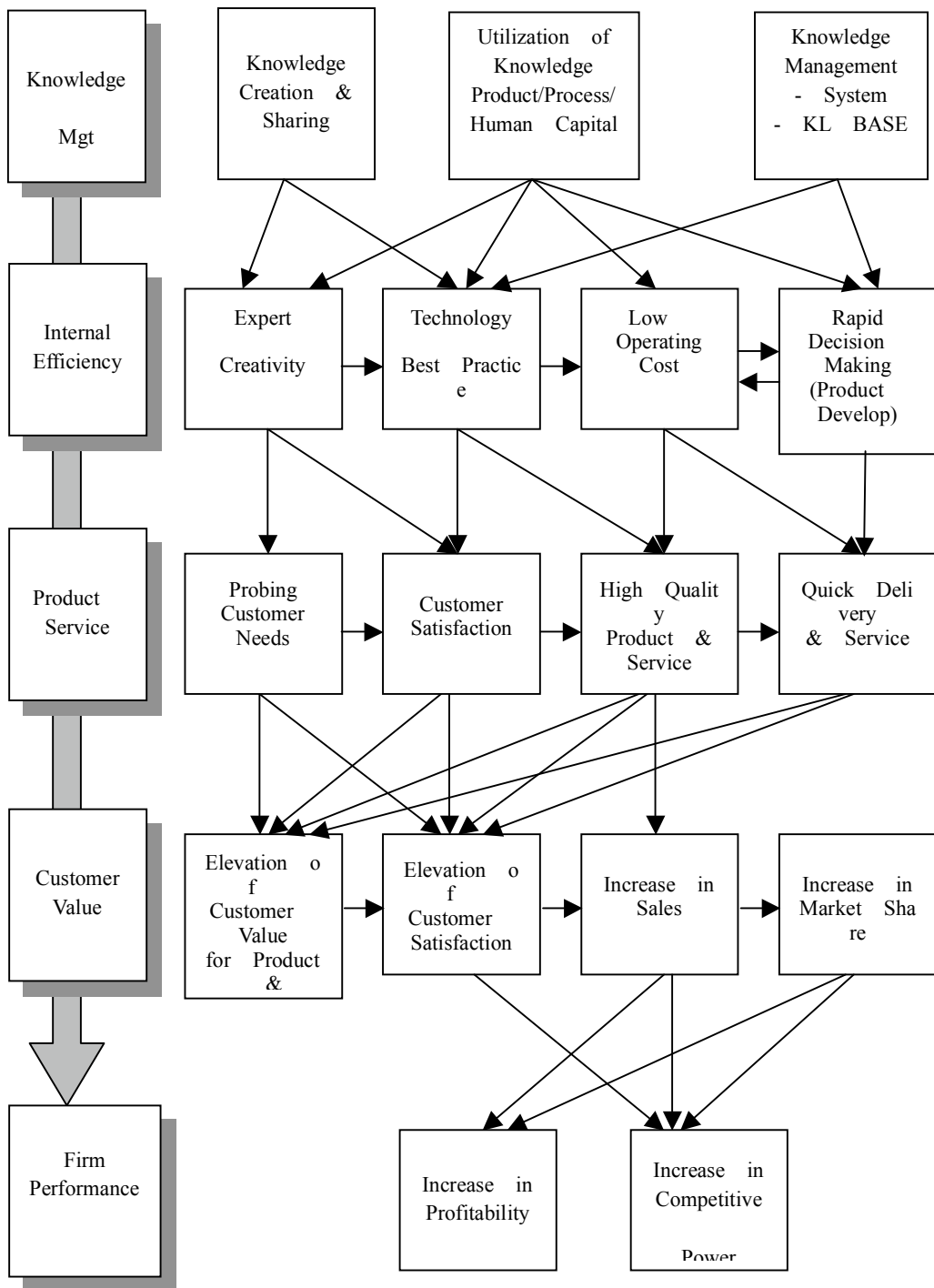
It is important that an entrepreneur should utilize accumulated knowledge in an organization and individuals to contribute to firm’s performance. Only firms solidifying and sustaining competitive power can survive, develop and grow. Knowledge management is recognized as total means to improve firm’s performance by applying it to production, marketing, research & development, personnel, planning and innovation. Thus,

the vision of knowledge management is to improve firm's competitive power or to maintain firm's competitive power. Knowledge management is the management of knowledge assets within an organization to enhance competitive power by steering the product leadership, operational excellence, and customer intimacy.

**Table 1: Firm Knowledge**

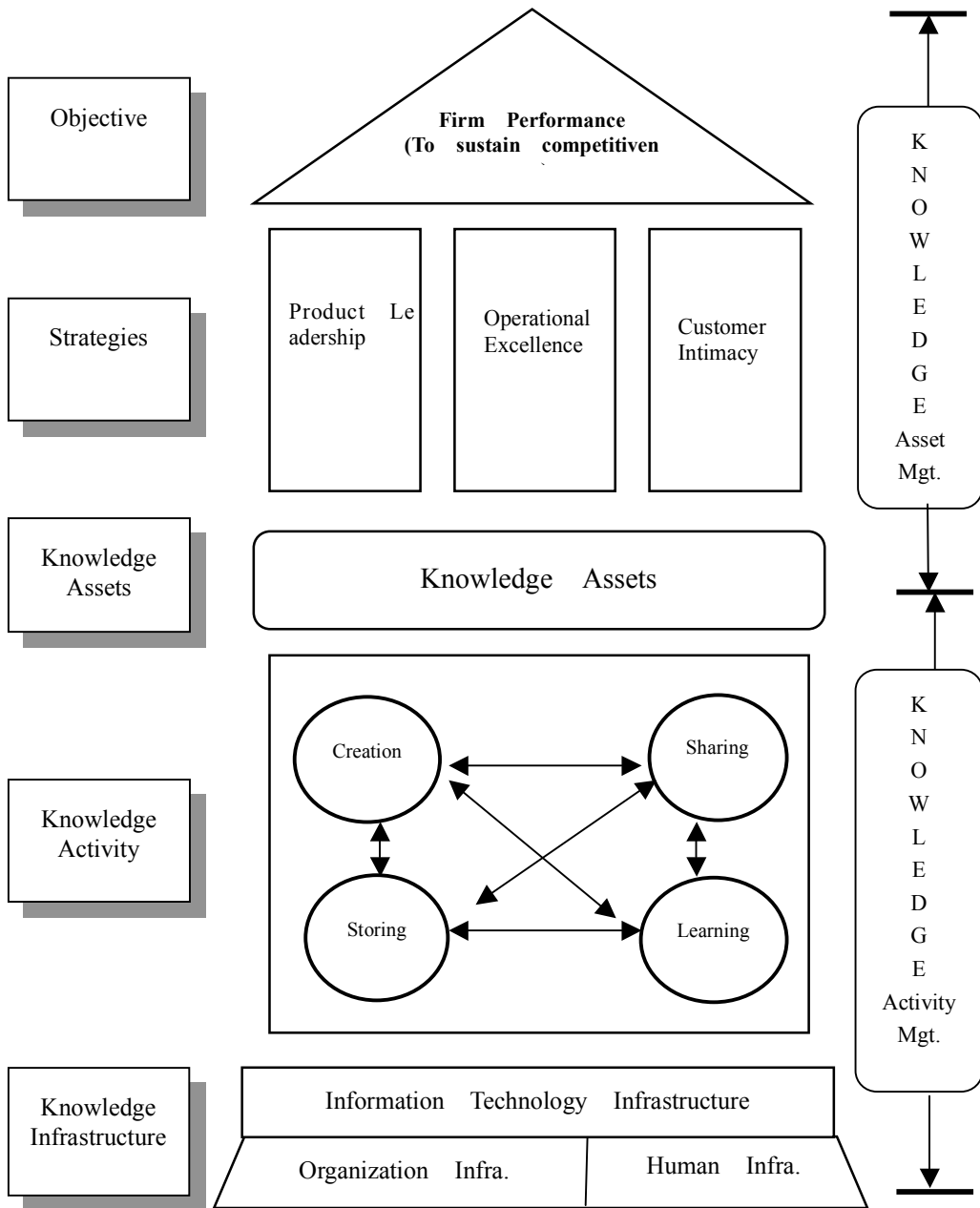
	Organizational Knowledge	Individual Knowledge
Fact	Brand Image Degree of Customer Satisfaction Patent Database of Customers Communication Infrastructure	Expert Knowledge General Knowledge for Operation Foreign Language
Know-how	Experience for FDI New Product Development Skill Design Skill Skill of Financial Management Skill of Risk Management Skill of Cost Management Skill of Outsourcing	Social Network Operational Capacity Communication Skill Presentation Skill Negotiation Skill Creative Competency Operational Expertise
Pattern	Meeting Style (Speed Meeting) Decision Making Style Operational Process	
Institution	Evaluation System Welfare System Firm Culture, Vision, Mission	

The resource-based theory suggests that the firm's asset can be a source of competitive power when it is scarce, hard to imitate and hard to substitute. The knowledge assets retained within a firm satisfy these features of being the source of competitive power. A firm cannot have the same knowledge as the others' because different firms have different human and knowledge resources. Also, a firm cannot imitate other's knowledge because knowledge is accumulated as the result of experience and investment over the long-time period.



**Figure 1: Effects of Knowledge Management**





**Figure 2: Knowledge Management Model**

### THE ELEMENTS OF KNOWLEDGE MANAGEMENT MODEL

Knowledge management model consists of five elements: objective, strategy, knowledge assets, knowledge activities and knowledge infrastructure. These are the knowledge management domains in which an entrepreneur can effectively target himself. An entrepreneur moves around these domains by performing knowledge activity

management and knowledge asset management in particular. The knowledge activity management is to improve competitiveness of knowledge assets by efficiently managing activities such as knowledge creation, knowledge sharing, knowledge transfer and knowledge learning through knowledge infrastructure which is formed by organization, human capital and information technology. Knowledge asset management improves firm's competitive power by utilizing knowledge assets to achieve product leadership, operational excellence and customer intimacy. The success of knowledge management depends upon how well two activities, knowledge activity management and knowledge asset management, are harmoniously performed.

### **Objective**

The objective of knowledge management is not to seek or create knowledge itself, but to improve firm's overall competitive power by utilizing firm's knowledge. The

**Table 2: Knowledge Activity Management and Knowledge Asset Management**

	<b>Knowledge Activity Management</b>	<b>Knowledge Asset Management</b>
<b>Input</b>	Knowledge Infra	Knowledge Assets
<b>Process</b>	Creation, Sharing, Accumulation, Learning	Product Leadership, Operational Excellence, Customer Intimacy
<b>Output</b>	Improvement of competitiveness of firm's knowledge	Improvement of firm's competitive power

requisites for competitive power are sustainable competence, visible competence and win-win competence. These three requisites implies that the competitive power is not temporary or impulse but continuous, can be assessed by visible criteria like increased sales or improvement firm's image, and must be beneficial to both organization and individuals.

### **Strategy**

In general, product leadership, operational excellence or customer intimacy assures firm's competitive power. It is not unusual that a firm is not able to pursue all these three strategies at the same time due to limited operational resources. Entrepreneur should select one of three strategies according to firm's knowledge characteristics and concentrate investments on the selected strategy.

Product leadership is the competitive capacity to create customer value by providing the best product and constantly developing new products. Product leadership leads to the completeness of product and the assurance of competitive power in the market.

Operational excellence implies the competitive capacity to raise efficiency and reduce cost in operation by steering economy of scale, economy of range, standardization and specialization. Firm with operational excellence provides cost-efficient product in comparison with competitors by reducing invisible costs as well as visible costs.

Customer intimacy creates customer value and strengthens firm's competitive power by offering optimal solution to customers based on the knowledge from intimate relationship with customers.

### **Knowledge Assets**

Knowledge assets include necessary knowledge and the knowledge resulted from knowledge activities. Necessary knowledge means the knowledge necessary for implementing the strategies of product leadership, operational excellence or customer intimacy, which are, for instance, brand power, design, patent, creativity, quality management, outsourcing, planning and control, process management, communication skills, information about customers and prompt customer correspondence. Also, knowledge is obtained from the activities like creation, storing, learning and sharing.

### **Knowledge Activities**

Knowledge activity is the total process of creation, storing, learning and sharing of knowledge which is embedded in organization and individuals. The objective of knowledge activity is to enhance both explicit and tacit knowledge in terms of quantity and quality. Knowledge creation refers to producing new knowledge while sharing is interchanging available knowledge between organization and individuals, between organization and organization or between individuals and individuals. Learning is an activity to learn new knowledge through the process of creation, sharing and storing. Storing refers to the activity of obtaining, retaining and classifying knowledge in systematic order.

### **Knowledge Infrastructure**

Knowledge infrastructure refers to platform of knowledge activities, which is composed of organizational infrastructure (institution and culture included), human infrastructure and IT infrastructure. Organizational infrastructure refers to organizational structure, culture, recruiting, evaluation, compensation, training and human capital management. Human infrastructure is the capacity to facilitate knowledge activities, which includes not only leadership of top management, but specifying the role of knowledge manager, project manager and knowledge worker. IT infrastructure is firm's IT system that supports knowledge creation, sharing, learning and storing, which includes, for instance, group ware, intra network and hardware and software. Knowledge infrastructure is a crucial part as a necessary business resource to determine the success of knowledge management. What is important for the knowledge infrastructure is that it should be designed to fit to characteristics and capacity of organization in particular.

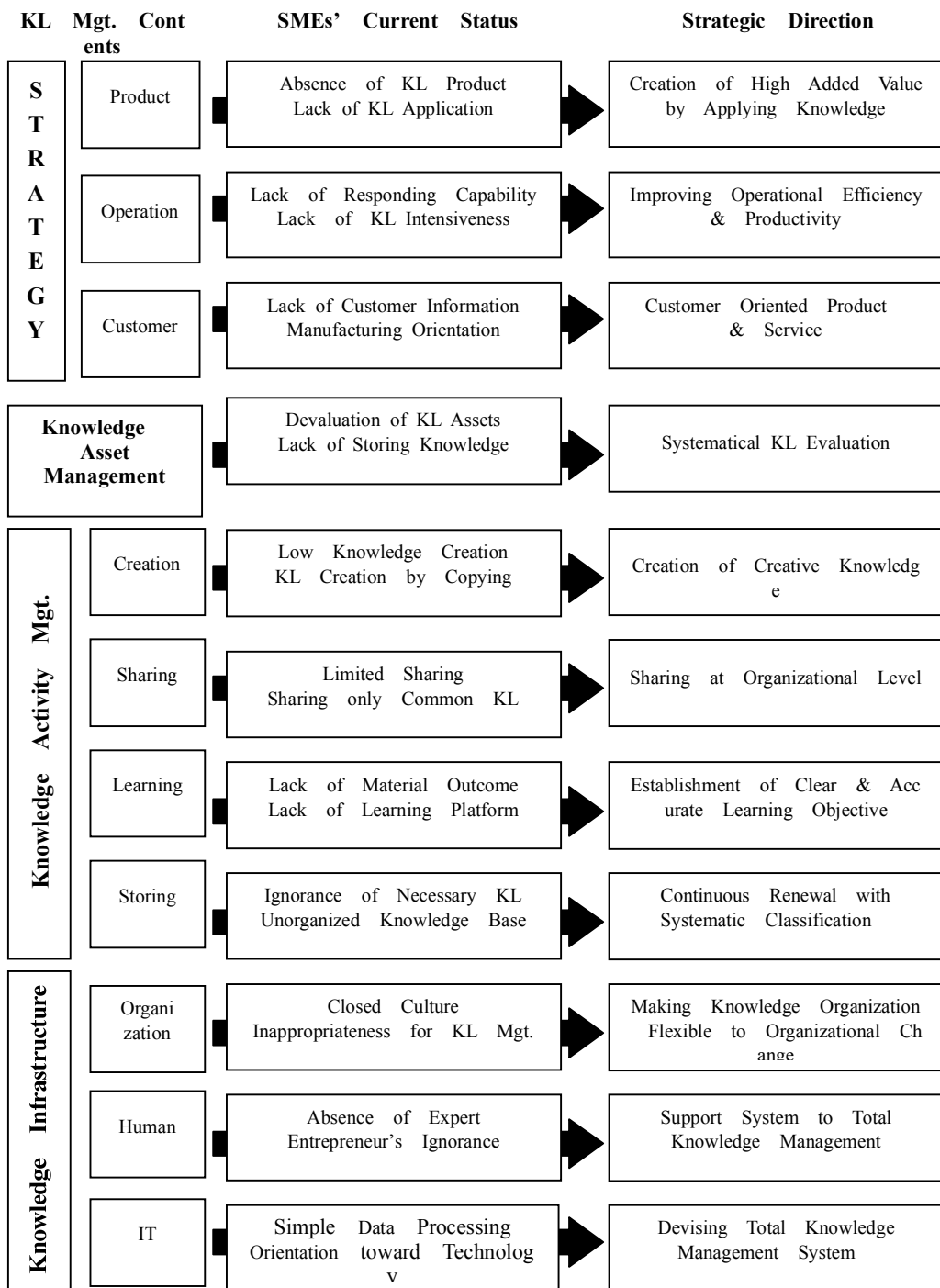
## **CURRENT STATUS OF SMEs IN KNOWLEDGE MANAGEMENT**

It is appropriate to review the current status of SMEs in knowledge management in terms of the fore-mentioned elements of knowledge management.

### **Strategy**

Product leadership of SMEs is weak in their brand power, design capability and development of new product. Competitiveness of SMEs generally relies on low prices. SMEs are weak in utilizing explicit and tacit knowledge and tend to follow simple "Me Too" strategy.

SMEs have difficulties achieving operational excellence because most SMEs still stick to labor and capital in their production and operation process. Their focus of operation is mainly on achieving economy of scale or increase in productivity while they neglect the value creation from utilizing knowledge. SMEs cannot actively respond to change in business environment or emerging new trends because they do not have



**Figure 3: SMEs' Strategic Direction for KL Management**

capability to utilize knowledge and, thus, they are insensitive to challenges from the outside. Unless a firm is able to manage and analyze information or data about environmental changes, a firm cannot excel its competitors. SMEs are accustomed to improvement than innovation because they make investments of knowledge or physical assets with short-term perspective. SMEs tend to prefer immediate improvement of productivity to permanent or fundamental innovation of operational process. This may lead to an increase in divisional productivity, but an increase in efficiency of total process is disregarded or only sub-optimization is attained rather than global optimization.

In the area of customer intimacy, SMEs are liable to be short of tangible customer information which is crucial for doing customer service. SMEs are not usually equipped with the infrastructure for market research to analyze customer need, customer taste and customer trend and regard the money required for understanding customer behavior and psychology as cost rather than investment.

### **Knowledge Assets**

Some SMEs start to have an interest in knowledge assets, but even those SMEs consider tangible assets more valuable than knowledge assets which is intangible and consequently knowledge assets are inefficiently managed and utilized. SMEs do not recognize necessary knowledge and knowledge gap with competitors because SMEs are ignorant in the value and usefulness of knowledge. Considerable amount of knowledge is lost in SMEs when employees quit or move to other divisions because they do not know how to store and manage knowledge assets.

### **Knowledge Activities**

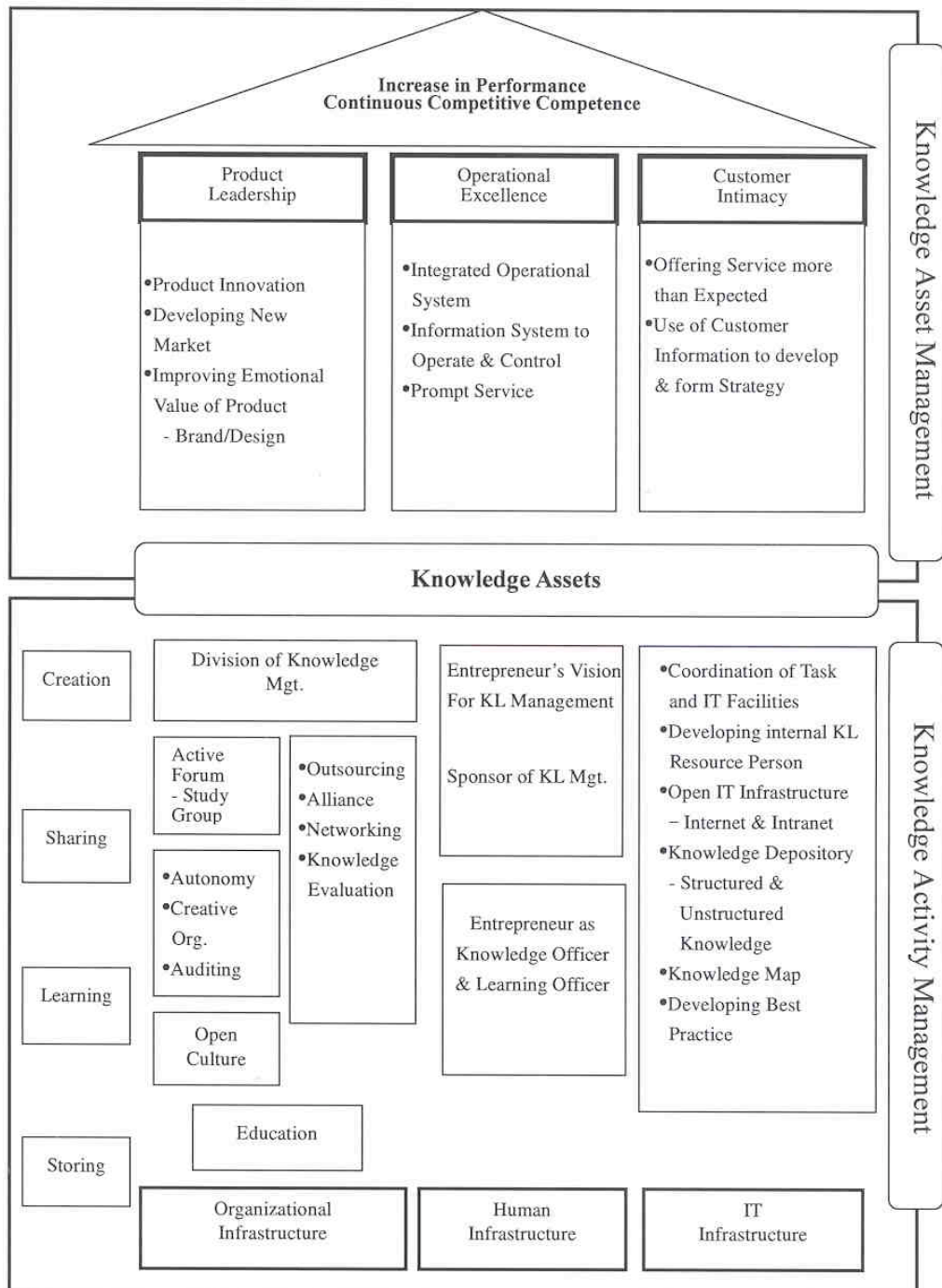
The amount of knowledge creation in SMEs is minimal because evaluation or reward system for newly created knowledge is poor, thus individuals are not motivated in creation of knowledge. Also, it is hardly expected to create knowledge under the circumstances that even the knowledge already existed in SMEs is not stored and managed.

Knowledge sharing is formed only among the interested parties at individual level, not at organizational level. Individuals in SMEs are accustomed to the preservation of knowledge than sharing with others, and consider the possession of knowledge as power and try to hide to raise his/her own value. This tendency incurs opportunity cost and hinders generating synergy effects.

Individuals in SMEs are not trained to make learning organization that they have low capacity in absorbing knowledge. Also, individuals do not know what knowledge is learned and stored because there is no guide line or definition for what knowledge is necessary to organization.

### **Knowledge Infrastructure**

Knowledge infrastructure is formed by organizational, human and information technological infrastructures. The way of solving problems and decision-making process tends to be heavily dependent on only owner-entrepreneur without discussion in which various interested parties take part. This tendency hinders individuals from developing their creativity, and consequently limits knowledge sharing and transfer within a organization. Managers of SMEs tend to be more interested in such visible results as cost reduction, sales increase and productivity increase which can be attained in a relatively short time period than results of knowledge activities produced over long time period. In general, IT infrastructure in SMEs is very poor. Even the SMEs with the vision of knowledge management build IT system to do simple internal data processing of



**Figure 4: SMEs Strategic Task for Knowledge Management**

personnel, accounting or sales. It is rare to find “Decision Support System (DSS)” or Strategic Information System (SIS)” in SMEs to support administrative activities. They put an all-in-one style package without considering user needs and user interface, which leads to low usage rate. Also, this package system is designed to fit to a data base storing simple information rather than storing complex knowledge and sharing it.

## **CONCLUSION**

The knowledge management is one of the core tasks that SMEs cannot postpone its application to maintaining their competitive power. As it is suggested in the above, the knowledge management is a holistic approach to improve firm’s competitive power, which is different from the old management style that puts more emphasis on individual specialty and capability. The knowledge management is not a new tool or concept. It is rather a new way of doing things aiming at producing synergy effect by sharing and transmitting the knowledge a firm already owns.

Due to the recent advancement of information technology, SMEs can easily implement the knowledge management with relatively low costs than ever. This paper tries to develop a knowledge management model fitting to SMEs and suggest a strategic agenda to which SMEs pay attention in adopting the knowledge management. Since SMEs are poor in the area of knowledge management infrastructure, the leadership of entrepreneur is the most important ingredient to ensure success of the knowledge management. This paper is a just exploratory work which should be followed by empirical studies to ascertain practical implications.

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# **ENTREPRENEURSHIP AND INNOVATION TOWARDS THE APPLICATION OF KNOWLEDGE MANAGEMENT IN MALAYSIA**

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## **INTRODUCTION**

Knowledge Management is concerned with the exploitation and development of the organization's objectives. The knowledge to be managed includes both explicit, documented knowledge, and tacit, subjective knowledge. Management entails all of those processes associated with the identification, sharing and creation of knowledge. This requires systems for the creation and maintenance of knowledge repositories, and to cultivate and facilitate the sharing of knowledge and organizational learning. Organizations that succeed in knowledge management are likely to view knowledge as an asset and to develop organizational norms and values, which support the creation, and sharing of knowledge (Devenport et.al. 1998).

Peter Drucker acknowledged that knowledge management is a key to future growth and that productivity could only be generated by knowledge and not by the mere improvement of production processes.

Entrepreneurship is the process by which individuals pursue opportunities without regard to resources they currently control. By this definition, ownership or control of resources may not limit an entrepreneur's choice of opportunity. However, the resource choices that are necessarily made during the founding of the process may either limit or enhance the new venture's ability to succeed (Stevenson and Jarillo, 1990). Innovation is the process of taking new ideas effectively and profitably through to satisfied customers. It is a process of continuous renewal involving the whole company and is an essential part of business strategy and every day practice. Innovation is also considered to be the new way of delivering quality to the customer both consistently and with economic viability in mind (Zairi, 1994).

## **BACKGROUND**

Like many developing Asian economies, Malaysia too faced the financial crisis in 1998. However, Malaysia made a very remarkable recovery. After experiencing steep decline of nearly 8% in 1998, growth resumed in 1999 on the back of a favourable export performance and public spending. The accommodating fiscal and monetary policies have played an important role in aiding growth. Private consumption grew with stable employment conditions and strong prospects for manufacturing and exports contributed to healthy investment growth. GDP started to grow strongly and inflation rate declined because of continued excess capacity in certain sectors, as well as productivity improvement and stable fixed exchange rate.

Malaysia's transformation from agricultural into a manufacturing and service-oriented economy has been impressive. The country has a strong multinational corporate presence which helped minimize the collateral damage to the economy from the Asian

crisis in contrast to the Republic of Korea, Thailand and Indonesia. The country is fortunate to have abundant natural resources. It produces significant quantities of petroleum and natural gas and tin. As a net exporter of oil, Malaysia benefits from higher oil prices. Within manufacturing, Malaysia has moved up the value-added chain over the years.

Malaysia has been successful in attracting substantial foreign direct investment (FDI), multi-national corporations (MNCs) have been attracted to Malaysia by its relatively well-developed infrastructure facilities, its lower cost and higher quality labour forces and its pro business government. The high presence of multinational companies has diversified the manufacturing sector and helped the sector's advance up the value-added chain through technology and knowledge transfer. Moreover, the high participation of MNCs shielded the country from the worst of the recession. Foreign investment has traditionally gone into capital and technology-intensive products, such as electronic and electrical products, chemical products and petrochemical. The United States, Japan, Singapore and the Republic of China remains the top sources of foreign investment in the manufacturing sector.

The presence of major foreign companies in the country is a vital strength for Malaysia because they are in a better position to cope with the changing and competitive global environment in electronic products. With the entry of China in the World Trade Organization (WTO) and the formation of Asean Free Trade Area (AFTA) there is a concern that Malaysia could start to lose out as now FDI is diverted to mainland China. However it is reassuring that during the recent crisis and ever, after the imposition of capital controls, most foreign companies continue to and even expand in the country. The government of Malaysia is shifting its focus towards developing a knowledge-based economy (K-economy) to capitalize on the global information technology (IT) revolution. The government believes that Malaysia's transition to a K-economy will promote a higher level of sustainable growth by increasing productivity growth in the economy. In order to reap the benefits of the new economy the country needs to encourage a new working culture so that the society and labour force can respond to fresh opportunities and at the same time encourage changes in the organizational structures of government departments and companies.

### **MALAYSIAN VISION**

The Malaysian government is cognizant of some shortcomings and has therefore provided a framework for the transition to a K-economy known as National IT Agenda (NITA)/Vision of K-Malaysia 2020.

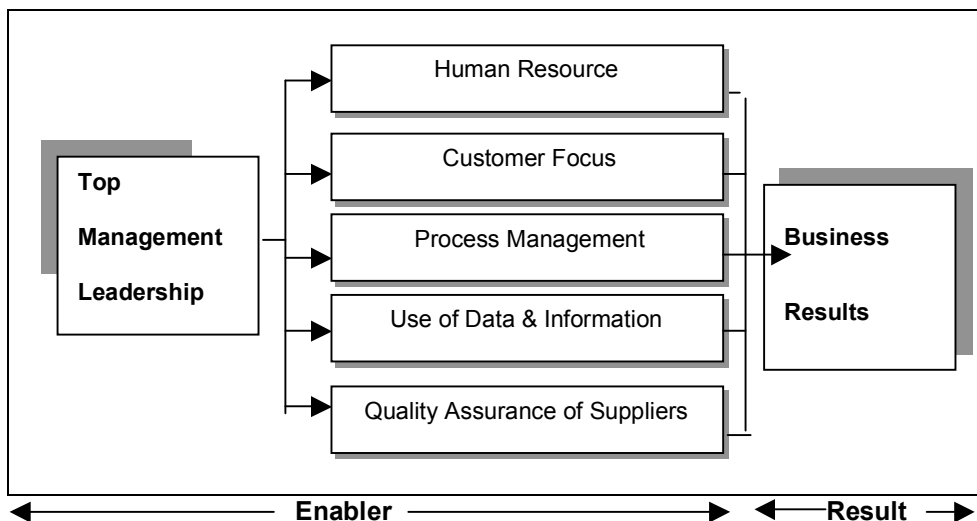
The Vision is the innovative framework that has been drawn for the Malaysian economy and society to remain competitive. Malaysia has therefore decided to develop a changing society moving towards year 2020. With the aid of the information computer technology (ICT), the people within the society would be able to evolve and transform the society from information society into value based knowledge society by the year 2020. The economy is expected to remain competitive and therefore a new ICT sector is created and information is treated as commodity.

The putative march to an 'information age' has also introduced new heroic figures and sacred territories to the communications landscape. The technologist, especially the techno-entrepreneur, has emerged as the chief agent of change in this new economy. These "technopoles" have attained fame as the key centers of an emerging technoeconomic paradigm, and the crucial places which bring together institutions, labour, and finance to

generate the basic materials of the information economy. They are, as Castells and Halls describe, “the mines and foundries of the informational economy” (1994: 1). In Malaysia the government’s initiative in embracing the K-economy has been well articulated with the significant move in the creation of new technological spaces, called Malaysia Multimedia Super Corridor. Rising on former plantation land south of Kuala Lumpur, the MSC has become “a giant test-bed for experimenting with not only multimedia technology, but also, and more importantly, the evolution of a new way of life in the unfolding age of information and knowledge”. Since its announcement in 1995, the MSC has become the centerpiece of the country's ambitions.

‘Vision 2020’ program, was designed to transform Malaysia into a ‘developed’ and ‘informational’ society by the year 2020. Malaysia has to move forward towards this vision through concerted effort, leapfrogging Malaysia into the knowledge economy.

The Malaysian technopole landscape has attracted a lot of interest as communication technologies have been recognized as the center of the government’s growth strategy. Malaysia has therefore now entered into the more advanced tier of nations that are using the tools of communication and information technology to build a genuine knowledge-based economy and society. The Malaysian Super Corridor model is of great importance because it is one of the most substantial efforts by the government to systematically transform social patterns of communication and culture with new technologies. ICT is seen as the enabler, facilitator and catalyst for innovation and entrepreneurship towards achieving a firm grasp of the K economy. The Malaysian Super Corridor (MSC) has is Malaysia’s nuclei for the government to encourage the usage of ICT for innovation and entrepreneurship towards the application of knowledge management.



**Figure 1: Malaysia’s Prime Minister Quality Award Model for Organizational Excellence**

The MSC, through the government has encouraged embeddedness in the form of recognition to companies showing flair for innovation and entrepreneurship in their quest for excellence as a criteria in the various quality awards. The leading prestigious award recognizing excellence is the Prime Minister Quality Award. It has a framework and

criteria of innovation and entrepreneurship strongly embedded in it. The Prime Minister Quality Award (PMQA) serves as a model to guide organizations in pursuit of excellence. This model hinges on 7 crucial elements for achieving excellence as depicted in Figure 1.

### **Top Management Leadership**

Management has been the single most important factor that drives organizational excellence. This drive is reflected through management commitment in providing time and energy, and setting out clear goals and directions for quality initiatives. This is crucial, as the management will set the stage for the effort put in to attain organizational excellence by everyone in the company.

The commitment from company's leadership is about driving the whole organization towards business excellence. This commitment calls for employees to be proactive, initiate leadership at their own levels, and act as a solution provider to customers, give attention to details as required by their customers, manage internal business processes effectively, provide efficient data and information management, and maintaining a close working relationship with suppliers.

### **Managing Data & Information**

Usage of data and information is paramount to any business undertakings. Effective decisions are made based on facts and figures. In a situation where customers' needs are important and fulfilling them require effective and efficient processes, organizations must be able to utilise data and information about their customers, products, processes and human resources. In today's business that counts on speed, effective information management can be a competitive strategy for organizations competing in the global market. This strategy calls for effective utilisation of ICT where data and information about businesses can be made available according to the needs and requirements of each company.

### **Managing Human Resource**

Research findings suggest that there is a positive correlation between satisfied employees and delighted customer. Satisfied employees strive to ensure their external customers are happy with the products produced or services delivered. They are willing to walk the extra mile simply because they themselves are satisfied with the work and want their customers to be delighted as well.

However this practice does not happen by accident. It must be planned and properly executed. At the same time, organization must adopt suitable HR strategies and policies to develop their human resources, understands their employees' needs and requirements and most importantly attend to their grouses.

Excellent companies drive positive HR initiatives particularly on training and development, as training is an important factor in corporate competitiveness.

### **Customer Focus**

Organizations exist because of customers. Thus, all business processes must take into consideration customers' needs and requirements. These processes cannot be developed in isolation with the customers' needs; it must be developed according to those needs. Organizations cannot develop business processes based on the nature of their business set-up and the many constraints that they are facing. However, many organizations failed to understand this and as a result their business processes cannot support the customers' needs. This company will eventually perish when a new competitor

comes into the market and offers what the customer wants.

Equally important in managing business is getting to understand customers. Products must be delivered and feedback must be sought to understand what happens to the products, customers, and the delivery process. Excellent organizations view this initiative seriously especially to understand their customers, the needs, and take steps to address those needs.

Understanding these needs requires proper training for employees who will be able to assist customers by providing efficient, effective, and courteous service and most importantly, to be able to listen to customers' complaints and provide alternative solutions.

### **External Suppliers**

Many of today's business operations are done on a networking basis, which simply mean, companies 'have to work' with other companies that manufacture parts and components. In most cases the decision to 'out-source' is because of cost effectiveness.

This working scenario calls for better working relationship between the organizations and suppliers. The companies that out-source must ensure that the parts and components manufactured by the suppliers are within the allowable specifications and requirements. To deliver this, the suppliers must develop and adopt management system and practices that will deliver products according to the standards required by their customers.

### **Process Management**

Another important element in organizational excellence is the ability to effectively manage processes. Products are delivered through various processes in an organization. These processes range from R&D, understanding customer's requirements, production, packaging, delivery and after sales service.

The delivery of quality products depends very much on the business processes before the products reach the end users. These processes must be efficient, effective and continuously upgraded. What could be delivered today using the current business processes could no longer be effective and efficient 12 months later. Thus organizations must continuously strive to improve their business processes to satisfy their customers.

Excellent organizations put in extra effort to manage their processes effectively and continuously seeking opportunity for process improvement. The production aspect though must be given priority for continuous improvement as it is the stage where the product is actually manufactured. In the service sector, the interface with customers is the moment where services are provided. These processes that are important to customers must be identified and improved to enhance company's performance.

### **Business Results**

For any business establishment, the bottom line is to make money. It is very important to conduct yourself and your company in ways that will support its prosperity in the future. This simply means managing the business efficiently and effectively and it will be reflected in the business results.

Malaysia is committed to the development of competitive enterprises through the use of modern technology. This includes the implementation of ICTs across all sectors of the industry particularly encouragement to SMI to embrace ICT. The Prime Minister Quality Award is an annual national quality award given to organizations in the private sector in recognition for their excellent achievement in quality management. Winning the award is a prestigious accomplishment, as the Prime Minister Quality Award is a proof

benchmark of Organizational Excellence.

ICT is therefore a prominent agenda to the government as it is a tool for enabling productivity and quality enhancement towards excellence, in order to make Malaysia a leading player in the global economy.

Malaysia therefore needs to harness and promote the growth of local ICT for the advancement of the nation. Promoting and encouraging the growth of the local ICT industry is primarily aimed at providing the necessary innovation and entrepreneurship traits for Malaysian entrepreneurs to meet the challenges of the K economy.

While the Prime Minister Quality Award recognizes Malaysian companies' excellence in quality management, a special ICT award called the MSC Asia Pacific Information Technology Award (MSC APICTA) award is also given in recognition to outstanding ICT achievements of individuals, students, entrepreneurs, SMEs or organizations with operation in Malaysia that have contributed to the development of the MSC initiatives or in building application and services for the benefit of Malaysia.

This Awards programme also provides both a unique opportunity and an ideal environment for individuals and companies to gain considerable local, regional and international exposure through on-going promotional activities. There are 14 categories of the award. The award categories by itself suggest considerable building and moulding of innovation and entrepreneurship traits and acumen among the winners. The 14 award categories are as follows:

- I. Most innovative for developing ICT solution for the delivery of education and training
- II. Most innovative for developing ICT solution for the health sector
- III. Most innovative for developing ICT solution for developing security systems application
- IV. Most innovative for developing ICT solution that supports electronic government initiatives
- V. Most innovative for developing ICT solution that supports the industrial sector, including manufacturing process
- VI. Most innovative for developing ICT solution that supports various business processes in an enterprise
- VII. Most innovative for developing ICT solution for the delivery of web-based transaction systems
- VIII. Most innovative for developing ICT solution that supports the tourism industry
- IX. Most innovative for developing outstanding communication technologies or creative use of communication technologies
- X. Most innovative for developing or creating innovative multimedia presentation relating to animation, games, arts, media and entertainment
- XI. Most outstanding ICT R&D project
- XII. Most innovative ICT projects from students of Institutes of Higher Learning
- XIII. Most innovative web based project from secondary school students
- XIV. Most innovative web based project from primary school students

The ultimate goal of the award itself is to ensure that the region establishes itself as a centre of IT excellence and trade. The Awards also support the MSC's goals and complement its strategy in stimulating economic developments, employment, innovation and an entrepreneurial culture.

Malaysia is currently focusing its effort towards transforming the current

production-based economy to a more knowledge-based economy. The K economy will require more ICT literate workers and more usage and applications of IT and ICT in businesses. To facilitate this transformation, the country will need a new path to the economic development approach especially with regards to entrepreneurship. A new entrepreneurship methodology concentrating on the development of technopreneurs is a key element in enhancing the contribution of ICT for the macroeconomic progress of the nation. Realizing the importance of technopreneurship, the government has launched the Technopreneur Flagship Application. This flagship of the Multimedia Super Corridor, launched in November 2001 aimed to achieve four key objectives: spawning a critical mass of SMEs and start-ups involved in information and communication technology, biotechnology and other life sciences, nurturing potential world class companies, creating the nuclei for the physical roll out of the MSC nationwide and spurring the growth of the venture capital industry.

The flagship also aims to increase the availability of seed funds, research and development grants and Venture Capital funds. It is designed to develop more talents through skill based training programmes in areas such as leadership, negotiation and cross cultural marketing. With the launch of this technopreneur flagship, a network of local and international SME portal (<http://www.technopreneurs.net.my/intro.html>) has been created to act as a platform for the global community to exchange knowledge and resources. To facilitate the interest of SME technopreneurs in contributing to the efforts of nurturing a healthy and resilient technopreneurship, an association TEAM (Technopreneurs Association Malaysia) has been formed by a group of Malaysian Technopreneurs to further the interests of Technopreneurs and to assist in the development of the Digital Economy in Malaysia.

TEAM has three Key Initiatives and Objectives:

- I. To act as a think tank and as a voice for technopreneurs
- II. To nurture the professional development of members and the industry in general
- III. To provide community education and bridge the digital divide

An important area under this flagship is the plan to set up the National Incubator Network. The present 12 available incubators in the country is expected to be expanded to include at least one incubator in each state. The objective is to set up this national incubator is to enable entrepreneurs to share knowledge and expertise regardless of location.

The Techproneur Development Flagship is a well strategised effort, henceforth its success will depend on how the flagship plan is implemented. The big task is to manage and coordinate the three main sectors of the pyramid – entrepreneur, incubator and venture capital firms at the national level. The challenge is working on creating a critical mass of entrepreneurs with ground breaking technologies, setting up of incubators that will lead start up companies from zero to world class companies and having venture capital firms that are able to interpret business plans and spot uncut diamonds.

## **CONCLUSION**

As the Malaysian economy is set to transform from a production-driven to a knowledge-based economy, intensifying the use of ICT to support productivity enhancement strategy is a necessity. The use of information to create value-adding knowledge will be the key to productivity enhancement and competitiveness. This means



that all sectors of the economy must create knowledge-based work practices encouraging the development of knowledge intensive industries. Therefore creation of intensive Knowledge-based industries will need plenty of innovation and entrepreneurial traits to determine its success.

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# **CORPORATE ENTREPRENEURSHIP AND INNOVATION: KEY THRUSTS IN THE KNOWLEDGE-BASED ECONOMY (KBE)**

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## **IMPORTANCE OF CORPORATE ENTREPRENEURSHIP AND INNOVATION**

When the term '*knowledge-based economy*' (KBE) was coined, many thought the methods and principles for doing business had changed. The bursting of the technology stock bubble led to some dismay and for others, relief in that their hunches that the information age and Internet frenzy were a short-lived affair, proved to be true. Now that some time has passed, it is clear the KBE is here to stay but the initial precepts about it have to change.

The environs have changed but the core has not changed. The activities, the skills, the competencies and the innovations that need to be sought were part and parcel of entrepreneurial ventures. They continue to be integral to success in the information age. Where are the changes?

They lie in:

- a. the intensity of change;
- b. the intensity of competition;
- c. globalization; and
- d. shorter product and service life cycles.

Entrepreneurship in the KBE requires the firms and entrepreneurs to adjust to the changes and to harness the opportunities provided by:

- a. the Internet;
- b. new technology;
- c. global markets; and
- d. turbulence.

Turbulence is troubling for firms that desire stability. However, it provides the possibility for niche enterprises and for newcomers to overturn the conventions in industries.

Entrepreneurship in the KBE will still need access to markets, technology, human resources, finance, and information. These are facilitated by computer and information technology, globalization, and international networks. In this symposium, we examine the aspects of innovation, entrepreneurship, venture capital, business models and motivating the knowledge workers in the firms.

One key ingredient for entrepreneurship is the inculcation of entrepreneurship and innovation within organizations. Here, we are also interested in the human resources systems that are put into place to harness the potential in an organization's people.

Entrepreneurship and innovation are two ingredients that will be needed for continued competitiveness. The significant changes that this symposium hopes to encourage are entrepreneurship in medium and large business enterprises because these

enterprises often need to be entrepreneurial. Most of the time, when one refers to corporate entrepreneurship, it is conceived as merely venture teams or projects. However, we need a more pervasive corporate entrepreneurship – we need to transform enterprises so that they can become total systems that promote innovation. Borrowing from the theory of evolution, Hamel (2001) argues that only one out of 1,000 ideas makes it to production; hence, the need to encourage and involve more people in entrepreneurship.

### **CORPORATE ENTREPRENEURSHIP**

Pinchot (1985) invented the term ‘*intrapreneurship*’ to refer to “entrepreneurial activity within corporations where individuals champion new ideas from development to complete profitable reality”. This term, as well as others such as “*internal corporate entrepreneurship*”, “*corporate venturing*”, and simply “*corporate entrepreneurship*”, were coined to refer to this derived activity.

There are a number of forms of corporate entrepreneurship. Hans Schollhammer (1982) in the *Encyclopedia of Entrepreneurship* lists the following:

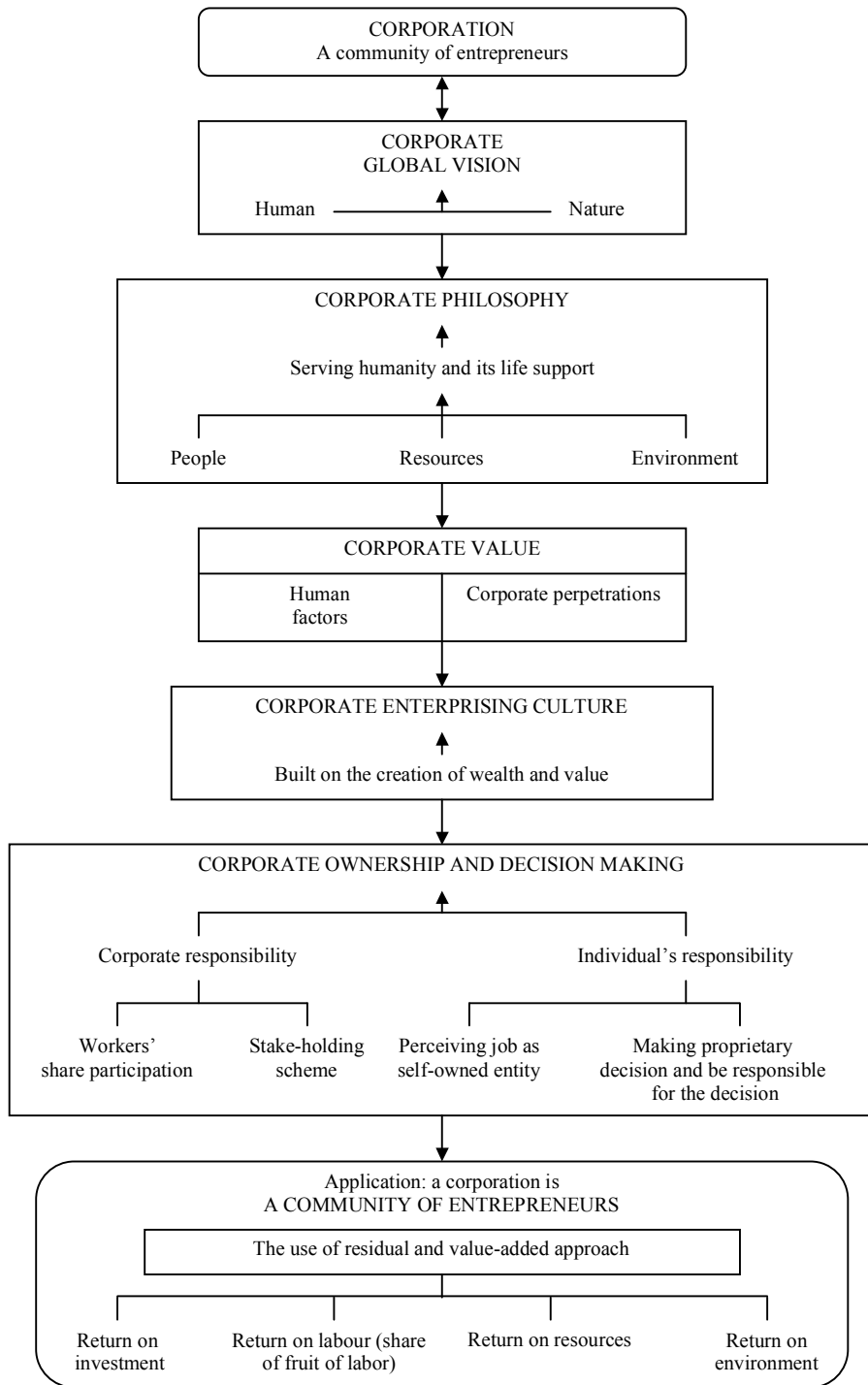
- Administrative – the firm has a centre that handles R&D or business development.
- Imitative – here the firm imitates the innovations of others by reverse engineering, or technology innovations of their own.
- Acquisitive – here entrepreneurship takes the form of mergers and acquisitions of other firms that may have relevant inventions and innovations.
- Incubative – the firm encourages entrepreneurship in fostering teams, providing internal financing and resources for innovations and inventions within the firm.

It can be seen that some forms of corporate entrepreneurship identified by Schollhammer are limited in nature. His typology includes only one form of corporate entrepreneurship that allows for the maximization of entrepreneurial efforts outside the senior management level. The type of corporate entrepreneurship required in the knowledge-based economy is a pervasive entrepreneurship where innovations and ideas come from within the organization, and not from selected units and teams. Karl Vesper defines corporate entrepreneurship as “new strategic direction or initiative from below the leadership of the firm, in a sense, autonomous business creation”.

We need this form of corporate entrepreneurship because:

1. You need 1,000 ideas from which one or two may be successfully implemented. (Hamel, 2000)
2. The knowledge of some processes vest in the individuals. Hence, permitting entrepreneurial ideas to surface should benefit the firms especially as some ideas, although not being in the core of a firm’s business, may be spun-off into associated enterprises that generate wealth.
3. Continuous and radical improvement requires the maximum level of involvement, which requires organizational change and a culture, values and philosophy that is inclusive and encourages the development of organizational members as entrepreneurs.

This corporation-wide approach adopts the definition that entrepreneurship is the process of doing something new or different to create wealth and to add value to society (Kao, 1995). This definition focuses on three aspects common to all entrepreneurs:



Source: Kao, 1997

**Figure 1: Transforming Organizations into Communities of Entrepreneurs**

Creativity [new], innovation [different], and wealth creation. It also envisages social responsibility as an objective of the entrepreneurial process with the requirement of adding value to society.

Introducing a total change over an organization requires starting from the very top. If you were to examine Figure 1, you will realize that what is required in the transformation process. The figure depicts the elements required for a corporation-wide corporate entrepreneurship drive. Any organization requires the call to a new ideal, the mission. This mission or quest needs to be explained in a philosophy that guides behaviour. The philosophy will engage the members of the firm because it needs to be accompanied by corporate values identified by both management and membership. Unlike the mission and the philosophy that are top management-driven, values have to be arrived at with the agreement of the members of the corporation. These values need to be upheld and to this end, the organization's culture must support and maintain these values. Where necessary, the firm must identify the negative sub-cultures that would frustrate its efforts to introduce the new values and engender the positive elements of the corporate culture.

At the individual level of the members, equipping is necessary. One cannot simply say, "Let's all be entrepreneurial" without explaining what is required, showing them how to do it, and equipping them with skills. The last item in the figure refers to reward. Motivating the people in the company is an absolute must. Therein is an ingredient that most businesses ignore: the power of ownership. When you own something, you care for it. How you go about creating that ownership or sense of belonging is the difficult question. It may be through share ownership or option schemes.

Where an organization needs to change is in the following areas. Hamel (2000) suggests:

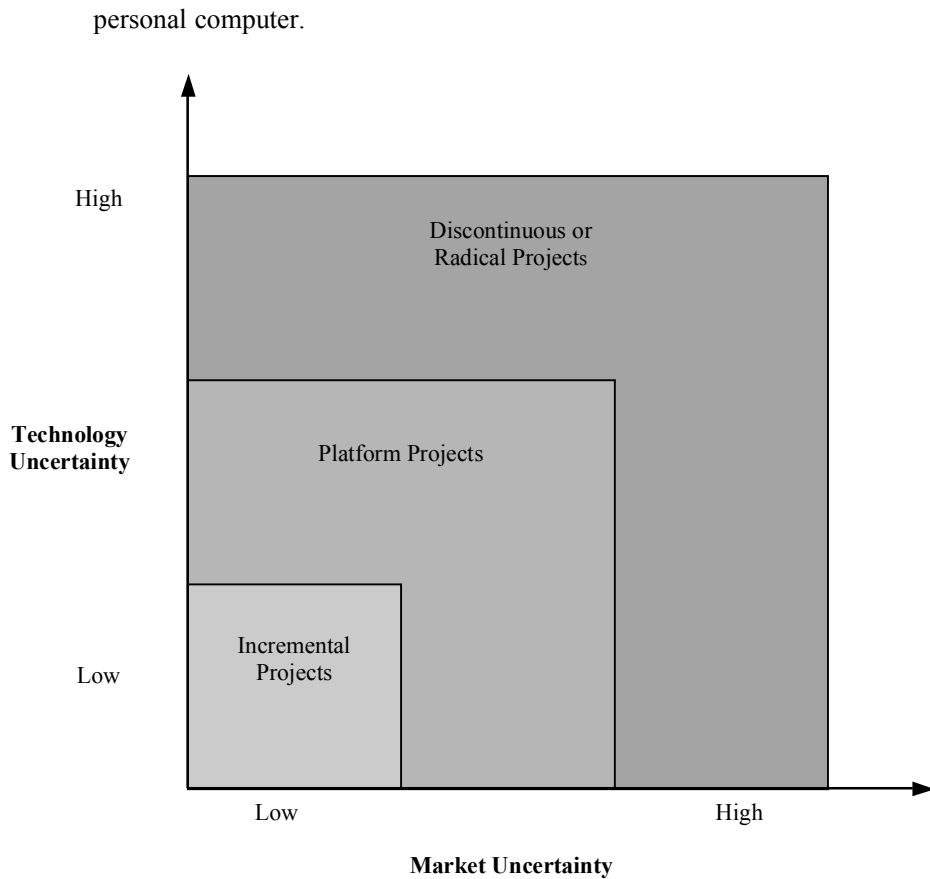
1. Change expectations from incremental to unreasonable ones.
2. Define the business flexibly so as not to be entrenched. Better yet, fashion it as a cause rather than a business. People are drawn to a cause.
3. Listen to new voices, welcome new ideas; strategy cannot be confined to senior management. See Katisuga of Sony, and Grossman and Patrick of IBM, when they tried to introduce Playstation and Internet respectively.
4. Motivate new ideas, create a market for it.
5. Fund new ideas the way that venture capitalists actually do, without too much emphasis on the hurdle rate that financial controllers are usually focused on.

### **OPPORTUNITY RECOGNITION IN FIRMS**

While corporate entrepreneurship, as depicted, implies that the whole corporation, its total membership, one has to realize that the extent of their innovations and the ability to recognize opportunities vary.

Whatever level of staff are involved in corporate entrepreneurship, there is a need to understand the process of opportunity recognition. Opportunity recognition (OR) – the process of finding a match between an unfulfilled market need and a solution that satisfies the need (Bhave, 1994) – is a core attribute of entrepreneurship. It has been the subject of numerous studies in entrepreneurial firms. Opportunity recognition exists in three areas:

- Incremental innovations
- Platform innovations – whole new product offerings that are not discontinuous (Koen, 2002)
- Radical innovations – offer potential for a 5 to 10 times (or greater) improvement in performance or a 30% to 50% reduction in costs, e.g. the first



**Figure 2: Types of Innovations**

Examples of each of these innovations are shown in Table 1 below:

**Table 1: Examples of Innovations**

Incremental	Colours, shapes, sizes of products
Platform	Low fat peanut butter, Diet Coke
Radical	Telephone, personal computer

The ongoing research on opportunity recognition has lessons for us. Table 2 below summarizes key observations drawn from Koen's (2002) work.

**Table 2: Key Observations on Types of Innovations**

Incremental	Platform	Radical
Employees	Trigger event	Product champions
Managers	Product champions	Inventor
	Senior management / entrepreneur sponsorship	High-risk technology
	Absence of high-risk technology	Fortuitous discovery

In both platform and radical innovations, the role of the product champions was discernible. There were research teams or inventors who spotted an innovation that could take the firm further. In a case studied by Koen (2002), Skippy launched its low fat peanut butter, which had been suggested by a team some twenty years earlier. It required a trigger event that led to senior management support for the innovation. The innovation did not involve high-risk technology but was an extension of product range that involved little in the way of a change in processes.

The presence of a trigger event is telling. It shows that unless senior management or entrepreneurs are constantly keeping an eye out for innovation that may exist in a company, they get neglected until an event such as news that a rival is introducing a similar range propels the company into action.

In the case of radical innovations, the role of the inventor is clear but the inventor needs the supportive environment to continue as product champion. The company must believe in the inventor(s) or they may be disappointed and leave. The observation that the discovery may be fortuitous is significant. Radical innovations are not likely to arise from willing that they do. One does not set out to say “I am going to invent Chemical X today and it will transform substance into organizations”. So the lesson here is for companies to pursue fortuitous discovery, to allow experimentation.

## **BUSINESS MODEL INNOVATION AS RADICAL INNOVATION**

Radical innovation can take the form of re-design of the business; what is called ‘*business model innovation*’. The term ‘*business model*’ was in vogue with the advent of the dot.coms. It implied that the New Economy companies would structure their businesses differently from the Old Economy companies. The technology stock bubble may have burst but the need for businesses to innovate in the area of business models has not gone out of style. In fact, now more than ever, the term must make its presence felt in the KBE. In the KBE, knowledge becomes an asset, the infocommunications technology is an integral tool and globalization is a state of affairs that has to be embraced. With these new environmental conditions, it means that existing enterprises need to be able to rethink not just technology, processes or networks, but the whole business. The business model refers to the business as a whole.

It differs from the innovations that existing businesses are used to. It is conceived of as a total business, much like the case of a new business start-up where one plans a business from scratch. It is new and seeks to deviate from the traditional or existing

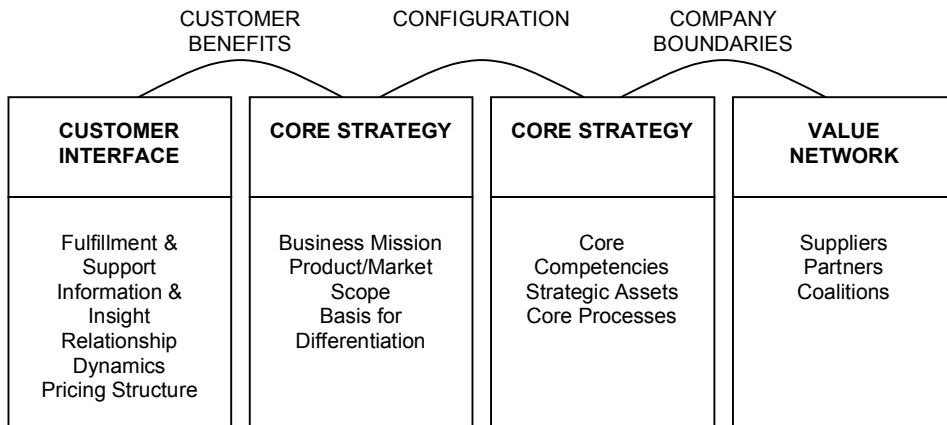
models. It is not incremental in approach as some innovations introduced in businesses. It is not incremental steps that many are tempted to engage in where the costs and extent of change are within control. It is a form of radical innovation.

Such radical innovation is needed because many visionary companies like family businesses settle in to what was successful and cease to innovate to their eventual detriment. The companies with radical revolutionary business models have been the ones that have continued to excel. They have, not like others, continued to pour human energy and capital into improving the business model that is no longer working.

Sephora Cosmetics, for instance, has befuddled the traditional cosmetics retail sector. In any department store worldwide, one would find counters representing the various brands: Estée Lauder, Lancôme, Chanel, etc. Sephora, however, has stores that display more than 600 different brands, wowing the customers because these are arranged alphabetically along a wall. There is a lipstick counter that sports more than 365 hues, arranged according to colour. By display, Sephora differentiates itself from other cosmetic houses by allowing customers to have access to and test the products. There is no bundling of purchases with gifts, just the items themselves. It captured twenty percent of the French retail cosmetics by the end of spring 1999 through its ambience, design and merchandise mix. The concept store has a wall of video screens, staff dressed in black with black gloves on one hand to show off the merchandise, and a black and white store layout. Staff work on a flat salary. It is an example of a new and attractive business concept.

Hamel (2000) depicts the business model using the four boxes in Figure 3:

These considerations may lead to the idea that your firm would want to be an instantly global firm via the Internet. It may lead to a re-conceptualization of one's business from being a hardware shop to being the portal for every man's utility box needs; from document company (Xerox) to including digitalization and printing.



Source: Hamel, 2000

**Figure 3: Business Model Innovation**

At the same time, one needs to examine one's capabilities. It is all right to dream but one needs to evaluate the internal competencies to best configure them to deliver the products/services to the customers. Dell Computer has, for example, decided that its core process is allowing the customers to build their own systems.



The two outer boxes in Hamel's diagram are similar to the considerations in any business plan. On the left hand, what the customer desires and how the firm relates to them. On the right hand, other stakeholders, without whom, the firm may not be able to deliver good service.

## **CONCLUSION**

These two key thrusts have been highlighted as they do not require external impetus. The motivation to embark on corporate entrepreneurship and total business innovation lies in the enterprise. It requires the leaders of enterprise to decide upon these steps. All too often, however, there is a pre-occupation with day-to-day issues and a forsaking of the long-term strategic view. The government policy makers can only encourage, train and equip business leaders and provide the infrastructure.

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# BANGLADESH

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*The Dhaka Chamber of Commerce & Industry*

## INTRODUCTION

Tomorrow's world will be the knowledge-based world where knowledge will be an increasingly important factor of production, which will require less labour, less time and less capital. Dr. Mohammad Yunus<sup>1</sup>, a renowned world economist of Bangladeshi origin in a recent meeting in Dhaka, Bangladesh mentioned that instead of having previously followed "Product Economy", the country should be placed on the track of the "Knowledge Economy."<sup>1</sup> Peter Drucker (1968)<sup>2</sup> claims the credit for coining the notion of "knowledge work", which he contrasts with service work and manual work. Although this has been developed, refined and redefined by other writers subsequently, the main themes of Drucker's analysis have continued to influence the debate on management of knowledge work. In his books he argues that "knowledge is fast becoming the sole factor in production, not just a factor." In his opinion, growing importance is associated with the emergence of a globalized post-industrial economy in which knowledge will displace capital as the motor of competitive performance.

## HOW THE INTERNET HAS BEEN CONTRIBUTING TOWARDS KNOWLEDGE-BASED ENTREPRENEURSHIP DEVELOPMENT

Business today is moving rapidly into the Internet age as it had moved into the Information age and Industrial age before that. According to Forester Research<sup>3</sup>, Internet Business-to-Business sales will reach US\$1.3 Trillion by 2003 and, by 2004, Business-to-Consumer sales will reach US\$100 billion. Companies relying on the traditional system may be isolated from the international business. The sooner this is realized the better. Then a company is able to begin formulating an e-business plan and link this plan most effectively to its corporate objectives. One of the main components of Internet economy is the e-commerce. The e-commerce is broadly defined as the process of using electronic methods and procedures to conduct all forms of business activities to achieve organizational goals. E-commerce uses different technologies and embraces a wide range of financial forms such as electronic banking, electronic trading, electronic Data Interchange (EDI), electronic mail (e-mail) and all forms of web sites. Since rapid

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<sup>1</sup>*The Bangladesh observer, numerous article.*

<sup>2</sup> Dr. Pramod B Shrestha. (2002). *Networked Knowledge Management: Leading our Digital future for TET- delivery systems*, Seminar paper presented in a regional seminar and international conference organized by Institutions of Diploma Engineers, Dhaka, Bangladesh in collaboration with Colombo Plan Staff College for Technical Education, Manila Philippines.

<sup>3</sup> Lord, Cristopher (2000). *The Practicality of Developing Successful E-Business Strategy*. *Dialog(R) File75: TGG Managements Contents (R)*, *Journal of Business Strategy*, 21,2,40, March, 2000.

expansion of electronic transaction constitute a major opportunity for trade and development, information and communication technologies and electronic commerce can be expected to drive the trade component of economic growth for many years to come.

A Table below (source: Dr. Pramod B Shrestha, Faculty Consultant, Colombo Plan Staff College, Manila Philippines) will show us transformation from Industrial to Information Age:

**Table 1: Transition from Industrial to Information Age Organization**

Industrial Age Organization	Information Age Organization
* Focus on measurable outcomes	Focus on strategic issues using participation and empowerment
* Highly specialized knowledge base resulting in single – skilling	* Inter – disciplinary knowledge base resulting in multi – skilling
* Individual accountability	* Team accountability
* Linear input-output thinking about programs	* Holistic perspective on programming
* Reactive: solving problems as they emerge- a short-term focus	* Proactive: anticipate issues before they become crises; achieving balance between short-term pragmatism and long-term purpose
* Hierarchical, linear information flows	* Multiple interface, boundary-less information networking
* Plant and equipment targeted for investment	* Development of people targeted for investment

According to Dr. Pramod, in this era of changing competitive milieu, organization must look for ways of generating extra value from their assets. ‘People’ and ‘Information’ are two critical resources increasingly being recognized as valuable. Knowledge networking is an effective way of combining individual’s knowledge and skills in the pursuit of personal and organizational objectives. But the preparation of capturing values and capabilities is different in different countries. Bangladesh is in the process to harness its infrastructure in transforming to an Internet-led knowledge-based economy.

### **SOCIO-ECONOMIC STRUCTURE OF BANGLADESH IN CONNECTION TO LEADING NEW FORMS OF ENTREPRENEURSHIP**

Economic growth must mean to improve human lives and not just the national income. The real wealth of a nation is its people and if they have education and technical skills, they can take over the global markets. In Bangladesh a great part of population is youth. They are a potential resource of the Country but are handicapped with

unemployment, lack of skill and training. According to 1995 labour force survey<sup>4</sup> the youth labour force (Aged 15-29) is about 20 million which represents about 36% of the total civilian labour force. If there is one science that will dominate the Twenty First Century it is Information Technology (IT), if there is one industry in which Bangladesh can emerge as a developed country from the least developed country, it is information technology. Bangladesh is yet to draw a roadmap in this regard.

Bangladesh is a homogeneous society having same Culture, Language, Race & Religion. More than 60% of its population of about 13 million are below 25 years of age having a great potential for penetrating in the IT market of the world.

In the new economic order marked by rapid and constant change, knowledge becomes the ultimate resources. Information is rapidly becoming the world's most precious resources, creating wealth while replacing land, energy, labour and capital.

Nations that try to restrict the flow of information will condemn themselves to underdeveloped status. Millennium declaration of the United Nations to end global poverty and remove digital divide Okinawa Charter of Global Information Society of July 2000<sup>4</sup>, signed by G-8 Heads of the Government, have already set the global agenda. This is the time for Bangladesh to create the organizations for eliminating poverty. Survival of Bangladesh lies in attaining computer literacy. To survive with a 130 million population burden, Bangladesh needs technology-based human resources to turn its massive young generation into potential resources. Perhaps IT is the most appropriate sector to accomplish this great task. Telecommunication is the inseparable technology for development of IT. Bangladesh faces major challenges because of poor access to telecom which hampers businesses from achieving connectivity to global gateway and global marketing place. Bangladesh needs an enabling infrastructure on a platform which equips the economy and people for globalization.

Telecommunications and IT have to play a key role in enhancing Bangladesh's competitiveness. Each new telephone line added US\$12,000.00 to GDP in Africa (source ITU)<sup>4</sup>. Bangladesh's teledensity is much behind India, Pakistan, Sri Lanka, Kenya, Zambia and Zimbabwe.

Bangladesh once missed the golden commercial opportunity in the early 90s when it did not join the Bay of Bengal underwater fiber optic network, missing the opportunity to connect herself with the international communication backbone. Understanding the mistakes that had been done in the past, Bangladesh now is serious to get an access to this network and has been taking appropriate steps.

Globalization is particularly disrespectful of past success, and is oblivious to economic projections. The world has changed so much that formulas for yesterday's success are almost guaranteed to be formulas of failure tomorrow. Success in the past has no implication for success in the future. There is no future in this decade for an old way if doing business. We have to reinvent ourselves by heavily investing on human development in the IT field. The world to day considers very little else other than the economy in judging a country or its people. The wars in today's world are economic wars.

We have barely started. Success depends on speedy implementation of reforms. All the elements of today's regulatory environment; telecom regulations, cyber laws, financial procedures, labour laws, land laws and taxation need to undergo significant changes. If we do not take the issues in right earnest, we will be thrown out on the wrong side of the

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<sup>4</sup> Aftabul Islam, FCA (2002). *Information Technology: the Future for Bangladesh published in the Souvenir of Bangladesh Computer Samity (BCS). ICT Revolution for Economic Emancipation.*

Digital Divide. It is absolutely Bangladesh's choice to remain as a developed nation or under-developed nation. The future will be Digital or Non-digital. In Information Technology, if you fall behind there is a risk of a digital divide.

### **INTERNET-RELATED CONSTRAINTS**

Though Internet has been identified as the main global tool for trade, developing countries like Bangladesh have been facing Internet-related problems as a trade support tool. Among them are telecommunications infrastructure gaps, the need to develop more local sites, translation (English is still the dominant language on the Internet), challenges to adapt existing laws to this new medium, and higher cost of installation and access. Building familiarity with Internet use is also difficult when there may only be a few computers per company.

A frequently-cited constraint is related to infrastructure. The International Telecommunication Union notes that developing countries have 312 Internet Service Providers (ISPs) per 10,000 people, while there are 6 Internet Service providers per 10,000 in developing countries; there are 25 telephone per 100 people in developing countries, versus 54 lines per 100 people in the developed world<sup>5</sup>.

### **IT SCENARIO IN BANGLADESH**

Very few people in the country can afford to buy a computer for home use. The present number of computers is around 600,000, i.e. 4.5 per 1,000 population, which is one of the lowest in the world. The annual growth rate is around 50%. But even with this impressive rate of growth, the penetration of PCs is likely to remain very low in the foreseeable future. When it comes to Internet use, the picture is also not very encouraging. There are around 65 Internet Service Providers (ISPs) in Bangladesh. Bangladesh Telegraph and Telephone Board (BTTB) is the lone ISP in the public sector; all others being operated by private sector) which provide services to around 100,000 account holders (approx. 500,000 users). The only means of connection to one global information superhighway is now through satellites. The decision of the government to allow the private companies to directly negotiate with vendors for installing Very Small Aperture Terminals (VSATs) and reduction in the license fees to be paid to the government has led to a reduction in the Internet user charges. But even this rate (typically around Tk. 1 per minute) and the low speed (typically 4-5 kbps at user level) make it very expensive for ordinary users. Moreover, the ISPs are located only in the 4 or 5 major cities. Therefore users from other towns have to access the ISP servers using Nation Wide Dialing (NWD) facilities, which makes it even more expensive. The recent decision of BTTB/MOPT to increase the licensing fees for VSAT and monthly telephone charges for ISPs, coupled with the introduction of time-based metering of local telephone calls, will have a strong negative impact on the use and spread of Internet, and overall growth of IT in the country. Recently Bangladesh Telecom Regulatory Commission have been formed, some of these decisions of Ministry of Posts and Telegraph (MOPT) have been kept in abeyance. It is interesting to note that the Government of India has recently accepted a recommendation of the Telecom Regulatory Authority of India to allow ISPs to offer Internet telephony services to their customers. This would be effective from April 1, 2002.

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<sup>5</sup> *Internet*

The teledensity (around 5 per 1,000, source: Prof. Jamilur Reza, Former Advisor, Caretaker Government, Bangladesh) for fixed telephones is also one of the lowest in the world. The penetration of telephones in the rural areas is also very low (0.5 per 1,000). The combination of low numbers of PCs, low number of telephones and the high charges (telephone plus ISP charges) are the main reasons hampering the development of this sector.

**Table 2: Telecommunication at a Glance**

Tele density	0.50%
Total Fixed Telephones in Use	602,986
BTTB (T & T)	474,322
- Urban	411,427
- Rural	57,077
Private Operators	128,664
Card Phone in Use	1,381
Public Call office	630
Telex Subscribers	1600
International Voice circuit	2,107
International Trunk Exchange	3
Total International Circuit	3,936
Nation Wide Dialing (NWD) Circuit	21,930
Switching	61%
Transmission	75%

Source: TechBangla IT Research Cell

**Table 3: Use of IT in the enterprise level**

Type of Business Institutions	Top Management (Chairman/MD/CEO/Director)	Departmental Head/In-charge	Existence of Separate IT/MS Department (%)
RMG	27	1	28%
RMG; Knitwear	10	1	36%
Buying House	10	0	30%
Health	14	4	22%
Trading	49	1	3%
Real Estate	9	1	11%
Pharmaceutical	8	2	80%
Courier	10	0	10%
Media	8	7	67%
Handicraft	7	2	Na
Total	152	18	247%

Source: Tech Bangla IT Research Cell

The country needs to increase enterprise level IT use. The entrepreneurs now are coming up in a bigger way as both the government and the private sector are considering the importance of this area.

## **GOVERNMENT PORTALS**

Some of the government agencies have already launched their websites. If any Internet user submits a query to the popular search engines (e.g. Yahoo, Google, AltaVista) with the words 'Bangladesh Government', s/he would be able to find out the address [www.bangladeshgov.org](http://www.bangladeshgov.org) which is listed as the official website of the Government of Bangladesh. The homepage of this Website currently contains links to only 6 ministries and 46 agencies. It is seen that less than 10% of the ministries/agencies have their homepages. Some of these contain important documents like 5<sup>th</sup> Five Year Plan, Budget, Census Data, Customs and Income Tax regulations. However, there is very little scope for interaction with the agencies. Moreover, users complain that e-mails sent to the agencies using the links in the website are very rarely replied. Unless the information in the Websites is updated regularly and responses provided to queries sent through e-mail, the very purpose of setting up the Website is lost. Therefore, while the present position reflects only a small improvement, viz. access to some of the information, there is a need for regulations requiring the organization to be more responsive. Implementation of the decision of the Prime Minister's Task Force on IT to place all forms (required by various agencies) and recruitment notices on the Web would be a big improvement. The Task Force has also decided to launch a Web Portal for the Government, so that any user who wants to interact with the government would enter the Website and would be gradually directed to the appropriate agency. Another important website of Bangladesh is [www.parliamentbangladesh.org](http://www.parliamentbangladesh.org).

## **IT-ENABLED SERVICES**

Rapid developments in global telecommunications network, coupled with easier accessibility to computers, have given rise to a new type of opportunity for developing countries, viz. IT-enabled services:

- (i) reduction in international telecommunications charges;
- (ii) declining unit cost of computing power; and
- (iii) increasing trend to outsource non-core competency areas.

The key features of IT-enabled Services are

- Data entry
- Back office processing
- Medical transcription
- Insurance claims processing
- Salary processing
- Legal database
- Multimedia Content development
- Call centers
- Customer services
- Engineering Design, CADD
- Translation
- Animation

Some new areas where IT can contribute for entrepreneurship development may also be appropriate for Bangladesh. The areas could be Education, Legislative Issues, Payment of utility bills, improvement of Law and Order situation, on-line payment of

Taxes and Levies, maintaining Land Records, Public Grievance, Procurement of Goods and Services, Health Care, Post Offices, City Corporation and Municipalities, Recruitment of Personnel, Policy Documents etc. For all these, Bangladesh needs to develop appropriate infrastructure. These It-enabled services may bring transparency and in turn some changes in respect of good governance which is very much needed at this stage of the country.

### **SKILL SETS REQUIRED FOR DIFFERENT SERVICES**

**Table 4: Skill Sets Required for Different Services**

<b>Segment</b>	<b>Skill set required</b>
Customer services	Language, accent
Data processing	Computer literate
Human resource	HR skills, legal
Remote education	Domain knowledge
Engineering design	Domain knowledge
Translation & localization	Language
Medical transcription	Computer literate, medical knowledge
Animation	Creative, computer literate
Finance	International/country specific accounting
Web hosting	Computer literate
Market Research	Knowledge of MR, statistics
Network consulting	Computers, LAN

The above required skill are required to be attained through training, access to technology and appropriate education.

### **HUMAN RESOURCES DEVELOPMENT IN IT**

One of the major weaknesses that is preventing Bangladesh from utilizing the opportunities in the global market of IT is the existing lack of trained manpower. The present scenario is shown in the following table:

**Table 5: Missing Links in ICT Skill Development**

<b>Specialty required in Software Development</b>	<b>Concentration of training in Bangladesh</b>
Software Architect	No
Senior Systems Analyst	No
Senior Software Engineers	No
Senior Database Designers	No
Senior Communications/Networking Designers	No
Transaction Systems Designers	No
User Interface Designers	Yes
Testing Designers	No
<i>(To be continued)</i>	
Project Manager	No



<b>Specialty required in Software Development</b>	<b>Concentration of training in Bangladesh</b>
Senior Programmers	Yes
Senior Programmers	Yes
Database Programmers	Yes
Programmers	Yes
Communications Programmers	No
Documentation Specialists	No
Multimedia Programmer	Yes
Multimedia Designer	Yes
Media Specialist	Yes

(Source: TechBangla 2000 and CPD Task Force Report on ICT, 2001)<sup>6</sup>

The last few years have seen increasing emphasis being laid on developing Human Resource Development (HRD) in the IT Sector. It must be remembered that there is no shortcut solution to this problem. Whereas physical infrastructure development can take place provided adequate resources are invested, development of human resources is time consuming. A prerequisite to our success in the IT field is the availability of a large pool of graduates well versed in the foundations of Computer Science and IT applications. In a recent survey it was found that around 60 educational institutions are involved in imparting education in the field of IT leading to a bachelor's degree.

These fall into five broad categories, viz. Public Universities, Private Universities, BITs, Colleges affiliated to National University and local affiliates of foreign universities. The details are shown in the following table:

**Table 6: Institutions Involved in Bachelor's Degree in Computers or IT-Related Fields**

<b>Category</b>	<b>Number</b>	<b>Number of Students Admitted Each Year (approx.)</b>
Public University	7	500
Private University	16	1,300
BITs (Govt. funded)	4	240
Colleges affiliated to National Universities	18	1,000
Institutes offering courses leading to degree from Foreign Universities	17	250
<b>Total :</b>	<b>60</b>	<b>3,290</b>

The total number of graduates per year would increase from the current figure of around 300 per year to around 3,000 per year in 2004. However, this number is still too small to meet the requirements of a vibrant IT industry. Some of our students are studying IT-related subjects in foreign Universities and likely to return home, but their number

<sup>6</sup> Prof. Jamilur Reza Chowdhury, Former Adviser, Caretaker Govt. of Bangladesh (March 2002). *A Feature on Promotion of Information for Human Welfare and Opportunities for Bangladesh.*

would not be very large. In order to meet the shortfall, efforts have been initiated to introduce crash programmes like 1-year postgraduate diploma in Computers and Information Technology to enable graduates in other disciplines (related to computers) to become computer professionals. A 15 crore taka project for 5 public universities has already been launched and would produce 300 professionals per year. Some private universities have already started the programme, including opportunity for completing the PG diploma in 2 years as a part-time student. Some other projects have also been initiated by the government.

During the last four years, a large number of IT Training Institutes have started operating not only in different areas of metropolitan cities, but also in smaller towns spread throughout the country. Many of these have franchises from very large foreign companies specializing in training in different sectors of IT. A proposal for introducing voluntary accreditation is under consideration of the government. Besides, introduction of national examinations at four levels is also being considered by Bangladesh Computer Council (BCC). This would enable the trainees to acquire nationally recognized levels of competence and would also be an indirect indicator of the quality of training institutes.

### **CURRENT IT POLICIES IN BANGLADESH**

As a developing country, Bangladesh is also sharing the world-wide trend and explosion on E-Commerce that means IT. Momentum is being geared up to take full opportunity from the IT revolution which has evolved during the last decade. It is felt and acknowledged that Bangladeshis can take its rightful share for development and export of software & all IT services. Realizing this tremendous prospect, the Government of Bangladesh has already declared “Data Processing and Software export” as a **Thrust Sector** both in its Industrial and Export policies and provided a unique package of incentives so that the private sector can play a major role in this sector. Some of the incentives are:

1. Financial incentive in terms of soft and easy term loan is available from Banks and other financial institutions to set up IT-related business;
2. Hundred percent foreign investments and joint ventures are encouraged by allowing tax exemption and repatriation of capital and profit;
3. VSAT (Very Small Aperture Terminal) is now open to the private sector ( at a yearly fee of US\$3,500 )
4. Bangladesh has an optical fiber network which runs over 300 Rail Stations all over the country;
5. Bangladesh will be connected immediately with the submarine global optical fiber backbone and at least 300 Railway Station spots spread all over the country will become online to the global system of high speed transmission/receiving capacity;
6. National Telecommunication Policy has been finalized;
7. An IT Policy has been drafted with a view to making Bangladesh an IT-driven nation by the year 2010;
8. IPR (Intellectual Property Right) Act has been introduced;
9. During the Year 2002, even with the limited resources and constraints, Bangladesh managed to export software worth approximately US\$30 million and the figure has been increasing day by day. Like our well-recognized success story in readymade garments, IT-sector will be another thriving industry for the future.

10. The vision of the National Information and Communication Technology (ICT)<sup>7</sup> Policy published in September 2002 is to build an ICT-driven nation comprising of knowledge-based society by the year 2006.
11. ICT policy has got an annual target of 2(two) billion US dollars from earnings of export of software, data entry and IT-enabled services by the year 2006(Website: [www.most-bd.org/whtsnew.htm](http://www.most-bd.org/whtsnew.htm))
12. Government has announced a fund of Tk. 100 crore equivalent to US\$20 million (approximately) as Entrepreneurship Equity Fund (EEF) to facilitate IT entrepreneurs. In the budget 2002-2003 the government has established an Industrial Development Fund of Taka 300 crore to encourage innovative products in the fields of soft ware development and agro processing sector.
13. Government has fully realized the benefit of e-commerce and they are committed to take necessary action for the rapid development of e-commerce.
14. Information Technology (Electronic Transaction Act) 2002 is in process for approval.

### **CURRENT STATUS OF ELECTRONIC NETWORK IN BANGLADESH**

At the moment Electronic Network facility may be termed as non existent in Bangladesh. However it does not mean that it can not be developed quickly enough. The reason is that we have a fibre optical network system covering most of railway system. It may be mentioned here that one of the Mobile Phone company namely Grameen Phone is already using the railway fiber optic system for their transmission network. At the moment only twenty five percent capacity is being used. That means the rest of the 75% can be used for establishing Electronic Networking System.

Another opportunity for developing Electronic Networking is that very recently the government of Bangladesh has deregulated the telecommunication sector and Internet services in a major policy decision. It has now removed obstacles of opening up high speed data transfer. Furthermore, Bangladesh Telegraph and Telephone Board (BTTB), a part of Ministry of Posts and Telecommunication, has allowed vendors to supply VSAT connections directly to the Internet Service Providers instead of connecting through them. Small fee of US\$ 3,500 per annum is being charged by BTTB. This has reduced the cost of data transfer drastically to the advantages of users.

Our vast population, particularly educated, intelligent and unemployed youth can be transformed into a real asset like those of our competing South Asian neighbours if nationally coordinated move is made and used in a planned manner. IT sector is so popular among youngsters that this pool of resources would certainly be able, once trained, to extend their professional services effectively both at home and abroad.

Online Banking has been introduced by one of multinational Banks (Standard Chartered) a few years ago. Since then other banks including local Bangladeshi banks have joined the system. Local Credit Cards (not convertible to US Dollar) in collaboration with Visa and Master Card is also being operated by a number of Banks. International Credit Card has been introduced by two local banks.

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<sup>7</sup> *National Information and Communication Technology (ICT) Policy of Government of Bangladesh, Ministry of Science and Information & Technology, September 2002 (Website: [www.most-bd.org/whtsnew.htm](http://www.most-bd.org/whtsnew.htm)).*

The following factors are essential for introducing Internet-based entrepreneurship development in Bangladesh:

- a) We need to work out national e-commerce strategies.
- b) Telecommunication infrastructure must be brought to a level where uninterrupted communication can be established. Access to telecommunication should be made easier, faster and more economical. The sector should be opened so that both the government and private businesses compete and give the best telecom infrastructure to the consumers.
- c) Extensive training program must be introduced to train educated youth to take the challenge of IT revolution. The training must be of world class to keep up with present and future needs. Training centre should be properly manned and equipped with complete facilities and spread over all (64) district head quarters.
- d) A legal framework conducive to the requirements of electronic commerce transactions (Interfirm Electronic Networking) has to be put in place and proper training has to be given and information supplied to all concerned.
- e) Financial policies and banking regulations need to be adjusted to the requirements of the digital transfer of monies.
- f) Increase telephone density in both urban and rural areas to at least ten times the present density of 1 per 100.
- g) Introduction of Cyber Law to accommodate new definition of document and extend their authenticity in the eyes of law. Cyber transaction in all its forms need to be legally recognized.
- h) Increase significantly PC use at home and office by extending personal loans on soft terms.
- i) Strengthen communications infrastructure and promote use of Internet
  - Provision of infrastructure that allows high bandwidth data communication
  - Make telephone connection easy available
  - Review current tariff structure with regards to telephone connection and usage with a view to promoting use of Internet and thereby facilitating increased use of e-commerce all throughout Bangladesh.
  - Take appropriate steps to promote introduction and increased use of Internet throughout the country by creating an enabling environment for Internet services. This could be done through joint effort of ISP's and BTTB.
  - Establish tele-centers in rural and semi-rural areas with a view facilitating access to ICT facilities and services as well as introducing e-commerce facilities in those areas.
- j) Create awareness on e-commerce by creating and maintaining websites on niche product areas. This can be done through related government agencies in consultation with the stakeholders.
- k) Take necessary steps to create conducive environment for FDI (Foreign Direct Investment) and venture capital initiatives.
- l) Mobilize government institutions like Export Promotion Bureau to take appropriate steps for the promotion of e-commerce. This could involve providing support for setting up vertical portals for less organized but potential sectors like handicrafts.
- m) Mobilize postal institutions, private courier services and freight forwards to

institute proper delivery mechanism to facilitate e-commerce. This will include strengthening and reviewing current postal delivery system, equipping them with IT resources both human and materials and introducing special incentive schemes for private courier services and freight forwards for example by allowing tax deductions in investments made in making themselves e-commerce ready.

- n) Develop Central Data Bank which will be included in website.

### **CONCLUDING REMARKS**

While governments in most developed countries and many of the developing countries in the region are taking advantage of the tremendous potential of IT and Internet led new entrepreneurship development, Bangladesh is yet to make any significant efforts in this direction. Although the government has declared IT as a thrust sector for export, our software companies are facing difficulties in convincing the foreign buyer about their capability and experience. A domestic software industry is now a prerequisite for successful entry into the world market. Since the private sector in our country is still to be developed, it is the government and semi-government agencies which can create the market for software developers. Some of the applications which have been outlined can play an important role in providing such challenging opportunities to our young IT professionals. Some of the opportunities for IT-enabled services have been identified. Bangladeshi entrepreneurs can explore the various services and if they succeed in getting only a small segment of the global market, employment opportunities for a large member of young educated people can be generated in a short time. Human resource development can also be targeted towards developing the skills necessary for rendering the various types of services.

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- TechBangla-a registered not for profit organization for promoting technology and industry in LDCs. At present registered in Bangladesh, USA and UK. Techbangla IT Research Cell (ITRC) under JOBS-USAID and DCCI supported initiative prepared the findings under title E-commerce in Bangladesh-A Readiness Assessment (December 2000).

**ANNEX-1**

How IT should work for Bangladesh?  
**Thoughts from DCCI**  
(For possible inclusion in ICT Policy of Bangladesh)

Notes for readers

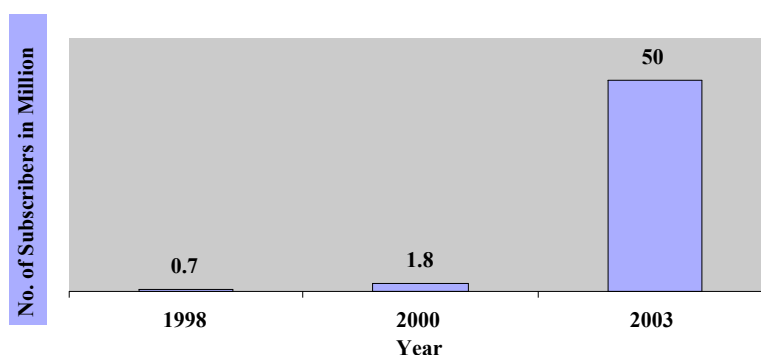
- Policies are long-term objectives at the highest level. They must be expressed simply and be easily understood.
- Each of the policy statement will need to be further broken down into
  - shorter term policy guidelines each of which in turn should then be
    - broken down into clear, measurable and time bound action plans by relevant departments
- Selecting, choosing and enabling who is singularly accountable for what objective and accomplishment is perhaps more important than policy statements
- Creating an environment and an executing agency with inherent efficiency will be a greater challenge than having an ICT policy.
- Control for implementation needs to be established at three levels
  - Strategic – to ensure policy objectives are achieved
  - Managerial – to ensure assets and resources mobilized optimally
  - Operational – to ensure tasks assigned are completed
- Support from other policies such as Telecom, Education, Power will be mandatory for ITC sector development (Draft revision to 1998 Telecom policy as presented on 17 April 2002 by BTRC and IIFC is IT supportive)

## INTRODUCTION

With the advent of the Information Age, there have been changes that affect Indian enterprises. The Internet and e-commerce have been making in-roads in Indian firms who have in some cases benefited from these developments. A venture capital industry is beginning to be developed to support the new ventures that are being formed. Technology incubators have also begun to sprout. This paper explores some of these trends.

## INTERNET- THE INDIAN SCENARIO

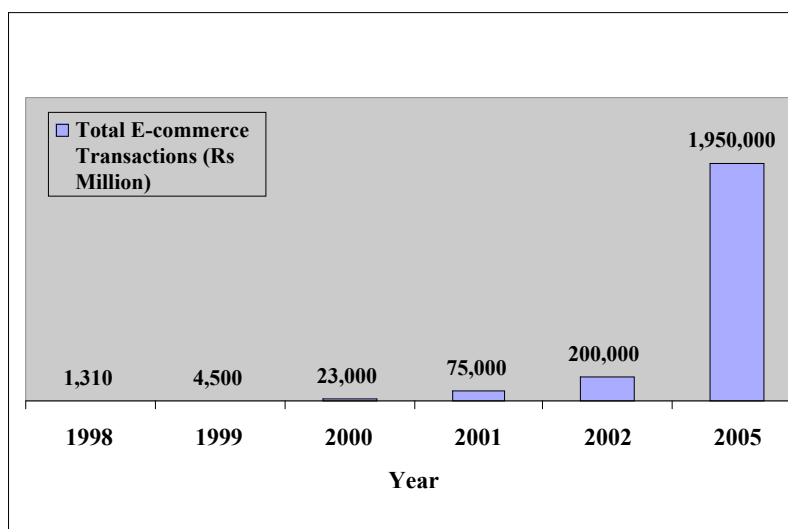
With increasing number of private ISP mushrooming all over the country, there is a sudden splurge in the Internet front in India. Though India still lags behind stalwarts like Japan, China and the Republic of China in terms of Internet usage, yet the gradual quickening in the pace of Internet growth can be judged from the fact that from a mere 1.8 million subscribers (and more than 5.5 million users) in year 2000, the subscriber figure is estimated to increase to a whopping 50 million by 2003. And as the Internet proliferates, so will e-commerce and e-business – this is a universally recognised fact. Boston Consulting Group-National Association of Software and Service Companies (BCG-NASSCOM) has prepared a report on the basis of market research done about e-commerce in India.



**Figure 1: Growth in Internet Subscribers**

## E-Commerce Penetration in India

While e-commerce in India is still at a nascent stage, the total volume of e-commerce transactions in India was about Rs 4,500 million (US\$90 million) in 1999. It is estimated to grow rapidly to Rs.1,950 billion (US\$39 billion) by 2005 (*Due to the multiple barriers to e-commerce adoption, overall estimates for year vary from a low Rs 1,200 billion to a significant Rs 2,700 billion*). As in other countries, bulk of the volume is expected to accrue from business-to-business transactions.



**Figure 2: Growth of E-Commerce in India & Projection for 2005**

### **Factors Impeding E-Commerce Adoption by Indian Industry**

Two groups of factors impede e-commerce adoption by Indian enterprises.

#### ***External Factors***

- Limited Internet access among customers and SMEs: current level of Internet usage in India is low among both businesses and individuals. Current penetration of PCs and other devices to access the net for individuals is less than 1% in the country. As per World Economic Forum report, India ranks fifty-fourth in network readiness, which is a measure of the preparedness of nations for networked world. Report which assesses the capacity of seventy-five countries to exploit the opportunity offered by information, communication and technology sector.
- Telephone line penetration is limited to less than 3% of the Indian population.
- Poor telecom and communications infrastructure for reliable connectivity: the infrastructure is not fully developed to facilitate extensive e-commerce adoption. The existing telecom infrastructure is still unreliable, Internet connectivity is slow and access costs are very high.
- Multiple gaps in the current legal and regulatory framework: the Indian Contract Law is not covered under the IT Act as a result legal enforceability of electronic contracts is open to challenge. The legal jurisdiction of contracts involving international parties is not defined. The IT Act does not clarify all the issues regarding taxation of electronic transactions and is silent on the issue of protection of Intellectual Property Rights (patents, trademarks and copyrights) in the Internet space. The issue of cyber crime control is not completely addressed by the IT Act since the offences defined in the Act are not exhaustive.
- Multiple issues of trust, lack of payment gateways: safeguards to protect



privacy of personal and business data collected over the Internet are not in place and industry incumbents are concerned about the security and confidentiality of their data.

- Transactions cannot be completed online due to a lack of convenient online payment solutions as information flow between banks is still not completely online. Very limited facility of digital signature is available at present.

### ***Internal Factors***

Many internal barriers act as gatekeepers to the realization of value from e-commerce.

- Perceived uncertainty of benefits: while many companies have undertaken some e-commerce initiatives, a few companies found Return on Investment benefits hard to justify. A few others do not see any urgency to adopt e-commerce since they perceive that the benefits will only accrue in the long term and there was little competitive pressure to implement e-commerce. Some companies have just completed expensive Enterprise Resource Planning (ERP) investments and are reluctant to invest in additional technology until returns from these investments are proven.
- Turf protection issues; incentive payments in procurement departments: in some Indian companies, the procurement department is a fiefdom where purchase managers see e-commerce as a threat to their power. Incentive payments from suppliers act as reasons for postponing online procurement due to the higher transparency it provides.
- Fear of transparency: E-commerce is expected to result in an increase in transparency of financial results for businesses. While transparency has multiple social benefits, this also acts as a deterrent for multiple businesses, especially SMEs to migrate online.
- Business partner IT systems and processes not geared to maximise benefits from e-commerce: the full benefits of e-commerce accrue when the e-commerce platform can be linked into an organization's back-end operations for real time information flow. However, many businesses in India, especially SMEs, do not have even basic ERP systems for back-end integration to maximise benefits of e-commerce adoption. Additionally, some enterprises, that already have some business software in place, for example billing solutions, are struggling to integrate the various business partner legacy systems into a common e-commerce platform.

## **INDIAN ORGANIZATIONS THAT ADOPTED E-BUSINESS & THE INITIAL RESULTS**

Many large and medium sized enterprises have deployed one or more components of an e-business infrastructure. The pattern of adoption of e-business in India is virtually identical to that elsewhere in the world, with automotive manufacturers, FMCG and oil companies and financial institutions (bank and stock exchanges) being the early adopters. The list of companies includes names such as Hindustan Lever, Pepsi, Coke, BPCL, IOCL, Bombay Stock Exchange, HDFC Bank, Maruti, TELCO, Ford, Samsung, Hindustan Motors, L&T, Godrej & Boyce, HCL Infosystems, Mahindra & Mahindra, Ballarpur Industries and many more.

### **Reduced Cycle Time, Reduced Inventory, Lower Transaction Costs**

Samsung India claims to have compressed their order cycle from 40 to 15 days after adopting e-business, and faster turnaround means substantial business gains. Likewise electronic manufacturer LG Electronics India achieved 30 percent savings through its e-SCM (Supply Chain Management) initiative, in terms of lower inventory, product and transaction costs. Quick return on investment is an attractive proposition for adopting e-business by an organization. And for this reason, a number of large Fast Moving Consumer Goods (FMCG) and consumer durable firms in India, which operate with very thin margins have gone for e-business. According to an estimate, FMCG firms can achieve up to 2 percent increase in margins through dealer/distributor connectivity while e-procurement and supplier connectivity can enhance margins up to 3 percent. Hindustan Lever Ltd.– a major FMCG reduced inventory from 45 to 5 days off-take by bringing all its distributors and dealers on line. Obviously the impact on bottom lines must be significant.

For all the value to be captured, system wide connectivity linked into existing IT systems of business partners is required. In India, these partners are primarily SMEs: the vast majority of them are not IT enabled. For the few who have IT systems, there are challenges in integrating existing solutions across the business. Additionally, many business partners in India are unwilling to come on line as it makes their financial situations transparent.

### **Reduced Cost & Benefits Through E-Procurement & E-Auctioning**

Large buyers have today realised how critical e-sourcing is to the overall growth of a company. According to Freemarkets, India's leading reverse auctioneer, the potential of savings are huge as almost 70-80% of a company's turnover is spent on procuring goods. In India, companies have used auctions effectively to reduce prices. SmithKline Beecham realised savings of 17-20% through reverse auctions of some direct materials. Hindustan Lever Ltd. realised savings of 35% through a reverse auction for an electrical wiring contract for a personal products plant. Maruti's auction for conversion from diesel to CNG of 17 forklifts led to 40% savings. L&T group in Chennai for procurement of desktop computers resulted in saving of 17% over offline negotiated prices with 9 suppliers participating. For the Mohan Meakins group, auctions were used for procurement of crown. The auction was conducted from Chennai and 8 suppliers participated across the country. For the auction value of approximately Rs 23.1 million, savings of approx. 4% were achieved as compared to the last Purchase Order raised by company on its suppliers.

While online procurement is a key source of savings, the highest value is expected from efficiency gains and collaborative efforts in the supply chain achievable through wider and faster information sharing. Therefore, the highest potential for value creation is likely to accrue to industries with complex supply chain flows such as Automotive. Automotive and Consumer goods expected to lead B2B e-commerce adoption. Industries with a high e-commerce adoption, for example Automotive, are well-positioned on all the above dimensions. The potential margin impact in Automotive and Consumer goods could be as high as 4% of sales. Both these industries are dominated by companies with the willingness to drive e-commerce adoption across their supply chains. Truck maker TELCO adopted an Internet enabled value chain management solution to cut inventory from 65 to 20 days. Jeep and tractor manufacturer Mahindra and Mahindra cut plant inventory level from 50 to 20 days and dealer inventory from 15 to 10 days through SCM system. Maruti Suzuki has connected its 300 vendors and 215 dealers through an on-line web-enabled network. Mahindra and Mahindra uses internet to provide customisation

options for select models such as the Quadro. Maruti is experimenting with car finance and insurance fleet management and reselling of second-hand cars.

Though Power Utilities form a potential industry to adopt e-commerce practices because of consumer network, in India the entire industry is dominated by Public Sector Undertakings (PSU) that are in very poor financial condition and where e-commerce investments are unlikely to be priority initiatives. Yet there is one PSU who is a trendsetter on the IT front, Gujarat State Fuel Management Company (GSFMC). GSFMC is a fuel management solution provider promoted by various state-sector companies such as Gujarat Narmada Fertiliser Corporation, Gujarat Electricity Board, Gujarat State Fertiliser Corporation and Gujarat state Petroleum Corporation. GSFMC is in the process of setting up a first of its kind on line energy exchanger. To be called fuelxs.com, the site will serve as an electronic marketplace where buyers and suppliers of fuel can interact and contract for fuel. It will provide an open transaction platform and support multiple bidding mechanisms for efficient price determination.

### **Reduced Cost by Cutting Intermediaries**

Bangalore based flower auction site rosebazar deals with all kinds of flowers from around the world. Buyers typically buy in lots of thousands. These buyers then sell to retailers/retails in cities like Delhi and Mumbai. Delivery to any place on earth is guaranteed within 24 hours. Reduction of intermediaries and marketing costs are advantages.

In India, though awareness of e-business is growing, it has yet to convert into adoption. Revenue wise, the difference in revenue in India and the US is high. For example, if a material sells for Rs 100 in the US, the actual price may be Rs 60 with the rest being labour and other taxes. But in India, labour cost being low, the difference between cost of the material and actual cost is not very high. Hence the potential for cutting costs in labour is less than market like the US.

### **Use of Internet-Enabled Business to Increase Revenue, Margins Through Discovery of New Customers**

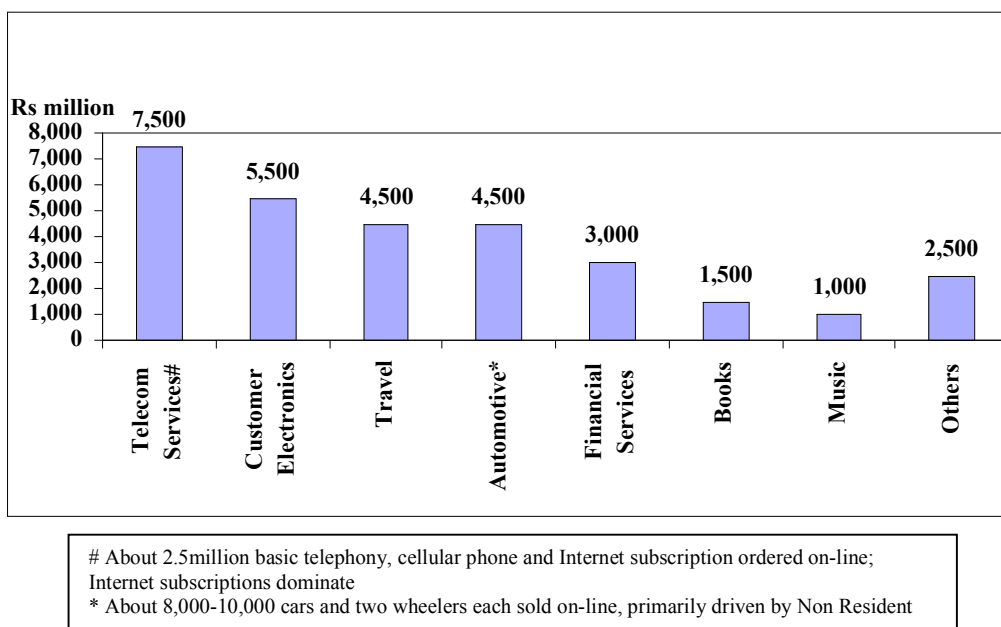
The Internet not only offers businesses the opportunity to cut costs but also to increase revenues and enhance margins. Increased reach enables businesses to discover new buyers for their products and services. Indiaconstruction.com has reported an increase in cross-regional purchases facilitated by the Internet. Maruti has realised higher price realisation on auctions it conducted for disposal of scrap. Essar Steel auctioned a part of its steel output and realised Rs. 400 more per tonne more than it normally would, giving it a price premium of about 3%. Tata International has developed an online catalogue for its products so that it can showcase its products to potential international buyers and gain similar benefits.

### **Low Cost Channel to Service Business Customers**

CISCO India accepts all its customer orders online. It estimates that its online ordering process has resulted in an increase in the configuration accuracy of its products to almost 100% as compared to 40% in the offline process. Additionally, CISCO's web site provides real-time assistance to its customers, with the ability to fulfil inquiries with one interaction –80% of all non-technical support questions are answered online through online documentation of product information, thus eliminating the time and expense required for onsite assistance by CISCO personnel.

### B2C TRANSACTION VOLUME EXPECTED RS 30 BILLION BY 2005

The way shopping was done in India has seen changing trends. About 12 years ago, Burlingtons brought catalogue shopping to India. The colourful catalogues did attract certain shoppers but then they suddenly disappeared. It was then the turn of TV shopping which slowly is giving way to Internet shopping. In Western countries, 39% of those with access to the Internet say they go to the store or mall less often, now that they can easily shop for product online. With online users expected to be around 35 million in 2005, Internet is unlikely to become a sales channel in India with overall penetration expected to be less than 1%. Cultural factors and the current convenience of offline retailing are the key factors that limit online sales. Indian women enjoy shopping more than men and if they have the time, they would rather go to the shops. Telecom services, Consumer electronics, Travel, Automotive products and Financial Services will be the most important categories. (The Financial Services numbers include commissions earned on online bill payments which are expected to be ~ Rs 55 billion by 2005).



**Figure 3: Expected B2C Transaction Volume by Category (2005)**

### E-SOLUTION PROVIDERS IN INDIA

For many corporations implementing e-solutions is a voyage of discovery, as the exact nature of the benefits and how they will accrue are still unclear. They look for IT companies to share in this voyage, learning and adapting to the situation with appropriate technologies. This gives the IT companies an opportunity to build capabilities in industries and technologies, specifically understanding how to realise value from e-solutions technologies.

It is estimated that the domestic market for e-solutions is expected to be ~\$500 million in 2005 (10% of the overall domestic products and services market). The domestic

market will remain a fraction of the global opportunity and the market will have lower margins than export markets. Still, this market is strategically important for Indian IT companies who aspire to migrate to higher value added services, as it provides an opportunity to acquire consulting experience in select industry verticals. This "learning" is likely to be easier done on home ground. Indian IT firms need to focus their sales efforts on leading Indian firms and MNCs with whom they can build industry expertise, and who will command referral value in export markets.

The Indian IT industry aspires to target \$1 billion of revenues from e-solution products by 2010. Indian IT firms do not have a credible reputation in product development. However, e-solutions may provide an opportunity to change that. For e-solutions products, focus has to be on collaborative product development with clients. The product opportunity is not universally strong in all areas. Based on product maturity, in SCM, the opportunity may be limited to small customisations, whereas in Knowledge Management, the opportunity may be as vast as global leadership. Indian corporates are already exploring these technologies.

SMEs typically lack large in-house IT divisions to undertake program management across multiple vendors and hence are looking for one-stop solutions. Indian IT firms can leverage their superior price-value proposition as compared to local system integrators/consulting firms to provide consulting, implementation and operations support to SMEs.

Indian IT companies lack strength of the customer perception on their ability to deliver a complete solution offering. For example, a US Chemicals Distributor indicated that it would be much easier for them to trust a large reputed US provider than a smaller Indian company. Indian IT companies need to consider structuring the pricing of their services to decrease the up-front investment/risk for the client and to build credibility on their ability to deliver. For example, an Indian customer relationship marketing (CRM) services firm has worked on a pilot for two months customizing solutions for a client at a minimal up-front commitment. Through this approach, they have managed to "break in" and convince the customer that their approach was superior to other competitors bidding for the project and could be provided at a lower cost and led a sale.

## **NEW PRODUCT DEVELOPMENT**

While Indian IT firms have acquired a reputation as a credible services provider, one does not associate the same reputation in new product development.

Historically, a significant share of the IT services implementations undertaken by Indian IT firms has focused on migration of legacy systems and custom application development. These implementations do not have a direct linkage with the client's business processes, making it difficult for Indian IT firms to identify trends and conceive of new product opportunities. Moreover, compared to the developing countries, the domestic end-user market lags behind in IT adoption of new technologies, severely limiting the opportunity for Indian IT firms to develop and scale domestic products. Indian IT firms have also spent significantly less on product development (-0.6% of sales) as compared to their US counterparts (~14.8% of sales).

Though the Indian IT industry does not have a strong track record of product development, a few companies have been successful in e-solutions products. Their stories illustrate a process to creating a product firm.

Aditi Technologies has developed a CRM application, which converted an existing "process" of servicing customers into a "product" that could be readily deployed. Aditi

offered remote support to Microsoft developers and customers on product inquiries. It leveraged their understanding of the client processes and their customer care experience in serving US customers in developing Talisma, an electronic CRM product.

A case study on success story of Aditi Technology appeared in Business India Intelligence September 2001. The same is reproduced here to illustrate the potential of Indian firms in the area of IT product development.

#### **Case Study of Aditi Technologies \***

Bangalore-based software solutions company, Aditi Technologies, was set up by an Indian-American in 1994 as an off-shore call centre for Microsoft. It has since become an international software firm providing e-business and custom technology solutions to global customers, including Microsoft, Spacelabs Medical, Cisco and CDSi (Japan).

Aditi's most recent claim to fame is Talisma, an email management software tool incubated in-house and widely acclaimed as one of the best in its class. The latest version, Talisma 4.0, developed at the company's Bangalore centre is an integrated electronic customer relationship management (e-CRM) suite that combines sales, marketing and service capabilities for complete customer inter-action. Talisma, which has been spun off as a separate US-based company, is set to offer its shares to the public soon.

Aditi has a proven track record for building "first-of-a-kind" solutions on every major Microsoft platform now globally evangelises ground breaking Microsoft technologies such as .NET, Exchange 2000, and BizTalk Server. Aditi also provides fee-based technical support on all Microsoft Developer and BackOffice tools. The company has the distinction of having built the first real-world enterprise application based on the Microsoft DNA architecture Ensemble. Ensemble can be used to create enterprise-wide solutions that facilitate information flow between departments. Aditi also built the first Exchange 2000-based application to be deployed internally by Microsoft.

Aditi broke even within a year of its birth. The challenge now is to grow. To do this it must move beyond primary cash cow Microsoft (Aditi founder Pradeep Singh is an ex-Microsoft man) and find new customers who can offer repeat business. Among five Indian companies that do work for Microsoft, Aditi is the only one with an on-site base in Seattle. Still, among Microsoft's offshore alternatives, the competition is very stiff- Aditi is competing with Wipro, Infosys. and Tata Consultancy Services, especially for their new e-business initiative. Though Aditi provides staff to Microsoft, but when it is working off-shore it enjoys no special benefits over other vendors, of which there are more than 100.

Aditi's major cash flows, besides Microsoft, come from CRM products and services, typically from Talisma-like products, and enterprise applications integration solutions. But off-shore work is what Aditi is most keen to do. "You decide the projects you want to take, make the necessary investment and the customer also gets committed for the long term," says. Microsoft and tap into the European market Vivek Chopra, CEO of Aditi. "Your team becomes an extension of the customer's team and processes, the customer buys in, its an ideal situation."

#### ***Future Plans***

For Aditi to grow, an acquisition or strategic joint venture would be an obvious choice. The company is just waiting for the right alliance-probably a consulting company or a all/medium-size company where Aditi could become the off-shore arm. Though enterprise solutions are not typically what Microsoft does, the industry giant is getting into this area in a big way, not only on the product side but also customer servicing. Alongside, Aditi has invested heavily in its e-business initiative, priding itself on its expertise in

emerging technologies such as BizTalk Server. It has relied heavily on capturing not only Microsoft business per se but also Microsoft's customer base in the enterprise solutions-related business.

In a coup of sorts, it has roped in Mr. Chopra, a seasoned Wipro hand, with a clear mandate to take the company through what is obviously a make-or-break journey. Mr. Chopra spent 20 years with Wipro, one of India's most admired companies. He last served as vice president and country manager of Wipro, North America. Under him, Wipro's North American business grew to US\$250m, with 14 offices spread across the US and Canada. For Mr. Chopra, the new assignment is an opportunity to carve out a company's destiny. "Very clearly, we are going to take Aditi public", he says, adding that Aditi will probably list first in India and then in the US. He clearly knows what Aditi is and is not. "We are surely not in the contract programming business, our off-shore mandate is very strong and we are not end-to-end, not an everything to everybody sort of company", he says. "We're in some niche spaces, we want to differentiate ourselves and grow with that value proposition".

Mr Chopra hopes that in five years Aditi will be the clear favourite for global corporations looking at doing business with Indian software houses-maybe not an Infosys or Wipro in size but right up there among mid-size organizations with, say, 4,000 employees. Keeping with that vision, Aditi is swiftly expanding to fuel sales, unlike many other similar size corporations that are cutting costs across the board, including infrastructure. It has already invested over US\$10 million in facilities and other assets, set up offices across the US and in London. It will begin operations in Europe sometime in October, and tap into Japan as well. In these troubled times, making money in Europe will clearly be a defining moment for Aditi.

Aditi is not alone, "Tejas Networks" has developed a product that provides additional functionality around a core offering. The development process requires firms to identify a core product around which the component is being built and to develop the application to deliver a superior price-performance ratio once integrated with the core product. Tejas has developed an optical access product based on established Time Division Multiple Access (TDMA) standards. The product is being offered as a combined solution along with Sycamore Networks' optical transport system, to Tata Power, one of its first customers in India. Another approach for firms could be to create products primarily for the local market. These applications would need to satisfy country specific financial and regulatory requirements and be adaptable to local business practices. Local specificity would act as an entry barrier to foreign firms looking to enter the domestic market. Firms could develop expertise in such products and then target taking them to export markets.

For example, TCS has developed EX, a financial accounting package that sold close to 100,000 copies, and has further invested in developing versions of the product for the SME and the SOHO (Small Office Home Office) segments. Infosys developed Bancs 2000, a banking solution sold to over 35 customers and is now promoting Finacle, a cross channel, web enabled upgrade. Both these products require a deep understanding of Indian financial and regulatory requirements and of local business processes, and thus offer a high degree of insulation from international competitors.

The Indian IT industry has established itself as a credible provider of IT services and is well positioned to exploit the services opportunity in e-solutions. However, Indian IT companies lack marketing and implementation approach to suit sales of e-solutions.

## **VENTURE CAPITAL**

### **Objective and Vision for Venture Capital in India**

Venture Capital funding is different from traditional sources of financing. Finance innovation ideas have potential for high growth but with inherent uncertainties. This makes it a high-risk, high return investment for venture capitalists. Apart from finance, venture capitalists provide networking, management and marketing support as well. In the broadest sense, therefore, venture capital connotes risk finance as well as managerial support.

In the global venture capital industry, investors and funded firms work closely together in an enabling environment that allows entrepreneurs to focus on value creating ideas and venture capitalists to drive the industry by the levers of control in return for the provision of capital, skills, information and complementary resources. This very blend of risk financing and hand holding of entrepreneurs by venture capitalists creates an environment particularly suitable for 200,000 and so engineer graduates from Government and private-run colleges in India.

Scientific, technological and knowledge-based ideas properly supported by venture capital can be propelled into a powerful engine of economic growth and wealth creation in a sustainable manner. In various developed and developing economies venture capital has played a significant developmental role.

India, along with Israel, the Republic of China and the United States, is recognized for its globally competitive high technology and human capital. The success India has achieved particularly in software and information technology against several odds such as inadequate infrastructure, expensive hardware, restricted access to foreign resources and limited domestic demand, is a pointer to the hidden potential it has in the field of knowledge and technology-based industry.

India has the second largest English speaking scientific and technical manpower in the world. Some of the management (IIMs) and technology institutes (IITs) in India are globally known as centres of excellence. Every year thousands of young people specialize through diploma courses in computers and other technical areas. Management institutes produce 40,000 management graduates annually. Given this quality and magnitude of human capital India's potential to create enterprises is unlimited.

In Silicon Valley, Indians have proved their potential and have carved out a prominent place in terms of wealth creation as well as credibility. There are innumerable well-known success stories of successful Indians backed by a venture capital environment in Silicon Valley and elsewhere in US, supporting their innovation and invention. At least 30 percent of the start-up enterprises in Silicon Valley are started / backed by Indians.

With the inherent skills and manpower that India has, it can be easily predicted that software exports will thrive with an estimated 50 percent growth per annum. The market capitalization of the listed software companies comprises of approximately 25 percent of the total market capitalization. Also greater visibility of the Indian companies globally is evident.

Given such vast potential, which is, not only confined to IT and software but also in other sectors like biotechnology, telecommunications, media and entertainment, medical and health etc., venture capital industry is playing and shall continue to play a catalyst's role in industrial development.

Thus, venture capital is valuable not only because it makes risk capital available at the early stages of a project but also because of the expertise of venture capitalist that leads to superior product development. And the big focus of venture capital worldwide is -



technology.

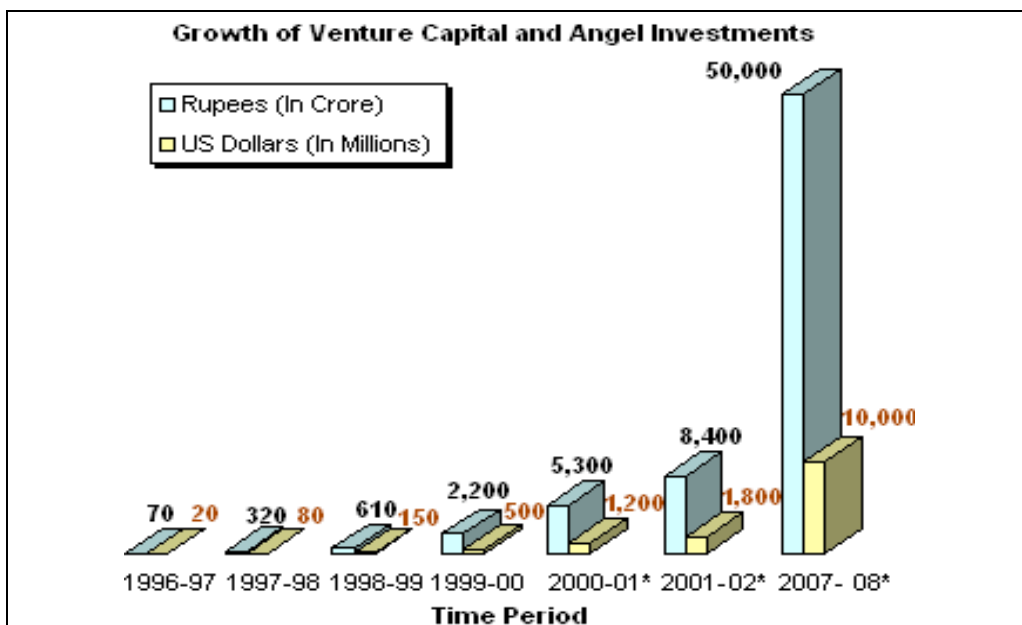
### Venture Capital/Angel Investments for the IT Sector

In India, the venture capital creation process has started taking off with all four stages receiving attention:

- ❑ Idea generation
- ❑ Start up
- ❑ Growth ramp up
- ❑ Exit processes

However, much more needs to be done yet.

The following graph indicates the growth of venture capital and angel investments in India's IT software and services sector:



(Note: 1crore = 10 million, \* Future Projected Data)

**Figure 4: Growth of Venture Capital and Angel Investment**

It must be noted that during 1999, approximately 80 percent of the estimated US\$ 30 billion worth of venture capital invested in United States, went to technology firms. India too, with its strengths in innovation and IT technology has attracted several Venture Capital firms.

In 2000 alone, 20 new venture capital funds have registered with SEBI, taking the total number to 30. In fact, VC or Angel investments in high tech firms in India have grown by over 5,000 percent from Rs. 700 million to projected Rs. 22,000 million between 1996 and 2000. And this figure is expected to grow to Rs. 500,000 million by 2008.

National Venture Capital Fund for Software and Information Technology Small Industries Development Bank of India (SIDBI), in association with Ministry of

Information Technology, Government of India, has set up a 10 year close ended venture capital fund called the "National Venture Fund for Software and IT industry" (NFSIT).

A portion of the Fund has been earmarked for incubation projects that involve high risks and might be used for development of software products. Software products require rigorous risk evaluation for which high degrees of expertise including international linkages are required. The fund managed to attract a number of high-class professionals as investment managers in the Asset Management Company.

Many state governments have already set up venture capital funds for the IT sector in partnership with local state financial institutions and SIDBI. These states include: Andhra Pradesh, Karnataka, Delhi, Kerala, Gujarat, Tamil Nadu among others.

### **TECHNOLOGY INCUBATION & DEVELOPMENT CENTRE**

Emerging technological and knowledge based ventures seek nurturing of ideas from professional for which one needs to go beyond traditional venture capital activity. Such entrepreneurial ideas have to be developed in a supportive environment before they become attractive venture. There is a need for incubation centres. In India one such centre is at Indian Institute of Technology, Kanpur. There is need for the Government to come forward and establish more such Incubation centres. There are great expectations in India from IT industry. It is claimed that by 2005, 10% of country's GDP including that of services shall be contributed by IT industry. Many world IT companies like Microsoft, Adobe etc are investing capital in India for their R&D projects.

- i) Like IT next area to watch from India will be Medical services. The cost differential of Heart Operation or any other Health Services in India compared to US or Europe provides great opportunity for Indian Entrepreneurs to come forward and open world class hospitals.

### **CONCLUSION**

The way business will be done tomorrow is changing at fast pace. Those organization who realize that the world is becoming a small village and adapt to these changes are going to survive in the competitive environment. India has IT know how but lacks infrastructure facilities and legal frame work.

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## INTRODUCTION

Knowledge-based industry is playing an increasingly important role in various facets of development. In an emerging world economic order characterized by pervasive use of technologies that have continually been redefining competitiveness and opening up opportunities hitherto unimagined, countries like Nepal are finding themselves at the crossroads between traditional approaches and the prospect of leapfrogging in the path of sustainable development by capitalizing on frontiers opened by technological advancements, notably, the Internet. E-commerce has been an important offshoot of the Internet and an integral part of evolving Information Economy. For a country like Nepal, the need of the hour seems to be to focus on creating a conducive environment for the proliferation of IT in general and e-commerce in particular to further augment national and international trade prospects and narrow down digital divide in the context of an economic milieu characterized by globalization and economic liberalization. This calls for coordinated government and private efforts aimed at promoting e-commerce in Nepal. While prevailing market forces in some way dictate the way in which these developments take place, the government will nevertheless have a crucial role in ensuring that developmental potentials of e-commerce are utilized to the fullest and an enabling and conducive environment is created for its development within the country. Evolving complexities that come concomitant with widespread application of IT, notably in the area of e-commerce, necessitates an initiative to work out national strategy and policy framework aimed at putting a facilitative mechanism in place based upon minimalist approach on the part of the government.

As things stand now, many challenges exist in the implementation of e-commerce in Nepal. Apart from affordability and human resources issues, there are issues that have to do with infrastructure (telephone and internet connections are still prized 'commodities' in Nepal, beyond reach and imagination of larger sections of society) and attributes that characterize it: namely bandwidth, quality of connection etc. In an e-commerce scenario where transactions transcend national boundaries, many issues come into play that need to be addressed from various levels if e-commerce is to play an important role in Nepalese economy. As such there is an invariable need to address the issues involved from international, national and business enterprise perspectives.

## KNOWLEDGE SECTOR: SCIENCE AND TECHNOLOGY IN NEPAL

In accelerating the process of modernization and economic growth for the betterment of human life, science and technology have played a vital role. In the last five decades Nepal has recognized the role and importance of science and technology in socio-economic growth of the nation, thereby giving greater thrust to it in its various National Development Periodic Plans. Since the Sixth Plan (1980-1985), the science and technology sector has been recognized as a separate sector with emphasis on enhancement

of endogenous S & T capabilities for achieving rapid economic development of the nation. In the current Ninth Plan (1997-2002) the approach to science and technology includes application of S & T for the overall balanced development including R & D activities, manpower development, import of technology, mobilization of resources and protecting and promoting values and achievements of S&T.

The formation of the National Council for Science and Technology (NCST) under the National Planning Commission in 1976 and of RONAST in 1982 is one of the landmarks in the development of science and technology in the country. His Majesty's Government meanwhile adopted a Science and Technology Policy in May 1989 with a view to improving the country's capabilities for overall development and scientific innovations. Similarly the Directive Principles and Policies of the State in the Constitution of the Kingdom of Nepal (1990) carry an explicit policy statement on Science and Technology, that reads "the State shall adopt policies giving the priority for the development of science and technology and the local technologies as well". In pursuance of this policy, the Ministry of Science and Technology (MOST) was set up on May 15, 1996 (B.S. 2 Jestha, 2053). The establishment of the Ministry has added a new dimension to the development of national science and technology capability for speeding up socio-economic progress and prosperity. The basic goal of the Ministry is to create conducive environment for the adequate development of science and technology and make necessary arrangements for its effective application in the task of national development. Accordingly, the policies of the Ministry seek to mobilize, coordinate and integrate the development of science and technology to attain a definite goal reflecting national aspiration (Source: [http://www.most.gov.np/MOST\\_FINAL/index2.htm](http://www.most.gov.np/MOST_FINAL/index2.htm)).

## THE EMERGENCE OF INFORMATION ECONOMY

One of the significant technological advancement of the recent times has been the advent of Internet, which is an embodiment of computer, communication and information technologies. The pace of proliferation of Internet has been more intense than that of telephone. The Internet network has increased from 213 computers and few thousand users in August 1981 to more than 43 million Internet linked computers by 1999 supporting an estimated 150 million Internet users<sup>1</sup>.

Rapid advances in Internet technologies and the subsequent proliferation of economic activity on the Internet have ushered in an information age where virtually every nation is trying to position itself to take advantage of this new phenomenon. Internet and other related technologies are fast interconnecting the world into a single virtual entity marking at times a significant departure from traditional methods of analyzing global issues and problems within geographical frame of reference specially in the areas of financial, economic and commercial activities.

Internet economy seems all poised to becoming one of the main components of overall economic order. The volume of Internet economy reached 77 billion US dollars in 1998<sup>2</sup>. Over the years, there has been significant rise in the overall level of electronic commerce or business transactions conducted via the internet and private commercial networks which is expected to reach US\$ 400 billion by 2002<sup>3</sup>. Latest Forester Research figures project B-to-B commerce to reach US\$1.3 trillion by 2003.

<sup>1</sup> *International Telecommunication Union (ITU), 1999*

<sup>2</sup> *Forrester Research*

<sup>3</sup> *United Nations Conference on Trade and Development (UNCTAD), 1998*

As mentioned earlier, one of the main components of Internet economy is e-commerce (Electronic Commerce). Electronic commerce, broadly defined, is the process of using electronic methods and procedures to conduct all forms of business activities to achieve organizational goals. Electronic commerce uses different technologies and embraces a wide range of financial forms such as electronic banking, electronic trading, Electronic Data Interchange (EDI), electronic mail (E-mail) and all forms of messaging between enterprises<sup>4</sup>.

Since rapid expansion of electronic transactions constitute a major opportunity for trade and development, information and communication technologies and electronic commerce can be expected to drive the trade component of economic growth for many years to come. Trade transactions conducted through the Internet and the World Wide Web will have enormous implications over the next few years for Asia's international competitiveness and Nepal can not possibly afford to be left out.

Nepal needs to seriously evaluate its position vis-à-vis emergence of Information Economy worldwide in general and e-commerce in particular. The scope of this paper will be limited to examining issues related to e-commerce and its implementation in the context of Nepal.

## **IT AND E-COMMERCE IN NEPAL**

Actual statistics are scarce, but application of Information Technology in Nepal had been particularly slow till the late eighties. Even though recent years have seen remarkable growth in terms of awareness and application of IT resources in a number of activities

Things are however changing at a relatively faster pace. There has been a remarkable rise in the number of personal computers and related equipment sold and installed in Nepal specially after 1992 and of late, Nepal has seen an emergence of ISPs (Internet Service Providers) which has resulted in increased use of Internet and World Wide Web. There are altogether 7 licensed ISPs (Internet Service Providers) including 2 V-SAT private operators in Nepal<sup>5</sup>. Recently, National Telecommunications Corporation has also joined the ISP bandwagon and announced provision of Internet-related services.

Internet connectivity, though increasing at a faster pace, is far from being at a satisfactory level. The number of Internet accounts in Nepal is estimated to be around 10,000 and the majority of the users are within Kathmandu valley. Since the potential for electronic commerce within and outside Nepal will also depend on the number of users who have access to the Internet, one of the priorities must obviously be in increasing this number. But this alone will not be sufficient to guarantee the development of e-commerce in the country. E-commerce development is dependant upon factors like the number of Internet users internationally who could have a prima facie interest in Nepal, quality and types of products and services offered by Nepalese companies, the skills and creativity employed in designing web sites and the bandwidth available for users and service providers. One should thus be aware of potential pitfalls resulting from a lopsided view of treating e-commerce issues solely from the Information and Communication Technology perspective. These technologies no doubt enable e-commerce but there are hosts of other issues, mostly non-technical, that must be taken into account while trying to formulate policies conducive to the growth of e-commerce.

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<sup>4</sup> *United Nations Economic and Social Commission for Asia and the Pacific (ESCAP)*, <http://unescap.org>

<sup>5</sup> *Economic Survey, FY 98-99, His Majesty's Government of Nepal*, pp 14

Even though there have been some limited initiatives on the front of e-commerce in Nepal, the country has yet to see an organized and concerted effort towards this direction. This is mainly because e-commerce issues cut across a broad range of technical, legal, economic and institutional questions for which we have yet to come up with appropriate responses.

### **GOVERNMENT INITIATIVES TO PROMOTE E-COMMERCE**

Given the scenario where there is a marked degree of reluctance largely owing to ignorance about the potentials of e-commerce coupled with resource limitations on the part of SMEs, it is important that the government should take a facilitative role by embarking on activities like creation of web sites on some niche-product areas (VORTALS), improvement of trade logistics, human resources development and introducing a system for electronic public procurement (B-to-G e-commerce) etc. Along these lines institutions like Ministry of Commerce and Industry and related outfits like Trade Promotion Center (TPC – [www.tpcnepal.com](http://www.tpcnepal.com)) of HMG should be strengthened in order for it to be able to respond well to emerging trade and commerce regimen characterized by increasingly pervasive application of e-commerce. Along these lines, a dedicated e-commerce cell should also be opened in the Ministry of Commerce and Industry to monitor and facilitate private as well as public sector initiatives in the area. Concerted efforts aimed at introducing electronic governance will also yield good dividends as far as e-commerce is concerned. This should however be stressed that the government's role should largely be facilitative with minimal interference.

### **BUSINESS ENTERPRISES LEVEL**

From the perspective of business enterprises and business community at large, issues at this level in connection with e-commerce include matters relating to access, trust fraud, digital contracts and guarantees.<sup>6</sup> While even developed countries are finding it a challenging task in coming to grips with these issues, country like Nepal must therefore be prepared for even greater challenges in trying to address them. There are some fundamental questions involved as to how these issues should be tackled in the context of Nepal. To what extent can the government intervene? Given the technical feasibility of advertising and setting-up of data bases, virtual shopping malls<sup>7</sup>, common platforms and supply chains, what could be the trade-off between individual versus collective efforts while trying to address the issues involved?

SMEs in Nepal will find themselves confronting with these issues since it is expected that 80% of growth in e-commerce will come from business-to-business transactions<sup>8</sup> where SMEs will have crucial roles.

### **POSSIBLE AREAS OF E-COMMERCE APPLICATIONS IN NEPAL**

Given inherent resource limitations and a scenario where developmental prospects of e-commerce have yet to be proven in the Nepalese context, an effort should be made to identify areas that stand to benefit more from e-commerce as an immediate strategy both

<sup>6</sup> *Didar Singh, Electronic Commerce: Issues for the South, 1999, pp 9.*

<sup>7</sup> *Electronic equivalent of real shopping complexes.*

<sup>8</sup> *Didar Singh, Electronic Commerce: Issues for the South, 1999, pp10.*

(B-to-B and B-to-C) e-commerce. These could be the areas where Nepal has relative competitive advantage or the ones that could cash in on prima facie interest that quite a number of people have in Nepal. Some of the areas could be:

- Handicrafts, carpets and readymade garments
- Digital products like Nepalese music
- Services : computer programming and other IT related services
- Food products, spices and herbal products
- Hotels and tourism related services

It should however be borne in mind that e-commerce is not only about creating web sites. With millions of web pages vying for attention among relatively limited potential customer population, the biggest challenge is to ensure steady flow of visitors. Creating web sites is however only one part of this story. In order for people to visit such web sites, these sites must show up in a key word search of web data bases maintained at several sites such as YAHOO. On top of that it is also important to bear in mind that traditional values like quality of product, customer satisfaction and efficient delivery system associated with successful commercial activity remain unchanged even after the introduction of e-commerce.

#### **DRAFT IT BILL IN NEPAL – SUFFICIENCY FOR E-COMMERCE?**

With the recent boom in Information Technology (IT) in the global scale, the world has seen many changes in the way business is conducted. With all these new methods of conducting business, the need for a new framework for the legal and social norms, which encompasses Information Technology is imperative. Keeping this in mind, the Ministry of Science and Technology has put forth a draft of “Information Technology Bill” which would govern legal aspects of the transactions and conduct of businesses. The draft bill includes provisions to oversee authentication of digital signatures and e-transactions. Nepal Rastra Bank (Reserve Bank of Nepal) is also said to have some provision for acknowledging export of software and services done through the Internet.

Having put forward the bill, some comments have arisen about the insufficiency of the bill in its present form. Some amendments and addenda are required to bring the bill to its full potential. The most lacking parts, as seen right now is the provision outlining intellectual property rights and e-bank transactions. The full implication of the draft bill still needs to be studied.

Unless the IT bill encompasses all these issues in a single sweep, it would contain many insufficiencies for professionals who want to legalize their business done through Internet. A thorough study is therefore required to propose amendments and addenda.

#### **INFORMATION TECHNOLOGY PARK**

Information technology is one of the largest and fastest growing business sectors in the world today. Developing countries have got an edge on the IT industry. India, for example, has already created brand equity worldwide. Nepalese software companies too have ample potential for providing cost effective, quality IT goods and services including software solution using state-of-the-art technologies. They are also capable of handling large projects within stipulated time. Establishment of Information Technology Park is one of Nepal's strategies to meet the challenges of harnessing the benefits of Information Technology. The Information Technology Park under the Ministry of Science and

Technology will contribute significantly to the software-exporting sector by providing reliable high speed data communication services and by offering industry friendly interface between IT goods, services and software exporters and the government.

The Ministry of Science and Technology has already started the works to develop the infrastructure of proposed Information Technology Park at Banepa (Kavre District) with high speed data communication facilities and the quality internet services. The preliminary work like land acquisition, master plan and detailed design is in the completion stage. About 227 ropanis of land has already been acquired. The boundary wall, road network, drainage system, barbed wire fencing, and retaining wall are all targeted to be completed within this current fiscal year (2001-2002).

The Information Technology Park will function as a 100% export-oriented scheme for the development and export of IT software and services using fast communication links. This scheme is unique in its nature as it focuses on the development and promotion of IT software and services and integrates the concept of 100% export- oriented units and export processing zones of His Majesty's Government of Nepal.

Since its inception, Information Technology Park of Nepal has followed a one-point agenda to help Nepalese software exporters and place Nepal in the global software market. The Information Technology policy has already been declared and the IT bill has also been drafted. The IT policy in general provides various incentives to the IT entrepreneur's income and in terms of income tax & custom duty exemption. His Majesty's Government of Nepal has tried to provide an investor-friendly scheme that would be an incentive for major software developing and exporting companies.

Information Technology Park will offer an infrastructure for information technology companies that includes building space in modules, developed plots, reliable power and water supplies and fast telecom and datacom services as well as convention facilities, restaurants, guest house, club, bank, library, recreation, shopping center, etc. within a self-contained campus. All government level clearances will be coordinated by the dedicated support team at the IT park.

The confidence that the campus will be able to generate among the investors is expected to induce a large number of new start-ups in the campus. The portfolio of physical facilities, promotional avenues and operational support offered by the IT park has been envisaged to create significant synergy facilitating quick setting up and fast growth of IT companies. It is envisaged that the IT Park will develop into a highly functional facilitator, nodal agency and forum for the IT industry. The IT Park will also represent the single largest collection of IT companies in the country and promote the IT industry in the country. It is expected to be operational after July 2002 with four information technology blocks. Further investment in the IT Park will be opened from all over the world. The major objectives of the IT park will be:

- To establish and manage the infrastructure resources such as data com, core computer facilities, built-up space, common amenities, etc.
- To provide services (import certification, software valuation, project approvals, etc.) to the users who undertake software development and export of software and software services through technology assessments market analysis, market segmentation, marketing support, etc.
- To train professionals and encourage design and development in the field of software technology and software engineering.
- To act as front-end to the software industry for the government approval and policy implementations.
- To perform various other functions like issuance of import certificate, software



valuation, attestations etc. for the member units as a single point interface.

### **ECOMMERCE AND PROMOTION SMEs OF NEPAL: NIDC'S INITIATIVE**

Nepal Industrial Development Corporation (NIDC) has taken the lead role in starting the SME Center among the 24 member countries of Association of Development Financing Institution of Asia and the Pacific (ADFIAP) and demonstrated ability by technically launching the site during the ADFIAP Annual Conference - 2000 held in Kathmandu. The SME Center Nepal is technically operational since its technical launching during the 23<sup>rd</sup> Annual Conference of ADFIAP held in Kathmandu on 3<sup>rd</sup> May 2000 (except at the period of transfer of server because of change of strategic partner of ADFIAP).

The launching was its second milestone after signing the MOU on June 15, 1999 with ADFIAP. Currently SME Center Nepal has around 1,000 members (without commercial commitment), participating in the Computer Association of Nepal (CAN) organized technology fair CAN-InfoTech-2001/2002 exhibition, held in January 2001 in Kathmandu.

### **A MODEL AGENCY FOR THE KNOWLEDGE BASED ECONOMIC AGE**

Professional bodies such as Computer Association of Nepal, Society of Electronics and Communication Engineers of Nepal, Nepal Internet Users' Group, Information Technology Professional Forum etc play an active role in collaboration with industry in the process of evolving professional ethics and standards in IT HRD. Sectoral organizations like Federation of Nepalese Chambers of Commerce and Industry, Management Association of Nepal, Nepal Engineers Association etc are also involved in maintaining quality of the output of HRD institutions.

### **ENTREPRENEURSHIP DEVELOPMENT IN NEPAL**

In recent years, many governmental as well as non-governmental agencies have committed themselves to entrepreneurship development. A number of schemes have been formulated for promoting entrepreneurship and self-employment in different parts of the country for different levels of entrepreneurs. Training conducted by these organizations, vary in duration, content, approach and methodology. Duration of entrepreneurship training programs range from 2 months to 5 days. Similarly, very few of them have balanced emphasis on all relevant areas such as motivational, economic and management. Some adopt experiential learning methods, others include case studies/discussions and field trips. The success rate in terms of setting up enterprises and running them successfully by those who have already attended such entrepreneurship development training has been quite varied ranging from 20 to 60 percent.

### **CAPACITY BUILDING ON ENTREPRENEURSHIP DEVELOPMENT AND SMALL BUSINESS MANAGEMENT**

There are very few organizations involved in capacity building on entrepreneurship development and small business management. Among them IEDI is the focal institute to develop human resources capable in designing and implementing entrepreneurship and business development programs in the country. This is materialized through launching

capacity building program under the various programs mainly Training of Trainers (TOT) on Entrepreneurship, Business Management and Counselling targeting at organizations working in poverty alleviation and micro enterprise promotion program through promotion of entrepreneurs and enterprises in different parts of the country.

IEDI is one of the leading and pioneer organizations in entrepreneurship development and small business management in Nepal. Besides IEDI there are other organizations involved in entrepreneurship development in Nepal. These organizations are as follows:

**Government Support Organizations:**

- Department of Cottage and Small Industry (DCSI)
- Cottage and Small Industry Development Board (CSIDB)

**Business Membership Organization:**

- Federation of Nepal Chamber of Commerce and Industry (FNCCI)
- Federation of Nepal Cottage and Small Industry (FNCSI)
- Small and Medium Enterprise Development Programme (SMEDP)

**UNDP Supported Organization:**

- Micro Enterprise Development Programme (MEDEP)

**Association and Private Sector:**

- Women Entrepreneurship Association of Nepal (WEAN)
- Centre for Business Development (CEBUD)

**Entrepreneurship Development Training Packages**

In Nepal there are 4 major types of training modality targeted at potential entrepreneurs and existing entrepreneurs. IEDI is promoting enterprise development programmes with the help of these training packages.

These are:

- New Business Creation (NBC) Training (CEFE Model)
- Small Business Management (SBM) Course (For existing entrepreneurs)
- Micro Enterprise Creation and Development (MECD)
- Start and Improve Your Business (SIYB)

These models are briefly explained below.

**New Business Creation (NBC) Package**

The NBC training aims to develop in prospective entrepreneurs the knowledge, skills and attitudes necessary to create and run a business successfully. Therefore, this training package has a clear concentration on development of entrepreneurial competencies, generation of business ideas and preparation of business plan. This training package was marketed by GTZ in Asia, Africa and Latin America in the name of CEFE.

**Small Business Management (SBM) Package**

Small Business Management program is basically targeted at existing entrepreneurs with a view to enhance their managerial competency. It has widely been observed that to start a business is a relatively easy job, particularly small and micro enterprises because it can be started with a small amount of investment, simple technology, less skilled manpower and is mostly based on local resources and local market. As a result, a

considerable number of the trainees, who have gone through business start up courses establish enterprises right after the training. But it has also been observed that many studies undertaken in the past have pointed out that sustainability of the newly created small and micro enterprises is significantly low due to inadequate know how of business management.

There are several tailor-made training packages that are being offered to different sub-sector of enterprises, e.g. micro-hydro owner, feed entrepreneurs, owner of biogas companies, NTFPs-based enterprises, agro-enterprises, tourism industry, etc. It conducts training for both urban and rural entrepreneurs. The tailor-made courses under this packages are as follows: Small Business Management Concept, Overview of Business Management, Marketing Management, Salesmanship, Growth Counselling, Productivity Improvement, Book-Keeping (VAT approach), Financial Management etc.

### **Micro Enterprise Creation and Development (MECD) Package**

MECD is an integrated action-oriented programme for people in rural areas of Nepal. Under the MECD programme various activities are conducted in line with the outcome of potential economic surveys of the project areas and need assessment of the target groups.

The activities they carry out and the support they receive should be sufficient to motivate participants and to keep them motivated. As the MECD programme is an integrated approach, it includes post-training services like technical skills training, credit facilitation and enterprise management support. These all serve to maintain their motivation.

### **Start and Improve Your Business (SIYB) Package**

The SIYB training program is an ILO management training program aimed at micro and small businesses. The program helps to develop and strengthen basic management skills. The program provides training institutions and other implementing organizations with training materials for various target groups in the micro and small business sector. It also provides a wide variety of tools for trainers to conduct training and counselling support, and for institutions to monitor and evaluate their own programs. The objective of SIYB is to provide a sustainable and cost-effective method to reach substantial numbers of small- scale entrepreneurs and provide them with the practical management skills needed in a competitive environment for profitability and growth.

The training path of the SIYB are mainly games, workshop and counselling.

### ***SIYB Business Game***

The game is used for both potential entrepreneurs and existing entrepreneurs. The game is an excellent dynamic tool for creating a simulated environment where the trainees can experience the consequences of their business decisions.

### ***SIYB Workshop***

This workshop aims at mainly three different category of entrepreneurs. They are potential entrepreneurs, starting entrepreneurs and existing entrepreneurs in the community. This program is designed to suit rural entrepreneurs with exercises, role play, pictorial etc.

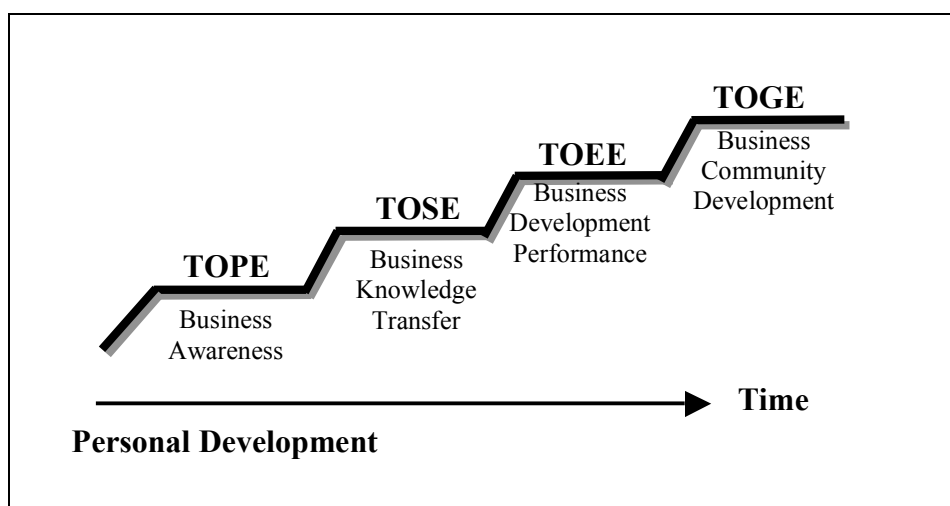
### ***Counselling Techniques***

SIYB counselling is designed as a complementary training activity, normally to be conducted after the initial SIYB training. It has been learnt through experience that

applying the counselling techniques as a follow-up will enhance the desired impact of the SIYB program. SIYB counselling follows the two approaches.

- Individual counselling
- Group counselling

SIYB is a step-by-step approach. The figure below shows the gradual stepping up of SIYB as per the level of personal development of the participants.



**Figure 1: Progressive Steps in SIYB Counselling**

## CONCLUSION

The area of information technology is developing so rapidly that it has been difficult to predict what is unfolding next. Whatever it may be, Nepal is prepared to accept the challenges of the rapid advancement of IT and try to use it for national development. We should realize that mere introduction of IT will not help the Nepalese society. Though the impact of IT revolution through out the world can't be argued, IT is not an end in itself but a means to bring prosperity in modern times.

It is evident that e-commerce will increasingly mark a major paradigm shift in international trade and commerce domain. Developing country like Nepal must therefore be prepared to take advantage of the potentials of e-commerce if it is to improve its economic situation and energise its economy. Even though a number of challenges do exist in making full fledged e-commerce a reality in a country like ours, a concerted effort must be made to facilitate the growth and development of e-commerce in Nepal.

In the context of Nepal, it is important to achieve development by activating the traditionally non-entrepreneurial groups. There are so many castes and ethnic groups which in the past have never considered entrepreneurship as an alternative. Today there are three renowned packages for potential entrepreneurs and several tailor-made packages for existing entrepreneurs but very few organizations exist to deliver these services. In a country like Nepal, training alone can not create enterprise and generate employment unless support services are available. People must be equipped with skills and the will to make economic

decisions. IEDI has trained trainer/facilitators of non-governmental organizations to implement the programme in their respective regions. These NGOs have implemented the entrepreneurship development programmes for grass root level economic actors. The achievements made in the programme show that the programme is effective and useful to help in entrepreneurial competencies development and creation of enterprises in the country.

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## **PHILIPPINES**

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### **THE PHILIPPINES IN THE KNOWLEDGE-BASED ECONOMY: CHANGE AND CHALLENGES**

Like its other ASEAN neighbours, the Philippines is in the midst of global integration. The ASEAN is currently dealing with the European Union, the Australia-New Zealand proposal for integration with AFTA, and how to shape or approach “ASEAN plus three,” meaning the grouping of ASEAN with China, Japan and the Republic of Korea.

The Philippine government has fully recognized the dawning of the New Economy or the Knowledge Economy. The government’s Department of Trade and Industry (DTI) believes that the New Economy is the most powerful force for the continued growth and development of the Philippines, and has focused on promoting, propagating and supporting it.

The country is known to have among the best knowledge workers in the world. These knowledge workers have the skills necessary to do specific functions that run the New Economy.

Over the next ten years, the market for IT-enabled services and E-commerce worldwide is expected to be valued at billions of dollars, with Internet users growing ten-fold every five years. Andersen Consulting estimates that global E-commerce reached \$150 billion in 1999 alone. That market is expected to grow to \$700 billion in the next five years, with 80% accounted for by business-to-business (B2B) transactions.

In the Asia-Pacific region, B2B spending is estimated to reach \$30 billion in 2000, growing 300-fold per year until it reaches \$1 trillion by the year 2004. Fortune Magazine estimates that the worldwide B2B market could reach \$7 trillion by 2004, with the Asia-Pacific accounting for roughly 14% of the total.

IT-enabled services, the identified market niche for the Philippines, are expected to reach US\$142.2 billion worldwide by 2008, according to McKinsey & Co. (Speech of Secretary of Trade Mar Roxas entitled: “Globalisation, New Economy and Philippine Gameplan for 21<sup>st</sup> Century/website: [www.dti.gov.ph](http://www.dti.gov.ph)). IT-enabled services refer to business lines that can be transformed by means of information technology. These include:

- Human resource services (\$44 billion)
- Customer interaction (\$33 billion)
- Data search, integration and management and mining (\$18 billion)
- Remote education (\$15 billion)
- Finance and accounting services (\$15 billion)

#### **Global E-Service Outsourcing Business**

The global e-service outsourcing business is estimated to grow to \$166 billion in 2002 from just \$32 billion in 1993, according to the Outsourcing Institute of the United States (“Global Crunch drives IT Outsourcing Boom, Philippine Star Business Networks, June 7, 2002”). The Department of Trade and Industry has identified the following major e-service outsourcing businesses where the country has a distinct comparative advantage:

❖ **Call Center Service**

There are 23 major outsource contact center providers in the Philippines. Based on the data compiled by the Contact Federation Philippines (as of November, 2001, [www.c-cubeservices.com](http://www.c-cubeservices.com)) the federation for the IT and e-services sectors including call centers, there now are 3,000 seats compared to less than 1,000 seats two years ago.

During its inception, the call centers provided e-mail response/handling support and technical support. The services eventually expanded to cover services in all customer touch points: voice, e-mail, and web collaboration (chat/instant messaging). The Philippine contact centers have since developed capabilities for almost any vertical and customer interaction, ranging from travel services, financial services, and online business-to-consumer support, to online business-to-business support.

World-class technologies are employed to handle voice interactions, e-mail management and web collaboration transactions. Some of these are:

- CRM technologies
- Interactive Voice Response Systems (IVRS)
- Computer Telephony Integration technologies (CTI)
- Call Management Systems
- Automated Quality Monitoring and Recording Systems

More than 80% of the foreign clients are based in the United States, and the rest are distributed across Europe (primarily the United Kingdom, Australia and Singapore.)

The entries in the current client list of contact centers in the Philippines belong to the top Fortune 500 companies, including the biggest global players in the high technology sector.

❖ **Medical Transcription**

The medical transcription (MT) business in the US is currently worth \$10 billion to \$25 billion a year with an annual projected 15% growth rate. More and more US-based companies are considering setting up satellite offices in the Philippines.

The MT business, which is used for insurance claims and malpractice suits in the US, involves the documentation of a patient's medical history. Since the Philippine Board of Investments has categorized this business as a pioneering industry, it provides 10-year tax holidays and other tax incentives to MT companies setting up in the Philippines.

The Philippines projects a significant growth in the volume of work outsourced to local companies due to its rich human resources.

❖ **Animation**

The Department of Trade and Industry has noted a dramatic increase in the outsourced animation industry in the last ten years. Foreign firms outsource animation needs not only for films but also for TV, educational tools and computer games. Filipino animation expertise can be delivered in real time via the Internet.

❖ **Business Process Outsourcing**

Large foreign companies are also steadily outsourcing business processes to cheaper offshore locations like the Philippines. These business processes include human resource management, accounting, data conversion, purchasing and inventory control.

❖ **Software Development**

Foreign firms have expressed satisfaction with the performance of Filipino outsourcing service providers. The Philippines has a strong chance in getting the top slot in outsourced software development.

The Philippines can attain market leadership in IT-enabled services due to the following reasons:

- It is the world's 3<sup>rd</sup> largest English-speaking nation and has an IT-skill set second only to India, which is first mainly because of a bigger population
- The cost of technology workers in the Philippines is only around 16% to 25% of the comparable costs in the US.
- The Philippines is one of 13 nations in the world, and only one of three in Asia, that have enacted a comprehensive Electronic Commerce Act, which provides the legal framework for the acceptance of E-contracting, the heart of E-commerce.
- The Information Technology and E-commerce Council of the Philippines (ITECC) has been formed to oversee and consolidate all public programs and policies of the national government with respect to the new economy.
- The country has formulated ISP.com, a comprehensive strategy for the promotion and development of IT and E-commerce. ISP.com, or the Internet strategy for the Philippines.com, covers infrastructure/ telecommunications development, financial systems, logistics, legal and business development.
- The Investments Priorities Plan (IPP) for 2000 and the forthcoming years identifies information technology as a priority investment area, which entitles investors to attractive incentives. This is intended to complement the incentives being provided by the Philippine Economic Zone Authority (PEZA).
- The PCs for Public Schools Program, a priority DTI-led project to equip and eventually connect all public high schools to the worldwide web, grants financing for some 20,000 brand new computers. Intel, Microsoft, Sun Microsystems, Cisco Industries, the Philippine Business for Social Progress, and the League of Corporate Foundations are among the organizations contributing their resources and expertise to the program.

**THE STATE OF KNOWLEDGE MANAGEMENT IN  
PHILIPPINE-BASED ORGANIZATIONS**

While there is no consensus on the definition of knowledge management, the meaning can nonetheless be derived from what is already being practiced. (Supangco, 2001)

As a process, knowledge management covers such activities as:

- Generation, which includes creation, adaptation, acquisition, and synthesis.
- Codification, which includes the capture of knowledge in forms that may be used by others.
- Transfer, in which knowledge that has been codified can now be moved from a source to a user, or from one point to another.

Given this definition, what is the state of knowledge management in Philippine-based organizations? In September 2001, the Personnel Management Association of the Philippines conducted a study on this issue, which aimed to determine the extent to which



Philippine companies consciously manage knowledge and the relationship between knowledge management initiatives and performance.

The study revealed a gap between the recognition of the importance of managing knowledge and actual efforts towards this end. Over 75% of the surveyed companies acknowledged the importance of consciously managing knowledge in their organizations, yet only 62% reported that their companies undertook efforts to manage knowledge in their organizations. (Supangco, 2001)

The surveyed companies had varying degrees of sophistication in generating, storing, transferring or sharing knowledge within their organizations. The companies had relatively well-developed systems for generating knowledge, but those for storage and transfer needed improvement. It was observed, for instance, that most companies encouraged their employees to seek information through face-to-face interaction and the company intranet instead of deliberately codifying and storing the knowledge generated by these venues.

The Philippines shows enormous potential for the flourishing of knowledge management. As the 2001 survey shows, much can still be done towards this endeavour. Nonetheless, as subsequent chapters will demonstrate, major strides have already been achieved in the government, business, education and non-government organization (NGO) sectors.

## **E-BUSINESS/KNOWLEDGE MANAGEMENT APPLICATIONS IN THE PHILIPPINES**

### **Government Sector**

#### ***Information Technology and E-Commerce Council (ITECC)***

The ITECC was formed in 2001 as a policy-making and direction-setting body which ensures synergy among all government departments as regards IT. This council is headed by the President of the Philippines, who oversees the direction of ITECC and ICT development in the country.

ITECC's vision is that of "ePhilippines," an electronically enabled society where the citizens live in an environment that encourages access to technologies providing quality education, efficient government service, greater sources of livelihood, and ultimately, a better way of life.

The ePhilippines vision is anchored on five equally important strategies:

- To develop the country as a world-class ICT services provider
- To provide government services to stakeholders online
- To provide affordable Internet access to all segments of the population
- To develop an ICT enabled workforce
- To create an enabling legal and regulatory environment

In line with these strategies, ITECC has created five committees to focus on each strategy by creating policies and monitoring the progress of each objective. These are the Business Development Committee, the eGovernment Implementation Committee, the Information Infrastructure Committee, the Human Resource Development Committee, and the Legal and Regulatory Committee. A sixth auxiliary committee, the Communications Committee, is in charge of advocacy and information dissemination on ITECC and ICT concerns.

The Business Development Committee has identified five e-services sectors where the Philippines can take advantage of its people's inherent strengths to achieve its vision

of becoming the e-services hub of Asia and the world. These priority sectors are Customer Contact Centers, Medical Transcription, Animation, Shared Financial Services and Business Process Outsourcing, and Software Development. The total revenue opportunity in these five sectors amounts to US\$1.66 Billion.

The Information Infrastructure Committee aims to define and develop the Philippine Information Infrastructure (PII). Information Infrastructure includes not only the physical infrastructure but also the other value-added service providers, such as ISPs and ASPs. The Committee also intends to:

- Lower the cost of bandwidth and encourage the development of content by identifying and promoting the development of industrial and educational IT hubs nationwide.
- Consolidate the existing government networks to provide a more comprehensive network backbone, which the government and all its agencies can use.

The Human Resource Development Committee works closely with the Business Development Committee in developing the skills needed in the five priority sectors. The Human Resource Committee also works with the industry in establishing industry-academe linkages to enhance IT skills. A key step is integrating the use of ICT in basic education, which, by exposing children to ICT as early as possible, enhances their learning experience by opening up different avenues of learning, and also provides them the necessary comfort level for dealing with computers in the digital age. E-Learning is a priority for the HR Committee, which recently hosted the first National E-Learning Conference to promote the development of e-learning in the country.

The creation of a Department of ICT is a priority of the Legal and Regulatory Committee. Legislative bills proposing this creation are now pending in the Philippine Senate and House of Representatives. Other bills in the legislative agenda of the Committee are bills on convergence and Internet Privacy and Security. The Committee is also looking at e-commerce issues such as digital signature certification, jurisdiction, and alternate dispute resolutions.

The main focus of the eGovernment Implementation Committee is to develop an executable and integrated long-term Information Systems Plan by updating and enhancing the existing Government Information Systems Plan (GISP). The plan focuses on processes which involve multiple agencies, thus enabling citizens to go to just one agency to avail of the service. Examples of these multi-agency processes are the registrations for business names and for Overseas Filipino Workers. Another priority of the committee is developing a single government portal which, as of now, is [www.gov.ph](http://www.gov.ph).

#### *E-Government*

The E-Commerce Law, or Republic Act 8792, mandates all government agencies to implement e-commerce in two years' time. Here are some of the e-commerce initiatives of various agencies:

- SEC-iRegister  
The Philippine SEC offers the public the convenience of online registration through SEC-iRegister, the web-based Company Registration System of the Philippines Securities and Exchange Commission (SEC).
- Consumer Assistance and Information Network System  
The site was developed to provide interaction between consumers, producers and consumer organizations, as part of the BTRCP mission.

- Claim Tracking System  
This on-line facility is designed specifically to assist you in your queries and concerns about the status of your tax credit applications.
- .gov.ph Domain Registry  
This registers requests for .gov.ph domain names.
- Electronic Health Information Village  
e-Health aims to build an information resource within the Internet that will foster a sense of community in an electronic environment. The idea is to provide a one-stop shop for researchers seeking general and specialized information on health, enabling them to link up with local and international information resources.
- Science Scholarships Online  
This site is for students planning to take up science and technology courses, and for institutions that offer scholarships on science and technology courses.
- National Computer Institute (NCI)  
This site includes the computer courses of NCI online.
- Tradeline Philippines  
Exporters or buyers (local or foreign) can register here and create their own customized profile, specifying the product/service offerings or purchase requirements. Tradeline Philippines then matches the buyers' requirements with the counterpart (exporter/supplier or local/foreign buyer), making him ready to do business with the Philippines and the rest of the world.
- E-Census  
This National Statistics Office website and call center allows Filipinos to request for birth, marriage, no-marriage, and death certificates electronically.
- Procurement Service of the Department of Budget and Management  
The Department of Budget and Management's Internet-based 24-hour procurement system allows government agencies, state colleges and universities, government owned or controlled corporations, and local government units to post bid notices and get responses from accredited suppliers.
- PROgress Bonds  
PROgress Bonds, government securities issued by the Republic of the Philippines, are five-year bonds with a fixed coupon of 13.875% p.a. payable quarterly. PROgress bonds also give investors opportunity to realize an upside for their investment through the exchange feature.
- University of the Philippines - Open University  
The U.P. Open University seeks to provide wider access to quality higher education.
- CityProsDB.com  
This DTI-endorsed website aims to build the country's knowledge workers database.
- B2BPricenow.com  
This is a Department of Agriculture and DTI endorsed electronic marketplace showcasing Filipino products.

### ***Knowledge Management at the House of Representatives***

The House of Representatives contains a tremendous amount of knowledge and information. In the course of legislative work, thousands of pages of research materials,

position papers, legal opinions, and other papers-- not to mention bills and resolutions -- pass through the various committees and units of the House.

The problem lies in the difficulty of finding and accessing these materials due to the following (Viscerra, 2002):

- Manual tracking  
Any of the scores of committees and units of the Lower House could be dealing with a particular set of materials as called for by legislative process. Original copies of bills are first filed with the Bills and Index unit and then processed under the committee system with inputs from experts and interested parties. These are then referred to the plenary for further debates. Congressmen must often send their staff to different offices within the Batasan Pambansa (National Assembly) complex just to know the actual changes that may have happened to a legislative proposal.
- Islands of information and knowledge  
Knowledge of the existence, content and the sources of the submitted materials is often limited to the staff of the unit or office handling a particular topic. Even in-house researchers sometimes find it difficult to access information, and are likely to get more information from outside sources.
- No network, no sharing  
The House does not have an effective Intranet infrastructure to encourage greater information sharing among its various units. While there are hundreds of computers within the Batasan complex premises, these remain stand-alone PC's of varying vintage, useful mostly for typing.
- Poor Internet access  
During the 11th Congress, individual dial-up Internet access was provided to all offices in the House, but just connecting to the ISP took so much time. A connection that got through routinely broke off in 10 to 20 minutes. The ISP service was discontinued.

To address the problem, House Speaker Jose de Venecia, Jr. merged existing offices to form the Knowledge Management Systems Department (KMSD) last year. The KMSD was formed out of the realization that, even at the manual level, the various units of the House of Representatives do not yet have an effective system of information and knowledge sharing among themselves and with their principals.

The KMSD has the following mission, roles and responsibilities:-

- To promote knowledge-sharing, process improvement and a culture of continuous learning within the House.
- To develop and maintain knowledge-sharing systems with the e-public and partner institutions.
- To promote greater transparency and enhance the responsiveness of the legislative process, not only to House members and other Secretariat units, but also the general e-public.
- To establish the Information and Communication Technology infrastructure at the House.
- To provide planning, management and ICT services, and integrate critical knowledge functions, knowledge-based assets and processes.
- To coordinate with the various House offices and units for the online generation of the reports and updates on policies and legislation.

The initiatives of KMSD include:

- Web-based database interface programs
- On-line Legislative Information System (LEGIS) that incorporates not only the statistical information on bills and resolutions, but also the full text of the bill and position papers through various stages of the legislative process.
- House Web site to allow public access to the LEGIS and to provide links to other government websites and data sources, as well as electronic bulletin boards and chat bins on an array of public policy issues.

***Dept. of Trade and Industry IT Helpdesk/ConsumerNet***

The DTI IT HelpDesk ([www.ithelpdesk.ph](http://www.ithelpdesk.ph)) was launched last March 2001 during the One Internet Day Celebration held at the Board of Investments. It was first conceived and conceptualised immediately after the passage of R.A. 8792 (E-Commerce Law) in June 2000.

The IT HelpDesk is a call center facility of the Department of Trade and Industry (DTI) which intends to address concerns related to electronic commerce, where the requesting party is unsure which government agency to approach. The HelpDesk site provides ICT information to the general public, as well as acts on queries through e-mail and feedback postings. It directs, refers, and monitors queries that it cannot act upon to the concerned agencies.

The following are the salient features of the HelpDesk site:

- About the Philippines – general information about the Philippines
- Consumer Protection – information that is helpful to consumers
- Economic Zones – information about economic zones in the Philippines
- E-Government – initiatives of various government agencies in implementing the E-Commerce Act
- E-Services – information on IT and IT-enabled services that the Philippines can offer
- Import/Export – contacts and resources to assist import and export requirements
- Investment – information on how to invest in the Philippines, particularly in ICT projects
- Key Contacts – important contacts from government and IT Trade Associations instrumental in realizing the country's vision of becoming the E-Services Hub of Asia
- Legal – ICT related laws, guidelines, policies and supplementary readings
- Statistics – information on Philippine statistics on labour and trade

***The Philippines' Best Practices Exchange Program***

The National Action Agenda for Productivity (NAAP) provides the overall framework and strategy for productivity improvement efforts in the country and supports the goal of attaining a newly industrialized economy status by the year 2004. The NAAP assumes joint efforts by government and private sector in sustaining socio-economic growth.

The Productivity & Development Center-Development Academy of the Philippines (PDC-DAP) spearheads the implementation of the Best Practices Exchange (BPEx) Program to answer the need for the adoption of benchmarking as a productivity improvement tool. The BPEx Program is one of the PDC-DAP's commitments under the National Productivity Advocacy Plan of the Medium Term National Action Agenda for Productivity (MNAAP). The Asian Productivity Organization provides technical support and the opportunity to network with the other ASEAN countries.

The BPEx Program aims to identify, document and facilitate the exchange of information on best practices through mutual cooperation. Under this program participating companies particularly those, which are just starting, can gain useful information generated locally and avoid costly benchmarking activities especially outside the country.

The following are the major initiatives:

- Establishment of a BPEx Network & Advisory Committee  
The network will serve as a mechanism for participating companies to share information on specific topics of interest and to learn from the best practices of leading companies locally and abroad. There are currently thirty-four (34) active members of the network. These members are senior managers and supervisors from 30 manufacturing, service and government organizations including representatives from the healthcare and academe.
- Establishment of BPEx Information Facility  
An information system/facility was put up to maintain links with other databases which contain information on best practices of leading companies. This will also cover identification, selection and documentation of best practices in electronic form so that these can be accessed through the internet via the PDC-DAP web page.
- Conduct benchmarking seminars  
This activity aims to introduce the concepts and benefits of benchmarking and impart the general approach and methodology of implementing benchmarking. Through the APO TES Program, the Center can invite or gather benchmarking practitioners from abroad to conduct benchmarking seminars on how benchmarking is done in specific areas and the best practices that have been identified and implemented.
- Implementation of Best Practices Forum  
This activity aims to facilitate the exchange of information on best practices through conduct of public forum. Non-member companies will be given the opportunity to share/learn from the experiences of other companies implementing best practices in their respective organizations.
- Conduct Benchmarking Studies/Surveys  
This activity provides an opportunity for interested companies to participate in the conduct of benchmarking studies on selected processes. PDC-DAP can also extend technical assistance to companies which are interested in using benchmarking to enhance their performance. It can assist the company to select the process to benchmark, identify the best-in class companies, design the questionnaire, collect/analyse the data and develop action plans to close the performance gap.

### **Private Sector**

The government/public have not been the only ones that have embraced the changes of the KBE. In this section we examine examples of private sector organization that have taken the plunge.

#### ***Bayantrade: The Largest Virtual Trading Community In The Philippines***

The CEO of BayanTrade, an online trading community, believes that on-line transactions, such as the bidding of supplies, create better savings than traditional methods (Carreon, 2002).

For 2001-2002, BayanTrade was named a recipient of the Second Annual Intelligent20 Award for 2001-2002 by the Singapore-based Intelligent Enterprise Asia magazine. The only nominee from the Philippines, BayanTrade was selected from a field of 48 entries from the Asia-Pacific region by a panel of judges from A.T.Kearney, Accenture, Andersen, Atos Origin, Deloitte Consulting, KPMG Consulting, Mercer Management Consulting, and Pricewaterhouse Coopers.

BayanTrade was established in June 2000 by a consortium of six Philippine conglomerates in manufacturing and service industries: Aboitiz Equity Ventures Inc., Ayala Corp., Benpres Holdings Corp., JG Summit Holdings Inc., Philippine Long Distance Telephone Company and United Laboratories Inc.

The mission of this regional consortium was to create a cross-industry marketplace for indirect supplies —such as office supplies, computer equipment, and maintenance, repair and operations (MRO) items— in the Philippines. The name was coined from the Filipino word for country, "bayan", and was also a play on the English phrase "buy and trade."

Together, the six founders of BayanTrade account for 20% of purchase spending in the Philippines, of which 25% is on indirect materials. Outside the BayanTrade boardroom, these corporations compete fiercely for market share. But as buyers within the BayanTrade e-marketplace, they cooperate as a virtual trading community to realize mutual benefits.

This decision towards "coopetition" was a crucial one for the founding members. It was learning another new business paradigm in e-commerce. The BayanTrade e-marketplace went live in November 2000. By end-2001, BayanTrade had 191 buyers, 175 from consortium companies, and 16 firms outside the founding conglomerates. It had 360 suppliers in 35 categories, from office suppliers and technology, representing over 35,000 SKU (stock keeping units) items.

It facilitated a total transaction volume of over P5.4 billion in 2001 -- the largest e-commerce marketplace in the Philippines. BayanTrade is the Philippine gateway to the Global Trading Web, the world's largest business-to-business trading community composed of e-Marketplaces in a broad range of industries and geographic regions.

The following are some of the benefits gained:

- Last year the average savings per commodity through BayanTrade online bidding was 13%. This means BayanTrade users have been able to realize about 500 million Philippine pesos (10.053 million at PhP49.737=\$1) in cost savings on value pass through of these online bidding events at PhP3.9 billion.
- BayanTrade users also reported that the time to process procurement requisitions dropped from 15 to 22 days to less than two days, on average.
- In terms of procurement processing costs, companies conducting e-catalog purchasing through the BayanTrade marketplace have seen their per PO costs drop from a range of PhP300 to PhP1,000 to less than PhP200.
- Estimated savings from the value pass through of 19,000 POs in PhP1.5B e-catalog purchases last year.

BayanTrade is now moving from simple first-generation trading/procurement functionality towards provision of value-added and second-generation services such as content management, hosted e-services, branded e-procurement portal, e-payment, and e-logistics that would make it a complete solutions provider. The world-class time and cost efficiencies in building and updating content using Commerce One Content Refinery are

leading BayanTrade to investigate new business opportunities that involve building content for regional and global e-marketplaces.

The future plan of BayanTrade is to focus on enabling more buyers, attracting more non-consortium participants, and expanding into vertical market areas. The vertical market expansion will layer industry-specific private marketplaces on top of the core BayanTrade capabilities, capitalizing on the collaborative capabilities of the marketplace platform to create “virtual verticals”, starting with construction, power and utilities, semiconductors and electronics.

On a global scale, the BayanTrade hub should also be able to access cost effective importation requirements of Philippine enterprises and offer excellent export items of the country.

There is also a need for a knowledge management infrastructure that (1) leverages on the transactions being facilitated through the e-marketplace; (2) builds on the domain expertise being obtained by the people whether on horizontal or vertical domains, and (3) facilitates the compilation, classification, and retrieval of such knowledge is also a requisite.

These challenges resulted in the following lessons learned:

- A consortium of six conglomerates with 150 individual buying and selling organizations can indeed come together, work together, and trust each other with good corporate governance.
- The operating strategy for the year had to be quickly revised to use e-bidding as entry point to e-catalog procurement.
- The notion of a buying club where profits are shifted from the supplier to the buyer is not sustainable. This realization necessitated a quick shift in paradigm to a genuine marketplace where there is a separate value proposition for both the supplier and the buyer and where the fees are appropriately charged to the one who benefits.
- Given that there is already a critical mass in the consortium, the business model also had to be quickly realigned to prevent the natural movement to being a closed community.
- The costs will be recovered from both non-consortium and consortium volumes, offering the same price to both, targeting 50% market share of Philippine spend, and where profitability will come from value-added services rather than from transaction facilitation. This will include collaborative and supply chain functionalities for those verticals identified as key to the Philippine economy.
- There is a need for a knowledge management infrastructure that (1) leverages on the transactions being facilitated through the e-marketplace; (2) builds on the domain expertise being obtained by the people whether on horizontal or vertical domains, and (3) facilitates the compilation, classification, and retrieval of such knowledge is also a requisite.

### ***Corporate Information Solutions, Inc.***

In January, 2002, Corporate Information Solutions, Inc. (CIS) started its implementation of its three-year knowledge management (KM) in order to optimise the use of its knowledge assets needed to support the execution of its business strategies.

The goal of the KM program is to provide the CIS employees, within three years, the necessary knowledge assets for their use, and the processes by which they share and re-use knowledge technology to help them capture/create, store and retrieve knowledge assets motivation, skills, and incentives.



Here are some specific reasons that triggered the implementation of KM in CIS:

- Knowledge was not readily available or as accessible when needed  
Knowledge was everywhere: in the employees' heads, in project documents, in corporate correspondence, and in client engagement material. Much of the knowledge CIS needed to achieve business goals had always been within it. At times, account managers who were preparing material for a client presentation had difficulty locating some needed information, as these were often stored in individual desktops or laptops. Project teams, with documents of closed projects to refer to, and access to customisable document templates. However, they did not have ready access to the lessons learned by other employees from similar completed projects.
- CIS had developed knowledge assets in over 27 years  
CIS had the knowledge assets: software code, work/project plans and documents, and solution and engagement information. Over its 27 years, it developed extensive knowledge sharing and re-use practices. These practices are manifested in how CIS develops and executes business strategy, acquires and manages customers, and selects, develops, and retains employees; and in how it develops its products and services.

The three-year KM program's target is to develop a "role-based" employee information portal (EIP) by 2004 which will be done through the following:

- By maximizing and leveraging its existing Lotus Notes and Domino<sup>TM</sup> messaging and collaboration infrastructure, each employee will have an on-screen workspace tailored to his function and pay level in CIS. The workspace will provide each employee with click-thru access to:
  - Core portal facilities - these are the standard e-mail facility
  - Top Stories (internal and external news about CIS or its employees)
  - CIS internal business applications
  - CIS Corporate Portfolio (describing service and product lines)
  - Business applications
  - Corporate events calendar role-based facilities - these are the project team rooms (online meeting rooms for project team members)
  - Quality and performance standards facility (searchable database of work standards and competence profiles)
  - Knowledge repositories (extended knowledge databases)
  - Community workspaces - electronic meeting places where Communities of Practice (CoPs; unstructured groups of employees with similar functions such as project management) can virtually meet and share knowledge
  - An expertise directory - a yellow pages facility that will provide employees with information as to who within CIS knows what, and within what context
- Continue the implementation of some its components namely:
  - E-mail facility
  - Quality and performance standards facility
  - Project Binder System (PBS)  
A project document knowledge repository using Lotus Domino.Doc. The PBS will house all documentation generated by on-going projects; once a project ends, its documentation will be moved from the PBS to CIS's library, and will be accessible via the CyberLibrary (CIS's web-based library management system) and the community workspaces. The PBS will also

complement CIS's on-going effort to be Capability Maturity Model (CMM) Level 3 compliant by the end of July, 2002.

The following are some of the valuable insights shared by CIS managing consultant, Ms. Ma. Angelina Roque who currently heads the virtual KM team of CIS in an article written by her and published in Business World Online, July 15, 2002:

- Any initiative founded on technology to be used and on the content of the knowledge databases alone will be difficult to sustain. Organizational culture should be considered to support the initiative.
- There is a need to factor impact to employees' behaviour. CIS is also devoting more attention to the behavioural changes, and to the processes required to sustain the KM effort beyond 2004.
  - It needs to structure its employees' work environment, and work and learning experiences, so that they get into the habit of sharing and using knowledge. One way by which CIS is doing this is by identifying the behaviour needed to sustain the usage of each of the components.
  - CIS will use the resulting behavioural map to determine what incentive programs, organizational support structures, and skills need to be in place to develop and nurture the behaviour.
  - CIS anticipates acknowledges that if its employees are enabled and encouraged to participate in an active exchange of information and ideas, and to trust in this collaboration, then they will gradually develop a shared understanding of what CIS wants to achieve. This shared understanding will consequently make each employee feel that their own work is a valuable part of a much larger goal, thus enabling them to support CIS' business strategy.

## EDUCATION SECTOR

In the education sector, new technology and Internet capabilities have been harnessed.

### ***De La Salle University (DLSU): The Virtual Classroom***

Two years ago, the National University of Singapore granted the De La Salle University the license to use its online learning system, the Integrated Virtual Learning Environment (IVLE).

The IVLE enables teachers to enhance or complement their teaching by making courses available in cyberspace. Asst. Professor Amy Forbes of De La Salle illustrates how IVLE works for the school: "The teacher is absent and the classroom is empty. And yet, classes go on. On-line, that is. At De La Salle University, faculty members are delivering their lectures via the Net, discussing class readings in real time with students who may be kilometres away from the traffic-filled streets of Manila, or even responding to a discussion topic initiated by members of the class".

The system is composed of a course calendar, discussion forum, distribution list, lecture plan, chat room, and a frequently asked question-builder. Teachers can post their lesson plans, give and collect assignments online, and provide links to relevant Web sites. Students can even take online tests which are automatically corrected by the program.

To gently ease students into using this new system, the school maintains a 60-40 ratio between on-campus class sessions using traditional classroom meetings, and computer-mediated meetings.

The system's asynchronous quality allows for "anytime on-line chats and discussions" and students take the initiative to log-on and post questions about readings the teacher assigned to them.

Some of the other benefits of the system are:

- The anytime availability of the lessons in cyberspace makes it easier for students to refer to it, and for teachers to enforce contractual obligations such as attendance (traditional and virtual), requirements and tests.
- With some course content also located on-line, students are more eager to engage in classroom discussions rather than be preoccupied with note-taking.
- IVLE has a discussion forum which, noted Ms. Forbes, is "the most exciting aspect of on-line teaching. For one, students are able to engage with the material being discussed in quite a different way than if they were asked to write a paper about it. The forum enables students to publicly post their responses. This interaction is quite stimulating and it minimizes minus the burden of checking mounds of term papers."
- Students respond more thoughtfully and learn the art of writing drafts before they post their responses. Arguments are well worked out, and they also back their ideas with sources and evidence.
- The Forum also enables the student to lead discussions as well as initiate topics of interest to her/him.
- Students develop their own guidelines on how to respond to posts. The absence of time constraints helps them form their ideas more fully. Less assertive students have an equal chance of utilizing online tools to put across her/his responses.
- Online learning makes the student assume a large part of the responsibility of learning. They become good discussion leaders as well as good discussion participants. Peer learning is encouraged.
- Its asynchronous quality enables students to communicate anytime, anywhere and thus be more able to think about their contributions more fully. The teacher, in turn, can spend more time assessing the students' performance than if she/he were expected to do it during the class hour.
- Days without school due to inclement weather, especially storms and floods in the case of the Philippines, may now be a thing of the past. Online courses on occasions when poor weather prevents both student and teacher from reaching the campus may provide the alternative to what would have been a missed class.

The following are some of the lessons learned:

- Technological demands are heavy. The university spent a considerable amount of money to train its faculty to use new media.
- IVLE provides ample opportunities for individual, asynchronous, and interactive learning.
- The delivery of online learning needs to be evaluated thoroughly both before and during its implementation, as well as in relation to traditional delivery systems.
- Implementers and administrators of novel teaching methods need to be given feedback so that the quality of teaching can be maximized.
- Questions regarding the intellectual ownership of online courses need to be addressed.

- There must be a balance between teaching and technology. Innovations in pedagogy are always welcome, especially if they result in the academic maturity of students.

The 21st century technology revolution makes it possible for anyone to have access to education beyond time and space. The essence of teaching remains to be the relationship established between a professor and her/his students, whether conducted face-to-face or computer-mediated.

***Ateneo de Manila Graduate School of Business: Center for Continuing Education (Ateneo-CCE)***

The Ateneo-CCE E-Learning Unit incorporates technology into the classroom as a dynamic tool for classroom instruction. The use of E-Learning in schools and in the workplace is a careful balance between skills enhancement and mastery of principles on one hand, and individual learning preferences on the other.

This unit provides high-quality training programs covering a wide variety of topics in Communication, Management, Finance, Technology and the English language. The unit recognizes the unique nature of the firm and the sectors that it operates in. It is for this reason that the Ateneo E-Learning unit carefully crafts the programs to suit the different needs and challenges of its industry partners.

The following are the benefits of Technology-Based Training:

- Greater access to quality education
- Increased customisation for individual participants
- More dynamic presentation of content and instruction
- Cost of travel and lost work-time reduced because of the wide variety of options for the virtual classroom
- Learning time reduced due to self-paced instruction
- Certification options readily available

***University of the Philippines' Open University (UPOU)***

An open university espouses a philosophy of open learning which differs in degree and dimension from institution to institution. For the UPOU, its philosophy of open learning is evolving. Its emphasis at present is on widening access to quality higher education programs.

The UPOU is the fifth autonomous university of the UP System. It was established through a resolution of the Board of Regents in its 1084th meeting on 23 February 1995.

Because of the limited resources of the residential colleges, UP can only accommodate an equally limited proportion of applicants for admission. Through the distance education provided by the UPOU, the University will be able to respond better to the demand for quality higher education especially in areas which do not have a UP campus.

The UPOU “seeks to provide wider access to quality higher education”. It shall adhere to the highest standards of academic excellence and encourage social responsibility and nationalistic commitment among its faculty, staff and students.

The specific objectives of the UPOU are the following:

- To provide opportunities for alternative access to quality higher education by offering degree programs and non-formal courses by distance education.

- To develop a system of continuing education to sustain professional growth and improve technical skills especially for those who can not leave their jobs or homes for full-time studies; and
- To contribute towards upgrading the quality of the educational system of the country.

### **NON-GOVERNMENT ORGANIZATION (NGO) SECTOR**

The NGO sector has also begun leveraging on information and Internet systems to further their (SD) goals.

#### ***Philippine Sustainable Development Network: NGO IN CYBERSPACE***

PSDN is a small non-profit non-government organization (NGO) with very limited resources. The objective of PSDN is to make information accessible to support the goals of sustainable development.

According to Ms. Amy Lecciones, executive director of the Philippine Sustainable Development Network Foundation, PSDN developed a web site in order to share best SD practices and provide concrete examples of how the SD concept was actually applied by people and communities that others could refer to or even copy. Funding for the web site was provided through a grant from the Royal Netherlands Embassy.

The initial 20 stories were launched in November 2000 under the Web site, SDVillage.ph. The Web site makes freely available strategies and technologies that work, facilitating technology transfer and replication of successful efforts at the local level. SDVillage.ph elicited quite a number of inquiries. These inquiries were coursed through either e-mail, telephone and in some cases personal visits to the PSDN office.

The following are some of the inquiries generated through the web site:

- Most of these inquiries were on the method being used by the Teoville Homeowners Association (THA) in its Zero Waste in the Home Project.
- Inquiries from newly elected government officials who were looking for projects they could implement in their own communities.

The following are some of the best practices shared:

- One new mayor got interested in how Puerto Galera (capital of Palawan province off the southwestern tip of Luzon) was able to successfully put up a water system, harness the community to put in labour as counterpart from the community, and implement an efficient collection system thus paying the waterworks system loan on time.
- The Zamboangita (in Western Mindanao) strategy has attracted great attention and was quite popular. It is a way of making the old carabao dispersal program successful along with the strategy of transporting farmers and their produce to the weekly tabuan (market day) for free, and a "Barato Baroto Program". The latter offers loans to fisherfolk so they can buy their own bancas on very easy payment terms.
- A good model for the urbanites is the "High-Rise Composting" at Alexandra Condominium in Ortigas Complex in eastern Metropolitan Manila.

#### ***UNICEF-Phil.: Knowledge Centers on Women and Children***

Following the 1990 Convention on the Rights of the Child, the Philippine government and the United Nations Children's Fund (UNICEF) agreed to adopt a program to promote the mobilization of a Child Friendly Movement.

A set of goal indicators was established which participating countries pledged to monitor and achieve. The goal indicators included:

- child survival -- maternal health, child health and nutrition;
- child development, universal access to basic education and literacy;
- child protection — child labour, children from indigenous communities, commercial and sexual exploitation of children, children in specially difficult circumstances (at war, in conflict with the law, children with AIDS, victims of child abuse and neglect);
- child participation — participation in community affairs, membership in civic and other community organizations.

Part of the strategy to promote the Child Family Movement involves forming a network of informed advocates to improve access to and use of information on women and children for policy advocacy, social mobilization, resource mobilization, project implementation, capacity building and monitoring and evaluation at the local and national level.

To operationalize this, the Knowledge Center on Women and Children was established. It is a "one-stop resource center" with information and materials (references, posters, leaflets, videos, pictures, statistical tables, thematic maps, etc.) on children and women for use by program managers, implementers, trainers and researchers.

The center also coordinates functions and activities concerning children and women. Here, program staff can access and download information from the Internet, send e-mail and contact other groups interested in the welfare of children.

There are now 16 Knowledge Centers in the 25 provinces and cities. Three are at the national level. Around five provinces have set up their own centers at their own initiative.

Although the center is primarily for the use of program implementers, some centers also serve as a place for children to visit and enjoy books, videos and other learning materials. The center is usually equipped with a computer, telephone, fax, photocopier and video equipment to facilitate data collection, processing, storage and dissemination of knowledge.

Setting up a Knowledge Center is not easy, especially in a nonprofit government institution with the usual concerns about the lack of budget, equipment, and IT infrastructure, including political will and workers' attitudes among the many constraints. Thus, the key to successful implementation is a unifying activity that serves a purpose and is interesting enough for the people concerned to sustain even without monetary reward. This unifying factor is the Child Info Software, the centerpiece of the Knowledge Center.

The Child Info Software is a database and presentation program developed for UNICEF by the Community Systems Foundations under the guidance and supervision of UNICEF Regional Office for South Asia, Kathmandu, Nepal and the UNICEF East Asia Pacific Regional Office, Bangkok, Thailand.

The software addresses the concern of unsystematic storage, retrieval, analysis and presentation of data and information on children. It puts together key data on women and children pertaining to health, nutrition, education, communication, protection and participation. When information on children is needed for a report, proposal or advocacy material, a researcher or program implementer simply has to access this using the software at the Knowledge Center.

UNICEF invested heavily in the technical training, provision of computers and printers to the Knowledge Centers. The institutional counterpart is the space, manpower,

supplies, and maintenance cost of the center.

A knowledge network composed of technical personnel from agencies supplying and using the data ensures regular updating of the database. Data may come from surveys or regular monitoring forms collected by these agencies. The knowledge manager who maintains the center produces tables, graphs or maps, and packages these into reports, newsletters, posters or computer presentations for use in policy advocacy and implementation.

## **CONCLUSION**

The Knowledge-based Economy is proving to be a powerful force for the continued growth and development of the Philippines, which has among the best knowledge workers in the world.

Realizing this, the various sectors of Philippine society are working together to face its challenges and accelerate its promotion and optimisation. With full support from government, private and non-government organizations (NGOs), major initiatives have been triggered to ensure that the necessary infrastructures are in place.

Over the next ten years, with the projected worldwide market growth worth over US \$700 billion for IT-enabled services and E-commerce, the government, with the Information Technology and E-Commerce Council as one of its key players, continues to focus on five key strategies to ensure the successful implementation of priority programs.

These programs are key to our country's vision of becoming an "e-Philippines", a vision articulated and spearheaded by no less than the President of the Philippines. The "e-Philippines" vision is that of an electronically enabled environment where its citizens gain ready access to technologies providing quality education, efficient government service, greater sources of livelihood, and ultimately, a better way of life.

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# SINGAPORE

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## INTRODUCTION

This paper provides an overview of technopreneurship development in Singapore as it ushers into a Knowledge-Based Economy (KBE). The key factors in nurturing and cultivating technopreneurship in Singapore will also be examined and in addition, the various efforts put in place both by the public and private sectors in technopreneurship development for SMEs will be highlighted.

Singapore is an international city that displays most of the characteristics typical of a KBE. It is a business launch pad to the ASEAN region and beyond, well connected to the rest of the world with a well established IT and telecommunications infrastructure. It has a very dynamic business community represented by over 600 Multi-national companies (MNCs) from all over the world and over 100,000 local enterprises comprising SMEs and Large Local Corporations (LLCs). Coupled with a very vibrant venture capital industry and an international talent pool of more than 90,000 professional expatriates, and government's policies in facilitating the development of technopreneurship, Singapore is on the right path of transforming itself into a KBE.

## TECHNOPRENEURSHIP IN SINGAPORE

In Singapore, entrepreneurs who venture in knowledge-based industries are usually in technology-related knowledge-based businesses such as E-business, information technology (IT), advanced manufacturing, biotechnology and logistics. These entrepreneurs are also called technopreneurs and they are usually technology trained and have a savvy for technology business. The average profile of a Singapore technopreneur is as follows:

- a) Young entrepreneur who has at least 5~8 years experience in a knowledge-based industry, e.g. IT, advanced manufacturing, biotechnology, etc. Average age is around 30~40;
- b) Highly skilled in IT and Internet literate;
- c) Possesses at least a University degree and an MBA;
- d) Travels widely in the region and have very strong regional and global contacts and network;
- e) Has a very strong passion in the field of technology and believes that he/she can create new standards and world class enterprises out of their technology ventures;
- f) Understands very well the concept of leveraging other resources and therefore usually team up with a few other technology savvy friends/colleagues to start ventures, i.e. seldom a lone ranger.
- g) Emphasizes creating shareholder value for the venture with an ultimate goal of bringing the company to public listing through IPOs.

These technopreneurs are quite different from their counterparts in traditional

industries as they have a more receptive mindset towards technology and practise a Western style of management. They are also more receptive to changes and dare to implement new business strategies and processes. However, most of these technopreneurs have very good understanding of technologies but may lack the business acumen necessary to survive in the complex business world. As technopreneurs, they need to be well versed in business issues such as management, financing, fund raising, marketing, business plans and a host of other business, marketing and management issues, which they sometimes find it difficult to juggle with. Hence, to facilitate technopreneurs in overcoming these hurdles and to encourage more technocrats to become entrepreneurs, the government has launched the Technopreneurship 21 (T21) Initiative to promote and encourage technopreneurship development in Singapore.

### **GOVERNMENT'S ROLE IN TECHNOPRENEURSHIP DEVELOPMENT**

As part of the government's initiative to promote and nurture technopreneurship in Singapore, it launched the Technopreneurship 21 (T21) initiative in April 1999. The T21 initiative is a high-level government and private-sector effort to prepare and lay the foundation for the successful development of a technopreneurship sector in Singapore. The initiative covers four areas that are critical for the technology sector to flourish, these are:

- Education
- Facilities
- Regulations
- Financing

These four areas are interlinked as the government realised that both hard and soft infrastructure, the preparation of potential technopreneurs and the availability of financing are critical factors in creating a flourishing environment for the development of technopreneurship in Singapore.

The T21 initiative is governed by a T21 Ministerial Committee headed by Deputy Prime Minister Dr. Tony Tan, which looks at setting economic strategies to foster the development of technology enterprises and to review their implementation. The committee also oversees the implementation of the T21 recommendations by the various government bodies and agencies under a multi-agency approach led by the Economic Development Board (EDB), which took over the role from the National Science & Technology Board (NSTB) as the lead agency to provide focus and direction to the technopreneurship drive. Supporting the Ministerial Committee are two working committees, viz, executive and private sector committees. The executive committee is headed by EDB Executive Chairman, Mr. Teo Ming Kian. The private-sector Committee is headed by CEO of Creative Technology, a Singapore company that has become the world leader in soundcard technology.

The executive committee, which has multi-ministry representations, identifies key areas in which the government can facilitate the development of technology sectors in Singapore while the private-sector committee solicits view, provides feedback and recommends proposals with inputs from a wide spectrum of private-sector backgrounds. In addition, an International Resource Panel, comprising well-known venture capitalists and successful businessmen from high-technology zones around the world serve as an advisory board to brainstorm and offer innovative ideas and insights into the work of the T21's committees. Highlights of some of the activities and achievements of the T21 are

given in the following subsections.

### **Technology Talents Development**

The development of innovative and creative talents who would be future technopreneurs starts young. The government is currently revamping the educational system in schools and developing universities into world class institutions which are not only generators of trained manpower but also hotbed for business opportunities creation. The school curriculum are being revised from Primary level onwards to focus more on creativity, innovation and cultivating the mindset of young students about entrepreneurship and risk taking. At the national level, the National Science and Technology Board (NSTB) has also been revamped to become the Agency for Science, Technology & Research (A\*STAR) since April 1, 2002 to take on a new role to foster world-class scientific research and talent for the knowledge-based economy. A\*STAR's mission is to be a leading star to guide and inspire young people to become technopreneurs, and galvanises Singapore scientific and engineering community to pursue knowledge and create high value added knowledge-based activities in Singapore. Under A\*STAR's two research councils, a network of 13 Research Institutes (RIs) and a technology transfer company called Exploit Technologies Pte Ltd., A\*STAR retains a pool of research scientists and engineers (RSEs) in the fields of biotechnology, advanced materials and manufacturing, high performance computing and microelectronics. These RSEs carry out a very wide range of industrial relevant research and the results of the research will be commercialised by A\*STAR's technology transfer arm, Exploit Technologies. Recently, to further build up a stronger tie between the science and research community and the industry sectors, A\*STAR has launched an attachment programme for its RSEs to the private sector, to assist companies to carry out research work. Under this Scheme, A\*STAR will absorb 70% of the manpower costs of the attached RSE while the company pays for the remaining 30%.

### **Hard Infrastructure Development**

The Government has put in place an infrastructure consisting of RIs, research centres at Universities and polytechnics to provide technical and research support for technopreneurs and technology companies. These research institutes and centres are all well equipped for carrying out applied and basic research for industries, especially in the fields of advanced manufacturing, automation, microelectronics, biotechnology and IT technology.

To further create a conducive environment for technopreneurship, where technopreneurs can work and play under one roof, the government has recently approved a \$15-billion masterplan to develop a global talent hub called one-north over the next 15 to 20 years. One-north, covering 194 hectares, is a city within city and it will have all the facilities to make it an attractive place to work, play and live in. These include laboratories and offices as well as hotels, shopping and leisure areas, a sophisticated transport network and a large central park. One-north creates an environment for nurturing technopreneurship, enabling scientists, researchers, technopreneurs to congregate, exchange ideas, interact and sparkle business opportunities. The first phase of this ambitious plan will involve an investment of \$200 million in developing the infrastructure for a biomedical and life science hub (Life Xchange), an infocomms and media hub (Central Xchange), a business, financial and corporate headquarters hub (Xchange Square) and a central park. One-north is a multi-agency project led by the Jurong Town Corporation (JTC) as the master developer.

**Soft Infrastructure Development**

Besides the long term strategy of investing and developing new infrastructure to meet the needs of knowledge-based industries, the government is also turning existing infrastructure scattered all over the Island into hotbeds for technopreneurship under EDB's HOTSpots (Hub of Technopreneurs) programme, which was launched recently in May 2002. HOTSpots is a 'technopreneurship belt' linking seven major technopreneur centres across the island with a special programme tailored to link technopreneurs and related companies. HOTSpots is a soft infrastructure project aim to support and enhance the growth of technopreneurs with special events and programmes tailored to:

- a) Build and extend their capabilities
- b) Provide greater platforms for fund-raising prospects
- c) Increase networking opportunities
- d) Showcase innovation and enterprise
- e) Strengthen interaction within industry

Examples of HOTSpots programme include:

- a) mentorship programmes like "Entrepreneurship Bootcamp" and "War Stories" which will allow successful technopreneurs to share, mentor and pass on vital skills to aspiring technopreneurs;
- b) fund-raising activities like "Elevator pitch" which provides a forum for technopreneurs to present their business case to Venture Capitalists in a one-minute sales pitch and investor conference;
- c) exhibitions and showcases for innovative products and roundtable discussions. EDB estimated that the developers of the seven HOTSpots centres will connect over 400 technology-related companies and 4,000 technopreneurs from fifteen different countries. It will bring together a vibrant community of start-ups, business angels, venture capitalists and technopreneurs across Singapore to interact, mix, collaborate and expand new businesses, as a microcosm as defined in EDB's 'enterprise ecosystem approach' strategy.

In addition to HOTSpots, EDB is also attracting foreign start-up technology companies to use Singapore as a launchpad for the Asia market. There are already four foreign incubators for cultivating Germany, Japan, the Republic of Korea and India new ventures in Singapore and EDB's aim is to double the number of foreign incubators to 8 by 2002. These will include the Israel incubator and the People's Republic of China Innovation Center for High Technology Enterprise (CICHT). The Chinese Center is an innovation center for technology enterprises of the People's Republic of China to internationalise their products and services, and also providing an opportunity of collaboration and interaction between Singapore and Chinese technopreneurs and companies.

**Technopreneurship-Friendly Policies**

The government is also reviewing and removing archaic rules and regulations that stifle technopreneurship in Singapore. These include:

- a) Bankruptcy laws have been revised to promote debt settlement without resorting to bankruptcy, and allow certain bankrupts to continue running a business and early discharge from bankruptcy. These new rules aim to promote an environment where a responsible technopreneur need not face the grim situation of bankruptcy due to business failures and is very

- conducive in promoting technopreneurship in Singapore;
- b) Immigration regulations such as the issuing of visas to foreign technopreneurs without a valid employment pass to carry out their business feasibility in Singapore for up to six months;
- c) Public housing regulations allowing a technopreneur to use his HDB flat (public housing) as an office under the Technopreneur Home Office Scheme.
- d) Risk minimisation policies such as EDB's Technopreneur Investment Incentive Scheme (TII) which entitles qualified investors to deduct their loss amount against their taxable income up to a maximum investment of \$3 million should their investment in a high-tech start-up fail.

### **Technopreneurship Investment Fund**

The Technopreneurship Investment Fund (TIF) was a US\$1 billion fund aimed at further developing the venture capital industry in Singapore, to catalyse the development of a venture capital industry by attracting venture capital money and a host of venture capital players to Singapore. The targets are individuals and able to manage risk and network in the global market, as well as assess and value intellectual property.

The manager of the Fund is TIF Ventures, a subsidiary of EDB. The first fund TIF1 with a fund size of US\$1 billion is further invested via 3 sub-funds, each with specific objectives:

- a) Broad-based fund: a US\$500 million fund to invest and attract top-tier Venture Capital (VC) firms to Singapore. This fund is used to leverage and draw in smart money from both local and overseas VC firms to invest in Singapore-based and Singapore-linked companies.
- b) Strategic fund: a US\$250 million fund to establish relationships and networks with and seek knowledge transfer from top-tier venture capital companies in the world. Some of the top-tier venture capital that are attracted to Singapore include Draper Fisher Jurvetson, Viventures Capital, Venture TDF etc.
- c) Early Stage Fund: a US\$250 million fund to seed and develop new venture funds that specialise in early stage investing. Part of the early stage fund is also used to co-invest with the private sector in specific programs to seed and develop technopreneurship ideas at the embryonic stage. These are the Venture Investment Support for Startups (VISS) and the Business Angel Fund (BAF) schemes.

TIF1 is highly successful and the fund was fully invested by December 2000, one year after its launch. So far, TIF1 has invested in 45 funds worldwide and has built up valuable strategic relationships with leading venture capital personalities and organizations both locally and internationally. To ride on the laurels of TIF1, TIF Ventures launched TIF2 in late 2001. TIF2 is a Fund-of-Funds (FOF) programme with a Fund size of US\$500 million and an objective to further invest in a portfolio of venture capital companies. The TIF programme is highly instrumental in transforming Singapore as Asia's venture capital hub. Technology companies and start-ups from as far as the Republic of Korea, India and the People's Republic of China have come to Singapore to source for funding. This has also made available a suite of venture capital companies that operate out of Singapore to invest in home-grown technology ventures.

### **SEEDS Capital**

Following the burst of the Internet bubble in March 2001 and the September 11 event, investment flow in technology companies and new start-ups has ebbed and venture capital companies are very reluctant to commit new investments in these companies despite a good business and revenue model. This has hit technopreneurs hard as their source for funding has dwindled. To restore confidence in investing in innovative start-ups, EDB launched the SEEDS (Startup Enterprise Development Scheme) in October 2001 with an aim to co-invest with third party investors in new technology start-ups. Under the SEEDS scheme, EDB will co-invest a maximum amount of S\$300,000 on a dollar matching basis with a third party investor in a technology start-up, provided that it has not previously attracted more than S\$500,000 in paid-up capital. The SEEDS Scheme is a unique scheme in that it leaves the due diligence, valuation and investment appraisal entirely to the third party investor, who would then liaise and negotiate with the start-up company on the investment. Throughout the process, EDB takes a hand-offs approach as it abides by the same conditions as the third party investor, and it will not assume any management role in the company after the investment. Another feature of this Scheme is that EDB will divest its investment to the third party investor before a period of 5 years or prior to its public listing, whichever is earlier, and it will also allocate one-third of its investment returns to the third party investor upon the successful divestment. The SEEDS Capital has an initial fund size of S\$50 million and it aims to invest in about 200 startups. Since the launch of the Scheme in October, a total of \$5 million has been invested and over 20 companies have benefited from the Scheme. Many technopreneurs find the SEEDS programme very useful as EDB prestigious image would help to build up the profile of the startup, making it easier to raise its second round of capital from venture capitalists when the market situation improves. Besides the investment, EDB also provides a suite of post investment value-added services such as incentives and networking activities to the SEEDS companies.

### **THE VENTURE CAPITAL INDUSTRY DEVELOPMENT**

The venture capital industry will be one of the main providers of liquidity to business in the knowledge-based economy. By taking equity stakes in the technology enterprises in exchange of cash injection, venture capitalists is becoming a valuable business partner through their experiences in growing businesses and well established network. Hence, venture capital is not only smart money but smart motivated money. It is therefore not surprising that the promotion of the VC industry is one of the key thrusts of the T21 initiative. As of 2001, there are over 115 VC companies in Singapore managing a total cumulative fund of S\$11.5 billion, up from the \$10.2 billion in 2000 (Economic Development Board, 2001). Since 1993, the VC industry has been growing at an impressive rate of over 10% every year, from a fund size of \$2.6 billion to over \$13 billion today. The VC companies in Singapore have invested into over 300 local companies in the following sectors:

- Biotechnology
- Building materials
- Consumer products and services
- Education products and services
- Electronics
- Info communications
- Media & communications
- Medical and healthcare related companies

- M-commerce and e-commerce
- Logistics
- Local supporting industries for MNCs

The majority of these venture capital firms prefer to invest in development and expansion stage (pre-IPO stage) of technology companies, their average investment appetite could range from S\$1 million to \$5 million. Most Singapore based fund target projects that have an ASEAN, US and Europe coverage, and to an increasingly extent in companies that

have a China-concept model. Some international venture capital companies, e.g. 3i PLC have multiple investment offices in the region with Singapore as headquarter. Each office would focus on different knowledge-based industry sectors depending on the skill set and experience of the local investment team, for example, 3i's Singapore team focuses on the infocomm and IT sectors as they had a lot of experience with deals in these sectors.

### **The Corporate Venture Industry**

Besides the private sector venture capital companies, large local corporations have also invested in technology companies through their corporate venture arms. There are two types of corporate venturing, the first is where a corporation invests in new businesses and they are direct competitors of the venture capital companies. Some of the prominent corporate ventures in Singapore include local corporations like Singtel Ventures, K1 Ventures of Keppel Corporation, Haw Park Corporation, OCBC Capital Management (venture arm of OCBC Bank), etc. The second type of corporate venturing involves one or more corporations investing something more than just cash into a company. This type of corporate venture companies focuses more on synergy and building businesses, which relate back to the core group in many ways. Corporate leveraging investment of this type has increasingly become popular in the US and it is expected that this new wave of investment philosophy will spread to Asia very fast, and is certainly going to stay in Singapore and it will become an important funding sources for technopreneurs and technology companies. In Asia, Hutchinson Whampoa of Hong Kong is the market leader in this type of corporate venturing.

Corporate ventures have a different investment strategy compared to VC Funds, while VCs firms have very deep pockets and could pay a high valuation for a project, and they need to follow a strict 'exit' timetable; corporate ventures could afford to make longer-term investments and build up the competitive advantage for itself through the investee companies. This could also mean that it would be more difficult for the invested company to cut loose itself from the corporate venture fund or realise a capital gain for its founders.

### **Performance of VC Firms in Singapore**

The rapid growth of the venture industries in Singapore in the 90's and the funds that they have poured into local technology companies have also led to many successful enterprises and profitable exits for venture capital companies. According to a study carried out by National University of Singapore on VC exit mechanism in Singapore from 1990 to 1998 [Wang, Clement K. and Sim, Valerie, Y.L. Exit Strategies of VC Firms in Singapore, National University of Singapore] which are based on surveys and interviews carried out with 21 venture capital firms and 100 investee companies that have exited from 1990 to 1998 (divestments), there are four most common exit mode for venture capitalists, these are:

- a) initial public offer (IPO)
- b) trade sale i.e. sale of the investee company to a 3<sup>rd</sup> party
- c) company buy-back
- d) write-off

The study also shows that out of the 100 divestments by venture capital companies, 65% of these are in high technology firms and 55.4% of these companies exit through an IPO. It was also found out that high technology companies experience a greater proportion of trade sale (20%) compared to their non-technology counterparts. On average, the divestment's total worth of assets, profit and sales at exit are US\$65 million, US\$4.6 million and US\$87 million respectively and the return on equity (ROE) and return on asset (ROA) values of the average investee company at the point of exit are 17% and 11.8%. In addition, the average age of the venture capital firms before they made a divestment is 6 years and these firms invest an average of \$2.4 million per company. The study also shows that most of the venture capital companies prefer to invest in expansionary or developing financing (61.9%) and the mezzanine stage (38.1%), with a meagre 9.1% of the fund is invested in seed and start-up stage companies. The lack of funds for seed stage companies shows that venture capitals shun this segment of the market as seed stage companies, especially technology companies are much more riskier than later stage enterprises. Hence, to further promote technopreneurship in Singapore, the Government has to encourage more venture capital funds to take a stake in early stage technology companies through some form of co-investment or risk sharing, the introduction of the Business Angel Fund (BAF) to stimulate investment by business angels to fund start-up companies in 1999 and the SEEDS programme in 2001 are examples of some measures taken by the government to encourage investments in home grown technopreneurs.

#### **PRIVATE SECTOR INITIATIVE IN PROMOTING TECHNOPRENEURSHIP**

Technopreneurs who are eager to obtain funding for their ventures might find it extremely difficult under the current market conditions to attract venture capital funding due to the following reasons:

- (a) The global venture industry is at its doldrums after the dot.com crash in 2001. Many VC firms that have invested heavily in technology and Internet companies have seen their portfolios languished or failed because of the bubble burst. This applies especially to VC money invested during the 1999 and 2000 timeframe.
- (b) Venture companies are picking sure winners to invest, i.e. companies who are at the mezzanine or pre-IPO round of fundings so that they could exit within the shortest time (i.e. 6 months to a year).
- (c) Most VCs are not interested in new start-ups even though they could have very good business and revenue models. Although EDB's SEEDS Scheme provides an alternative funding source, the technopreneur would still need to find a 3rd party investor or Angel before he could benefit from the Schemes. Like the VC companies, a lot of angels and high net-worth persons have also shunned technology investments because of poor market sentiments.
- (d) Technopreneurs often do not understand the requirements and thinking of venture capital companies or investors. They need a coach and guidance to assist them in the soft skills such as writing of business plan, presentation, structuring of the company, etc if they want to deliver an outstanding



proposal to compete for the scarce investment money. As the average rule of thumb in the venture industry is to invest in about 1 project out of every 100 proposals received, the technopreneurs need to be extremely well prepared in dealing with the VCs.

### **The SME Techventure Approach in Venture Funding**

Realising the global state of the venture capital industry and the need of technopreneurs to obtain funding, and coupled with the conducive support provided by the government in nurturing and developing technoprises (“Technoprise” refers to an enterprise that is technology-driven. It may be producing and selling a technology product or it may be producing a product that requires the application of advanced technology), a group of ten SME technopreneurs have pooled their financial resources to set up SME Techventure Pte Ltd. The mission of the company is to pool financial resources from successful SMEs to fund and co-invest with technopreneurs in new technologies and businesses in Singapore and Asia. It is also a private sector response to the government’s call for self-help within the SME community, which consists of 100,000 SMEs. Hence, SME Techventure not only complements the government’s efforts to develop the venture capital industry in Singapore but also adds vibrancy to the VC community with its ‘Technopreneur investing in technopreneur’ approach of investment philosophy.

SME Techventure works like a corporate venture fund of the second type, the group of General Partners managing the Fund has a combined 100 years of experience in managing technologies, marketing, manufacturing and corporate development of their own companies from the startup phase right through to full commercialisation and IPO phase. Leveraging on the network and wealth of experience of these Partners, SME Techventure also provides post investment value creation to investee companies.

To enable more SMEs to join the bandwagon of co-investing with SME Techventure in technoprises, SME Techventure is setting up its first fund with a target fund size of \$20 million and SME investors could invest with a minimum capital outlay. This fund will coinvest in Singapore technoprises that are keen to expand their businesses overseas into new markets like the People’s Republic of China. It would also jointly invest with these technoprises in sound technoprises in the People’s Republic of China, India and other parts of Asia that have not been fully leveraged. In this manner, SME Techventure reckons that the post investment value created for its investee companies will far outweigh the benefits of pure cash injection alone. Since the Partners have been starting technopreneurs themselves, SME Techventure’s investment model is different from the venture capitalists. Some of these key differences are:

- (a) SME Techventure prefers to invest in technoprises with an enterprise value of S\$1~S\$5 million.
- (b) SME Techventure has no preference investment sectors like most VCs do. As long as the technoprise embraces technology as an enabler to grow its business and its business model has high scalability, SME Techventure will consider.
- (c) SME Techventure will only invest in technoprises if the technopreneur is committed also to a small amount of investment. Contributions in intellectual property and intangible efforts only would not be the necessary and sufficient criteria for attracting SME Techventure’s co-investment funds.
- (d) The passion of the technopreneur and his top management team will be the key factor in the consideration of any investment. Technopreneurs who could demonstrate their passion and commitment to grow the business but lack the

- skills to develop a comprehensive business plan could also be considered.
- (e) SME Techventure prefers to provide “guided technopreneurship” to the investee company through post investment value creation by linking the company to the SME Techventure networks and strategic alliances, and assisting them to obtain second and subsequent rounds of funding. In this aspect, SME Techventure has built up strategic alliance with technology business matching companies like the Hong Kong Science & Technology Corporation, industrial parks, incubators and venture capital companies in the People’s Republic of China and the region.
  - (f) Besides equity financing, SME Techventure has also worked with strategic partners like banks and financial institutions to provide short term funding to technoprises that need cash flow financing to finance their business during this difficult period when businesses and sales are generally slow in view of the slowing economy. This form of financing is especially useful for technoprises who have previously raised one round of seed funding from venture capitalists but have failed to attract further rounds of equity investment for development and market expansion as a result of the cautious outlook of most venture capital companies.

## CONCLUSION

Technopreneurs and technoprises play a very important role in Singapore’s development strategy and effort to transform itself into a knowledge-based economy. The public sector has already played a catalytic role in facilitating technopreneurship development in Singapore through its various hard and soft infrastructure developments and investing funding support. It is now the turn to expand the role of the private sector in developing the knowledge-based economy. In this new economy, the private sector could play an increasingly important role in anticipating market trends and developments as it has become increasingly difficult, if not impossible, for the government to feel and spot technology and industry ‘winners’ as it lacks the knowledge and acumen in understanding where the market is and what it wants. The government can, however, continue to provide a conducive business infrastructure in the nurturing of knowledge-based industries with the private sector taking on a bigger role in deciding which knowledge-based industries and technologies it should focus on. The continual development and upgrading of the Singapore venture industries and the emergence of SME led groups like SME Techventure would in no time to come, be able to share some of these social and corporate responsibilities in nurturing and growing a vibrant technopreneur sector in Singapore for the good and benefits of all concerned.

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- Heart Work- Stories of how EDB Steered the Singapore Economy from 1961 into the 21<sup>st</sup>

Century. This book collects the stories of many of work done by pioneers and officers at the Economic Development Board (EDB) of Singapore to drive enterprise development in Singapore over the past four decades. Chapter 6 of this book also provides a brief history of the origination, growth and development of the venture capital industry in Singapore and it would provide an interesting read for those who want to know more about the government's effort in seeding ventures in Singapore.

Singapore Venture Capital Association – <http://www.svca.org.sg>. The Singapore Venture Capital Association was formed in 1993 to serve as a voice for venture capital professionals, and to promote the growth and development of the venture industry in Singapore.

Technopreneurship - <http://www.techsingapore.com/>. A one-stop portal dedicated to promoting high-tech entrepreneurial activities in Singapore's knowledge-based and technology-driven industry.

# THAILAND

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## INTRODUCTION

The changes in the world at the end of the 20<sup>th</sup> century including the free-trade, the financial liberalisation are the challenges which offer the opportunities as well as pose the threats to countries all over the world. In this respect, Thailand needs to adjust the direction of its economic development and have initiatives in enhancing the country's competitiveness. Also, the aforementioned changes mean that Thailand has to develop technological capabilities and entrepreneurial spirits in attempts to be able to stand on its own in the long term.

Considering changes in the economy, there was a transformation from agricultural economy towards industrialised economy which put emphasis on the use of raw material and substantial labor forces to improve productivity. However, the move is now towards the knowledge-based economy whereby the whole industry is directly based on the production, distribution and use of knowledge and information (OECD 1996, 2001). The move towards the technology-and knowledge-intensive industries requires competence-building and innovation management. This paper is concerned with management of technology based innovations in Thailand. It focuses on the development process of innovation towards diffusion (the stage of commercialisation). Boundaries are defined by using the conceptual framework of the innovation life cycle (Utterback and Abernathy 1975) and the industry life cycle (Twiss 1995) to discuss the innovation process.

Thailand realises the importance of science and technology (S&T) for economic development, wealth creation and improvement in the quality of life. It is setting the direction and gaining commitment towards knowledge-based economy through the National Economic and Social Development Plans and phased programmes. In its effort to achieve this aim, the National Science and Technology Development Agency (NSTDA) plays a major role in propelling the national knowledge competence for social and economic development. This paper will discuss the attempts of Thai government to manage the process of innovation. Further, it will touch upon the project of Venture Capital to complete the commercialisation of innovation and effectiveness of innovation. The structure of this paper after this introduction is as follows.

### ❖ **The Conceptual Framework**

This section sets out the innovation model as a framework to study the innovation process and reviews the strategy concepts. In particular, calculations over creating the knowledge-based industry revolve round strategies undertaken to manage innovations. The concept of competitive and collaborative strategy therefore becomes relevant to explain the dynamics of innovation. As the economy shifts from capital-intensive to information-intensive production, this has some implications for technological

learning. The review of learning mechanisms will prepare the ground for discussion in the subsequent section.

❖ **Discussions on Innovation Management Towards the Knowledge-based Industry**

This section considers the case of the National Science and Technology Development Agency (NSTDA) in undertaking the Science Park Project to promote the technological development, build up competencies to create successful technology businesses. The discussion on the government's policies to help the technology-based firms (TBFs) is made with reference to the National Economic and Social Development Plan Number 9 (2002-2006). Attention is also made on the considerable efforts of Thai government to help small- and medium-sized enterprises (SMEs) in creating technological entrepreneurship through science and technology strategies.

❖ **Conclusions and Policy Implications**

This section sets out the conclusions. Policies of action in adjusting the national development structure for progressing towards the knowledge-based economy are further recommended.

## **THE CONCEPTUAL FRAMEWORK**

To discover the extent to which the conceptual framework can be applied to form the basis of the present study, this section reviews the concept of 'innovation' and the innovation models to gain a better understanding of the way innovations diffuse into the market-place. It also reviews the concept of strategies in producing and diffusing innovations as well as the foresight concept to look ahead the areas of research in the future.

### **The Concept of Innovation and Innovation Models Towards Technological Change**

There are alternative concepts of innovation in describing technological change. Table 1 shows the various concepts of innovation defined in the literature.

**Table 1: Alternative Concepts of 'Innovation'**

<b>Concepts of innovation</b>	<b>Scholars</b>
1) Innovation: A process of enhancing existing technology	Rosenberg (1976, 1982); Nelson and Winter (1977, 1982); Dosi (1982)
2) Innovation: A process of turning opportunities into practical use	Pavitt (1984); Tidd et al. (1997)
3) Innovation: An integrated process involving (1) and (2)	Schott (1981); Daft (1982); Rothwell and Gardiner (1985)
4) Any new technologies and new processes	Rogers and Shoemaker (1971); Porter (1990); Voss (1994)

Innovation is a complex process whereby many scholars have developed many approaches to define its nature. The term 'innovation' used in this paper will follow the third concept. That is - an integrated process of enhancing the technology frontier, transforming this into the best commercial opportunities and delivering the commercialised product/process innovation in a competitive market with widespread use. The term innovation deals with both product and process innovation. Product innovation involves a change in the way products are produced in the market. Process innovation

involves a change in the technology and process of supply or distribution of a product. Often product and process innovation are interactive – as changes of process can lead to changes of product and vice versa.

Innovation management, on the other hand, concerns itself with the learning mechanisms for producing and diffusing innovations. Adler and Clark (1991), Bessant and Buckingham (1993) view learning as any activity leading to incremental improvement (learning curve improvement) whereas Rosenberg (1982), Malerba (1992) and Von Hippel and Tyre (1995) view learning as an integrated process of enhancing the stock of technological knowledge. These approaches characterise the innovation process in which having technological knowledge, to some extent, helps improve the productivity (innovation management under certain market conditions). This paper assumes that the way of learning to create technological competencies requires extensive commitment in developing skills, knowledge, institutional structures and linkages. Technological capabilities have their roots in various processes and are conditioned by the learning approach. They are also conditioned by external factors like infrastructure, government policies, and market mechanisms. Whatever specific learning approach is, it is argued that the National System of Innovation is important for generation and diffusion of technological innovations (Lundvall 1992, Nelson 1993). It is envisaged that the learning approach yields significantly different performances and different patterns of macroeconomic growth and transformation.

**Table 2: Rothwell's Five Generations of Innovation Models**

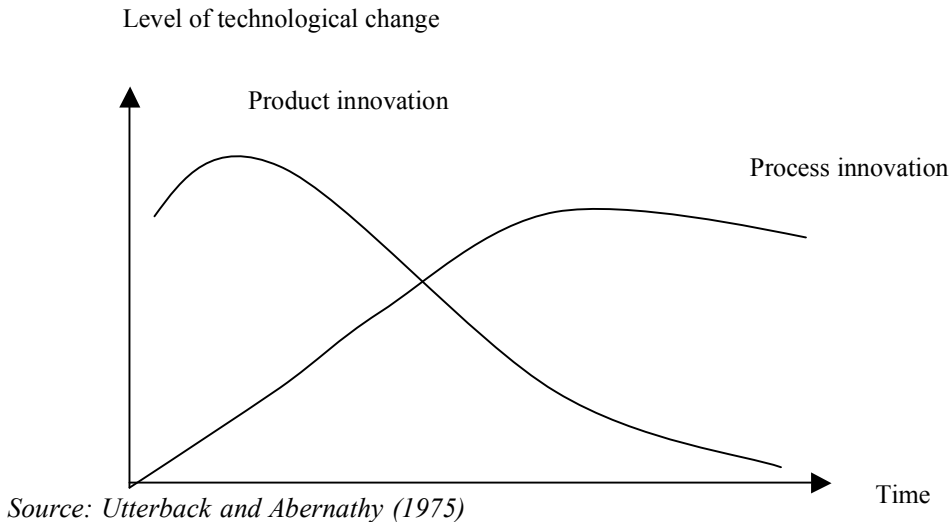
<b>Generation</b>	<b>Key features</b>
First	Technology push: simple linear sequential process
Second	Need pull : simple linear sequential process
Third	Coupling model: recognising interaction between different elements and feedback loops between them
Fourth	Integrated model: integration within the firm, upstream with key suppliers and downstream with demanding and active customers, emphasis on linkages and alliances
Fifth	Systems integration and extensive networking model: flexible and customised response, continuous innovation

*Source: Rothwell (1992)*

With respect to innovation models, technological change has been described by technology push (Schumpeter 1939) and demand pull (Schmookler 1962) or their interaction (Freeman 1982) as triggers of innovation. Table 2 presents the five generations of innovation models. During the 1960s and 1970s, innovations come about as a result of 'technology push' and 'demand pull'. More recently (1990s), the conceptual analysis has moved towards the theory of technological change as a system integration and networking model (Rothwell 1992). The fifth generation has seen a significant increase in the role of collaboration. In other words, the networking model is presented as a response to avoid the failure of innovation, particularly in commercialisation.

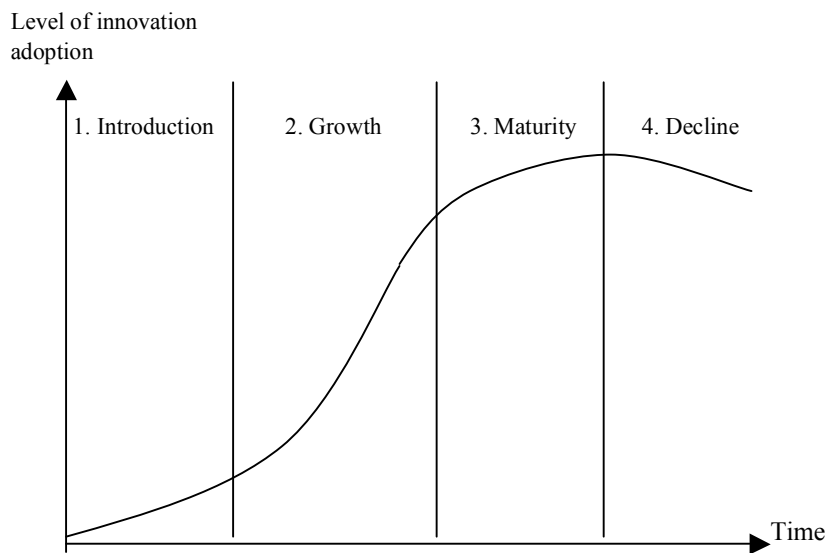
Following the collaborative approach of Rothwell (1992), Hamel and Prahalad (1994) propose a Managing Migration Paths Model. They argue that technology push is

not enough because it can be constrained by the power of technological change in shaping the competitive dynamics of an industry. In other words, technology push is not stable because rapid technological changes create many alternatives from which firms choose their technology strategy. Nor does demand pull provide a complete explanation in circumstances where customers lack the necessary foresight of possibilities in a world with radically new products or systems. To say it the other way round, Hamel and Prahalad (1994) suggest that innovations come to be seen as a result of collaboration for integration of skills and capabilities when competing for the future market.



**Figure 1: The Innovation Life Cycle Model**

Given the competitive environment of the innovation/diffusion process in the industry, Utterback and Abernathy (1975) developed a model of the dynamics of innovation – the innovation life cycle model (Figure 1). The model describes the process of innovation and the degree of technical change (incremental/ radical change). The product innovation precedes the improvement in the process innovation. Relatedly, the diffusion theory based on the innovation life cycle (Utterback and Abernathy 1975) can be linked to the industry life cycle (Twiss 1995) (Figure 2). Indeed, the industry has played an important role in the innovation process since innovations are developed along with the markets for them. Figure 2 also presents the concept of innovation in terms of a process of commercialisation. The innovation process characteristically exhibits an S pattern. The stages along the S-curve are characterized by the efforts of the innovator to adapt a technological development (invention) for transformation into an innovation (commercial product). The introduction stage represents the period of uncertainties which require problem-solving activities to make a saleable product or useable process. The growth stage reflects the situation where uncertainties are reduced. This can be seen by the accelerating rate of innovation adoption after a period of relatively slow growth (the introduction stage). The maturity and decline stage reflect the diffusion of innovation (commercialisation of innovation) according to the impact of the adoption (Easingwood 1988).



Source: Twiss (1995)

**Figure 2: The Industry Life Cycle Model**

The combination of 2 models can be applied to the case of NSTDA in carrying out research, development, design and engineering (RDDE). The models can also explain the progress of small- and medium-sized enterprises (SMEs) along the stages with the help of the government through grants, tax schemes, governmental policies in producing innovative products. The NSTDA initiatives provide a basis for successful technology companies which, in turn, have an effect to drive the industry forward. The analytical themes will be further discussed in discussion section.

### **The Concept of Strategies to Produce and Diffuse Innovations**

As far as the analysis of strategy is concerned, the adoption of strategies (whether collaborative strategy or competitive strategy) is important in managing innovations and in making innovation happen. When the resources and capabilities required in the diffusion of innovation are not available within an economic entity, it is likely that innovators adopt collaborative strategy and vice versa. However, the innovatory strategies employed by innovators along the stages of innovation can change over time. The changes of the strategies of the innovator in the light of ever-changing market competition, in turn, influence the progress of innovation.

The adoption of strategy to achieve successful innovation is a question that needs some review of strategy concepts. According to Porter (1980), a firm should adopt competitive strategy to defend itself against outside forces. Although his Competitive Forces model is widely accepted in the 1980s, it has increasingly been subject to criticisms in a competitive context in the 1990s. In the technology- and knowledge-intensive industries, the use of strategic partnerships is important. The competitive strategy in Porter's model ignores the active and dynamic roles of complex socio-economic factors under which firms may not have sufficient resources or capabilities to unilaterally



implement strategies. Practically, it seems difficult for any innovators to have full resources and therefore they need integration of capabilities to create and build know-how into their product innovations. The chosen strategies along the stages of innovation have a strong connection with innovators' organisational conditions in reacting to the competitive environment. As the move towards the knowledge-based economy requires knowledge to be embodied in innovations, it is, therefore, necessary that innovators manage the environment and define the strategic approach to encourage the learning along the stages of innovation.

When considering the nation (the country level) as framework, the concept of 'industry cluster' by Porter (1990) is helpful in explaining the development of technological capability in industry. Porter (1990) argues the use of industry cluster (industry concentration) in the public and private sectors for national competitiveness. The concept of industry cluster is popularised in the US Silicon Valley and the Italian textile industry (Parma 1999) where innovations were successfully commercialised by the clustering system. Porter develops the diamond model and explains 'cluster' at the macro level. He further argues that competition between rival firms in the cluster drives economic growth because competition forces firms to be innovative in producing new product/process innovations which thereby engender business spin-offs, foster R&D, and build up new skills and competencies.

As the world is moving towards economic globalisation, the competitiveness of knowledge-based economies is dependent on the development of leading-edge technologies. The challenges facing the countries are the development of technology strategies/policies to build, accumulate, utilise, and diffuse knowledge in the innovation process. This is because the technology strategies/policies provide mechanisms to guide firms in selecting technologies, mastering technological activities and diffusing innovations. The policy measures and the governmental strategies towards the knowledge-based economies straightforwardly concern the foresight procedure. According to Bowonder and Miyake's (1992, 1993) study, technological forecasting in Japanese firms was undertaken with an aim to create a competitive advantage and a more rapid development of innovation. The development of the national innovation system in Japan utilised network structures which facilitated the reduction of risk and uncertainty. Bowonder and Miyake also explored how Japan used technological forecasting to get useful insights on what future development would be like and which parties should be involved to carry out that vision. Ayres and Axtell (1996) held the view that technology forecasting, a method heavily employed by the Japanese firms, is a significant factor in minimising the risk and controlling uncertainty about the future.

However, in practice, it may not be easy to envisage the exact picture of a particular industry (technological forecasting) and thus foresight is an applied concept that permits a possible future based on an extrapolation of trend. Bowonder (1979) suggests that views about the future will have more real value if the timescale of foresight is long enough to allow the experts' view to create the vision of future situation independent of current conditionality. Loveridge (1996) supported the claim that to effectively foresee the future innovation process required expert opinion. Loveridge (1999) further argued that such foresight can be seen as an attempt to assess the future based on the substantive knowledge of expert in a particular situation. The following section will discuss Thailand's foresight efforts in promoting science and technology for social and economic development. Thailand employs the foresight exercise where expert views are used to better the understanding of the focused development of technological capabilities and to improve priority-setting for translating policies into action.

## **DISCUSSIONS ON INNOVATION MANAGEMENT TOWARDS THE KNOWLEDGE-BASED INDUSTRY**

To support technical change at the national level and to transform technology (invention) into innovation (commercialised product), there needs to be an interaction between the public and private sector (APEC Economic Committee 2000). The National Economic and Social Development Plan Number 9 covering the year 2002-2006 sets out the direction that the public and private sector work together in order to support knowledge production, knowledge transmission and knowledge transfer within an economy. Following our earlier conceptual discussion, this section presents an analysis of the Thai government's policies to help SMEs by using the National Science and Technology Development Agency (NSTDA) as the case study organisation. We discuss the structured approach of NSTDA in exploiting technology and manage innovations to achieve the knowledge-based economy.

### **NSTDA and its Role in Innovation Management**

The changes in the world at the end of the 20<sup>th</sup> century encourage governments to implement policies for the pursuit of science and technology development. Countries like Thailand take into consideration these changes and therefore, reconsider their approach to innovation management. Regarding the traditional approach, Thai industries rely on abundant materials and a cheap labour force in industrialisation. However, these two factors are no longer the points of advantage. The manifestation of economy has been towards using information as a factor for competitiveness. For Thailand's progressing up the ladder of development, it has set up the NSTDA (a special kind of governmental organisation under the Ministry of Science, Technology and Environment) with the mission of supporting research, development, design and engineering (RDDE) in scientific and technological areas critical to the country's development. Underlying the NSTDA mission goal are three operational goals: the support of public sector RDDE projects; the support of the technological strengthening in the private sector; and the disbursement of science and technology scholarships for study abroad and locally. In effect, NSTDA's function comprises four main areas of responsibility:

#### ***Research, Development, Design and Engineering***

The undertaking of RDDE includes the basic research, applied research to call for new scientific knowledge. The knowledge generation is to make effective application to the design of lab equipment and machinery.

#### ***Technology Transfer***

Technology transfer refers to the transfer of knowledge from innovation-oriented research projects to meet societal needs within the context of governmental policies.

#### ***Science and Technology (S&T) Human Resources Development***

The development of human capital is carried out by means of providing extensive education through schools, universities, vocational schools, distance learning approaches.

#### ***Enhancement of S&T Infrastructure***

The principal services entail testing/QC services, certification, consultancy, training/training co-ordination, intellectual property services to support research and development.

**Examples of Private Sector Supports**

**Table 3: Company Directed Technology Development Program**

Types of Activities	Types of Support		Benefits
	Technical Support	Financial	
<b>CD</b> Company Directed Technology Development Program	<ul style="list-style-type: none"> <li>• Support for engineering innovations development in the private sector</li> </ul>	<ul style="list-style-type: none"> <li>• Soft loan (5-7% not exceeding 20 million baht</li> <li>• Grant not exceeding 3 million baht</li> <li>• All within 50% of the project</li> </ul>	<ul style="list-style-type: none"> <li>• Research product and develop new manufacturing process</li> </ul>
<b>ICS</b> Industrial Consultant Service	<ul style="list-style-type: none"> <li>• Search and contact technical experts both local and overseas for 2 types of services 1. Analyze initial problem 2. Improve manufacturing technology</li> <li>• Technical advice from researchers</li> </ul>	<ul style="list-style-type: none"> <li>• Support money in using technical experts for 1. 3,000-5,000 baht per day but not exceeding 75% of the project cost 2. Up to 500,000 baht but not exceeding 75% of the project cost</li> </ul>	<ul style="list-style-type: none"> <li>• Solve technical problem in manufacturing process</li> <li>• Develop and improve manufacturing technology</li> <li>• Improve quality of product of the industry</li> <li>• R&amp;D new product and manufacturing process</li> <li>• Linking experts and research</li> <li>• Technical advice from experienced experts</li> </ul>
<b>STQC</b> Standard Testing Quality Service	<ul style="list-style-type: none"> <li>• Provide consultation and training on ISO 9000, ISO 14000, ISO IEC Guide 25 TGM, HACPP, GMP</li> </ul>	<ul style="list-style-type: none"> <li>• Provide support for partial cost for SMEs</li> </ul>	<ul style="list-style-type: none"> <li>• Receive information on international standards</li> </ul>
<b>STAMP</b> Support for Technology Acquisition and Mastery Program	<ul style="list-style-type: none"> <li>• Search for and transfer appropriate technology both local and overseas</li> <li>• Co-ordinate to receive technology or co-investment</li> </ul>	<ul style="list-style-type: none"> <li>• Support travelling cost within the set budget</li> </ul>	<ul style="list-style-type: none"> <li>• Educate on how to use appropriate and efficient technology</li> <li>• Receive technology transfer</li> <li>• Meet co-investors</li> <li>• Receive help in technology and business development</li> </ul>

Types of Activities	Types of Support		Benefits
	Technical Support	Financial	
<b>IPS</b> Intellectual Property Service	<ul style="list-style-type: none"> <li>• Advice on commercialization of intellectual property</li> <li>• Co-ordinate in searching for patent and technical information with the Department of Intellectual Property</li> </ul>	<ul style="list-style-type: none"> <li>• No cost for service but the private sector has to pay for search cost</li> </ul>	<ul style="list-style-type: none"> <li>• Technology info. from patent to develop business</li> </ul>
<b>Invest</b> Co-investment with the Private Sector	<ul style="list-style-type: none"> <li>• Research project with high commercialization potential technology that will affect economy development of the country</li> </ul>	<ul style="list-style-type: none"> <li>• Co-invest with the private sector</li> </ul>	<ul style="list-style-type: none"> <li>• Reduce risk in investing in new technology</li> </ul>
<b>R&amp;D</b> R&D with the Private Sector	<ul style="list-style-type: none"> <li>• Can be hired for research</li> <li>• Co-invest from the national centers for researches</li> </ul>	<ul style="list-style-type: none"> <li>• Support 50-70% of research cost investment</li> </ul>	<ul style="list-style-type: none"> <li>• Commercialization of the technology</li> </ul>
<b>Testing</b> Analyze and Testing	<ul style="list-style-type: none"> <li>• Analyze and testing service of products with updated technology and equipment from the national centers</li> </ul>	—	<ul style="list-style-type: none"> <li>• Can improve or innovate products with international standards</li> </ul>
<b>Training</b> Training and Seminars	<ul style="list-style-type: none"> <li>• Technology courses especially in the 3 main areas</li> </ul>	—	<ul style="list-style-type: none"> <li>• Human resource development updating on new technologies</li> <li>• Improve performance of technology management</li> </ul>
<b>TIAC</b> Technical Information Access Center	<ul style="list-style-type: none"> <li>• Technical and business information search service including on-line and CD-ROM</li> </ul>	—	<ul style="list-style-type: none"> <li>• Fast search on technology and business information</li> </ul>

In the market-led economies, the private sector plays the crucial role in industrialisation. Research and development is recognised as a key factor to generate technical changes and improvements in industry. However, in Thailand, the private

sector's spending in research and development is still negligible (Table 4)<sup>1</sup>. The problem is that although 80% of the firms in Thailand are SMEs, these firms generally do not engage in R&D activities. To put it another way, they tend to acquire technological capabilities from foreign sources at a superficial level – learning just to operate the systems. This clearly shows a passive learning approach of which they can only derive a limited stock of knowledge and build up limited capabilities<sup>2</sup>. Unless the government (public sector) initiates programmes for encouraging private sector to undertake R&D activities, it is unlikely that firms could acquire in-depth knowledge and expertise that are necessary to build up technological capabilities in the industry in the long term.

**Table 4: R&D Expenditures of Thailand**

Year	R&D Expenditures (US\$ million)	R&D as % of GDP	Share of private sector
1989	113	0.17	5.5
1991	154	0.20	8.0
1997	210	0.18	15.0
1999	197	0.18	N/A

*Source: The National Research council of Thailand, The National Science and Technology Development Agency*

Recognising the importance of private-sector technology development, NSTDA employs various policy measures. Among the policy measures to induce market-led economies are the following.

#### *R&D Financing*

As NSTDA's funding for R&D supports comes from the Thai fiscal budget, NSTDA becomes a major source of fund for providing supports to R&D activities in the public sector as well as private firms. At present, NSTDA has undergone the financial policies for SMEs by setting up NSTDA's Company Directed Technology Development (CD) program to provide financial support to enable private companies to invest in RDDE for commercialisation. The incentives to stimulate RDDE programmes in the form of financial assistance are grants and low-interest loans. Grants have a maximum limit of 75% of project expenses and do not exceed 3 million Thai baht (THB). The maximum amount given as a low-interest loan, which may cover up to a maximum of 50% of the total cost, is 20 million THB per project. The interest rate is one-half the interest rate for 1-year fixed deposits placed at banks plus 1.125% overhead charge. In granting loans, NSTDA considers that the research project of SMEs must accord to NSTDA's three priority areas, i.e. genetic engineering and biotechnology, metal and materials technology;

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<sup>1</sup> This percentage share contrasts with the situation in the advanced countries, where their private sectors accounted for 2-3% of GDP. The decreasing R&D expenditures in the year 1999 was an aftermath of the financial crisis.

<sup>2</sup> The contrasting approach can be seen in the case of Korea and Brazil. Differently, the Korean government took export policy measures to push the firms to acquire foreign technology and use it effectively to enable firms to be able to compete in foreign market (Enos and Park 1988). The active learning approach to accumulate technological capabilities can also be seen in the case of the USIMINAS steel plant in Brazil. See further in Dahlman and Fonseca (1987).

or electronics and computer technology (Table 5)<sup>3</sup>.

**Table 5: Laboratories for R&D Activities at NSTDA Science Park**

Genetic engineering and biotechnology
Food Biotechnology Laboratory Bioresources Research Unit Bioservice Unit Protein Engineering Laboratory Fermentation Technology Biochemical Engineering Mycology Laboratory Plant Genetic Engineering Unit Marine Biotechnology Unit Biochemical Engineering and Pilot Plant Medical Biotechnology Unit Cassava and Starch Technology Unit
Metal and materials technology
Particle Size Characterisation Laboratory Molar Mass Characterisation Laboratory Thermal Analysis/Vibrational Spectroscopy Laboratory Optical Microscopy Laboratory Scanning Electron Microscopy Laboratory X-ray Diffraction Laboratory Nuclear Magnetic Resonance Spectroscopy Laboratory Mechanical Testing Biocompatibility Testing
Electronics and computer technology
Network Technology Laboratory Linguistic and Knowledge Science Laboratory Software Technology Research and Development Laboratory High Performance Computing Centre Telecommunication Technology Research and Development Laboratory Electromagnetic Interference Research and Development Computer System Technology Research and Development Industrial Electronics Research and Service Laboratory Printed Circuit Research and Service Laboratory Laser Technology Research and Development Laboratory Electro-Optics Research and Development Laboratory

*Source: The National Science and Technology Development Agency*

#### *R&D Tax Scheme*

NSTDA undertakes the tax incentives to induce R&D investment in the private sector. In stimulating private-sector technology development, NSTDA offers tax incentives associated with setting up R&D laboratories and the related imports of

<sup>3</sup> <http://www.nstda.or.th>

machinery and equipment for use in R&D activities. The private businesses investing in R&D can deduct 200% of their R&D expenses for tax calculation<sup>4</sup>.

To encourage firm RDDE activities, other incentives include the increasing depreciation rate for laboratory equipment and machinery used in RDDE, the import duty exemption for the purchase of the equipment for RDDE, the tax exemption from sales of patents and inventions for a certain period of time.

#### *Technology Park - NSTDA Science Park For SME Incubation*

The conceptual framework of 'learning' mechanism has come to have important influence on industrialisation policies. The argument is that firms need to learn in order to be more efficient and competitive. The way of learning and assimilation can propel more developed capabilities in the innovation process. Surveys in Europe and the US suggest that business incubators have a positive impact on business creation and survival, claiming an 80% survival rate for incubated firms compared with a much lower average for those operating outside<sup>5</sup>. To set the process of learning into action, NSTDA has set up NSTDA Science Park to conduct R&D activities. The research carried out at NSTDA is in 3 major areas: genetic engineering and biotechnology; metal and materials technology; and electronics and computer technology. The laboratories or specialised research units shown in Table 5 reflect NSTDA's efforts to develop capabilities in specific technologies. The NSTDA Science Park operates as a true incubator to help develop innovations along the innovation life cycle as well as assist technology-based firms to embark on progressing along the industry life cycle. There is an important conceptual point here. That is – the progress of firms can also be seen as an output of learning. In the framework of this discussion, the NSTDA Science Park proceeds the role of innovation management by helping SMEs to commercialise R&D results, enhance the effectiveness of public-sector R&D, strengthen technological capabilities and national competitiveness.

To ensure the relevance of NSTDA's activities to the market demand of the industry, NSTDA pursues 'demand pull' strategy by simulating the concept of 'clustering' (Porter 1990) modelled on Silicon Valley in the US. In the US, public research, private (industrial) research and university research have often been closely<sup>6</sup> intertwined. The high technology incubators are set up to draw venture investment into the local economy. The mechanisms employed by NSTDA aim at coordinating and facilitating strategic collaborations and linkages between various research units, educational institutions and industrial sector. NSTDA is situated among the universities (Asian Institute of Technology, Sirindhorn International Institute of Technology, Thammasat University, Rangsit University, Bangkok University) which provide academic links to university research (as shown in Figure 3). It has established international collaboration links (as shown in Figure 4) to ensure that the networks add benefit and value of generating more business for the firms. To the extent that government support policies influence a step further for private firms, NSTDA has orchestrated the R&D attack by getting firms to think through together which approaches ought to be followed and what directions

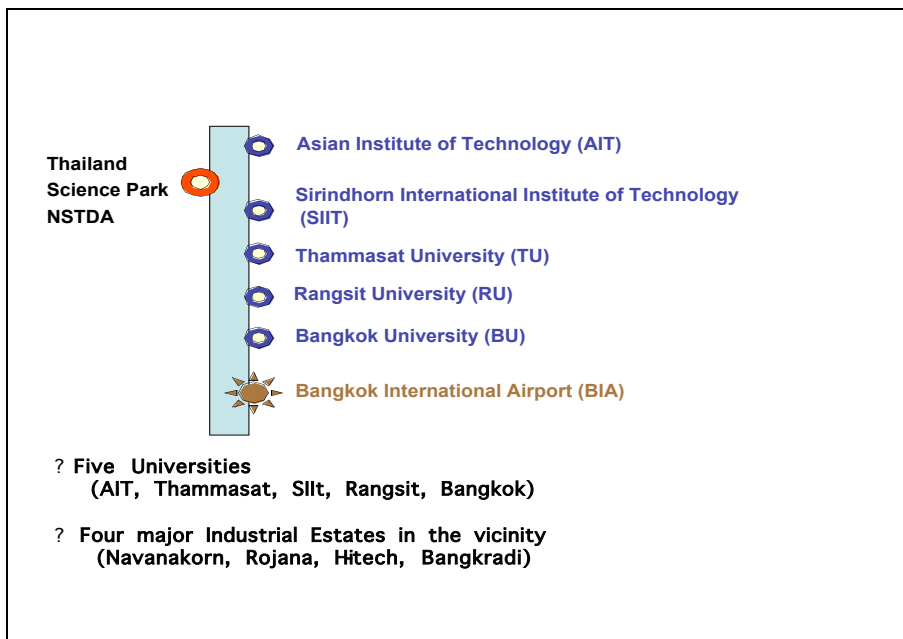
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<sup>4</sup> *Science and Technology Development Program, Thailand Development Research Institute Foundation.*

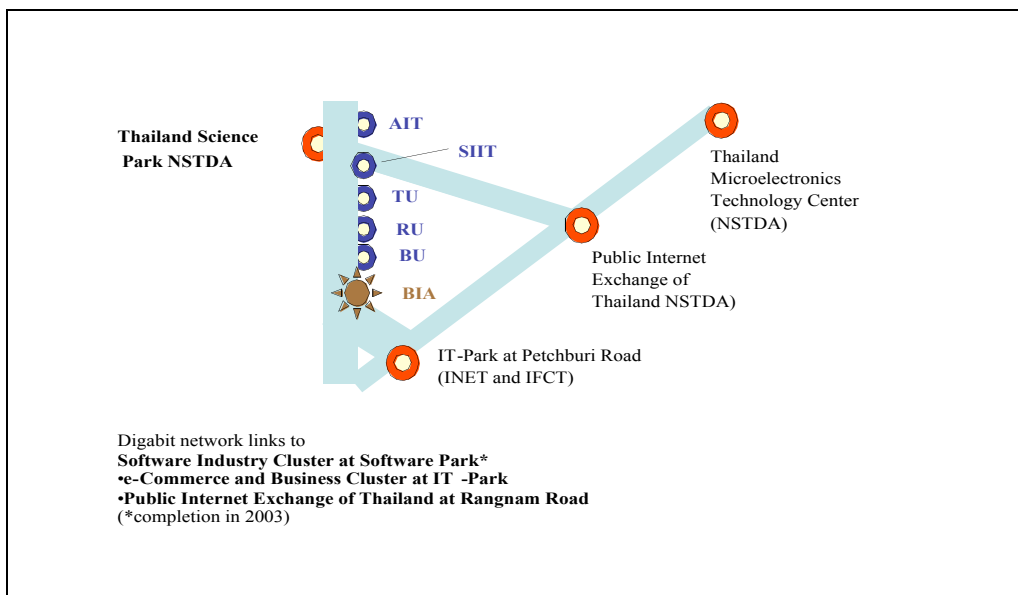
<sup>5</sup> *Coopers & Lybrand survey – see Financial Times 31 October 1995. EU Survey of BICs (1994) cited in the Enterprise Panel (1996) 'Growing Success: helping companies to generate wealth and create jobs through business incubation'.*

<sup>6</sup> *See Rosenberg (1985) and Thackray (1982).*

pursued if commercial primacy were to be achieved. Clearly, the NSTDA Science Park offers resources to get the potential firms off the ground.



**Figure 3: Technology Clusters of North Bangkok**



**Figure 4: NSTDA's Clustering Plan**



- **Japan: Communications Research Laboratory (CRL)**  
“CRL Localization Research Laboratory” at Thailand Science Park
- **Japan: National Institute of Informatic (NII)**  
Asia-Pacific Advanced Research Network (APAN)
- **Japan: Tokyo Institute of Technology (TIT)**  
JTEC: Distance Learning between TIT and Thailand Science Park
- **USA: National Science Foundation (NSF)**  
Internet2, I-UCRC Program with Thai Universities
- **European Union** Asia-Europe IT Program Management Office
- **Canada: TRILabs** -Thailand membership of TRILabs
- **Canada: National Research Council (NRC)**  
Industry Technology Assistant Program (ITAP)
- **World Bank** – IT – Empowerment for the Rural Areas
- **UNESCO** – Asian SchoolNet Project
- **UNDP**
- **Science Parks Around the world**  
IASP (International Association of Science Park)  
AURP (Association of University related Research Parks),  
NBIA (National Business Incubation Association)

**Figure 5: International Collaboration**

*Venture Capital Financing to aid diffusion of innovation*

It is a clear implication of conceptualising the problems in managing innovations that firms which have limited finance may not be able to invest in capabilities including R&D. As a result, there is a growing search for capital among entrepreneurial ventures. Currently, NSTDA is underway initiating its Venture capital project, a financing scheme to invest in emerging growth or high technology businesses<sup>7</sup>. One of the causes behind the relatively slow growth at the beginning of the S-Curve is the uncertainties in the start-up period. The rationale behind the Venture capital project is that banks are not normally an appropriate source of risk capital for small technology-based firms at early stages. Bank managers have difficulty in understanding the particular needs of technology-based firms. The acknowledged problem is that, for the banks' consideration to grant the loan, they are looking on average, for 15% return net of all costs to investor<sup>8</sup>. However, most start-up firms face many years of negative earnings and are unable to make interest and principal payments that would be required on a bank loan. Although it is true that rates of return have to be acceptable to institutional investors, returns on early stage funds are generally lower because the accomplishment rate remains unrealised, and has been valued conservatively. Yet, a commercially viable product does not necessarily exist at this stage.

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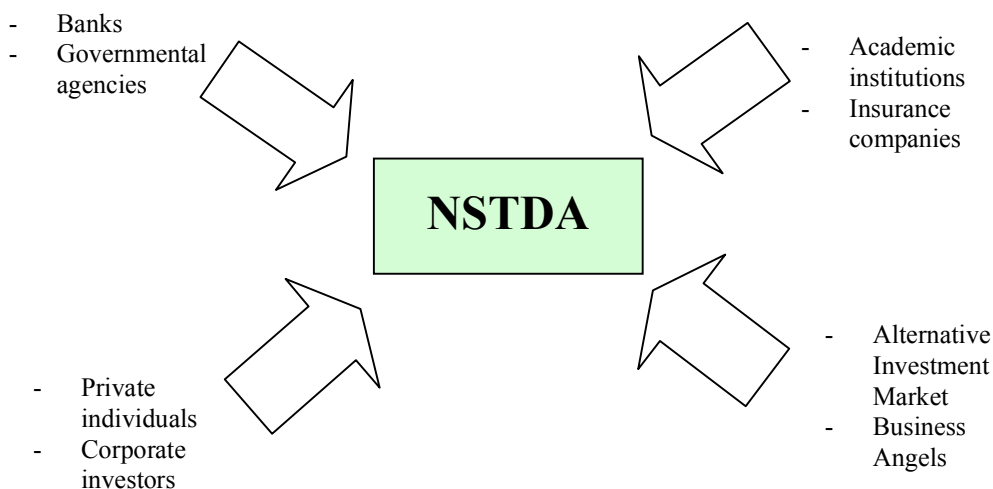
<sup>7</sup> According to the NatWest Report, Venture Capital is an organisation (or individual) prepared to invest long-term risk finance for the start-up and development of small and medium-sized unquoted companies that have significant growth potential.

<sup>8</sup> Seed Capital Limited – Lucius Cary.

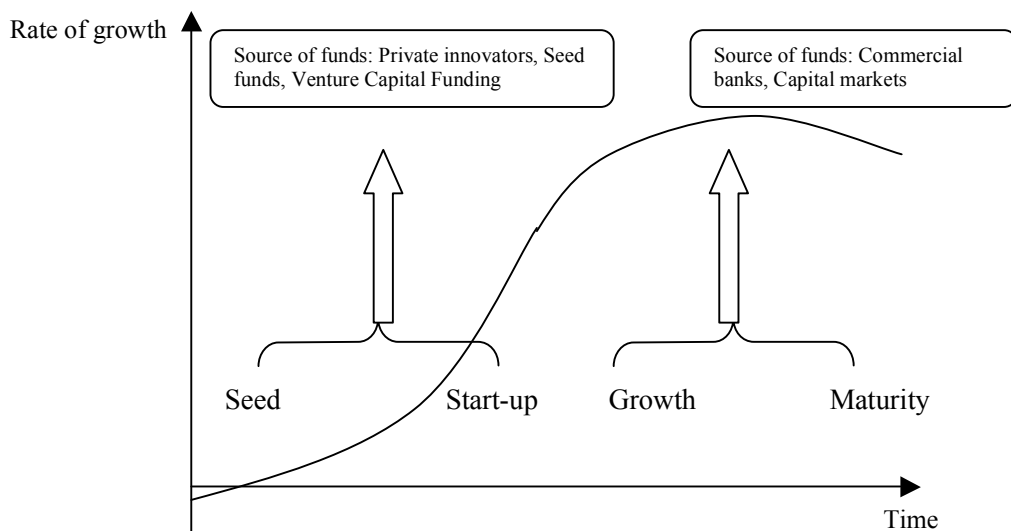
It is this aforementioned inability that hampers growth of technology-based firms.

The acquisition or development of new commercial opportunities necessitates additional, external funds. This is because it may not be desirable for the national economy, in terms of competitive advantage, and development of technological knowledge if finance is a barrier to the commercialisation of R&D. Figure 6 shows NSTDA's efforts to provide innovative financing mechanism. The way NSTDA structures its venture capital project from external sources lies in equity finance, from either business angels or formal venture capital firms. The objective of venture capital project is to develop a financial infrastructure that supports new 'knowledge-based' firms to progress from start-up to later stages of development (Figure 7).

The funding requirement linked to the stages of the innovation process may be the missing element in the life cycle. The difficulties of entrepreneurial firms to acquire risk capital vary depending on the stages of the innovation process. It is important to remark that the volatile and relatively slow growth of the S-curve concern the problem of technology investment. At the seed, start-up and early stages, a new entrepreneur needs equity financing. Also, seed funds or capital from private individuals would play an important part in the growth of technology-based firms. In later stages (growth stage onwards), capital markets are critical to the further growth of successful technology-based firms. Realising that R&D investment entails the risk and uncertainties, NSTDA is undertaking the venture capital project with an aim to facilitate the development of new technology-based firms and stimulate the application of commercialised research results generated by public sector enterprises. NSTDA plans to enter into joint ventures with investors in innovative technology projects or new technology-based-firms, and to invest in venture capital funds or new technology-based-firms in order to support R&D in the private sectors. It is hoped that the set up of Venture Capital would help prevent market failure that might happen in the existing grant system due to the budget constraints.



**Figure 6: The Venture Capital of Financing NSTDA**



Source: Adapted from Twiss (1995)

**Figure 7: Stages of Development for the Technology-based Firm's Lifecycle**

#### *Foresight For Technology Management*

On the ground of the foregoing analysis, foresight is another instrument in developing a strategy for specific sectors. It is a forward-looking process that takes into account the relationship among science, technology, economy, environment and society. The foresight exercise is widely taken place in various countries. For example, in the UK, it has set up the National Foresight Exercise to support and plan activities in various sectors of the country. In the US, the foresight exercise has taken place in the Ministry of Defence and the Ministry of Commerce. In Japan, the foresight launched by the Ministry of International Trade and Industry (MITI) enables the country's moving into the forefront of international R&D.

For Thailand, it has undertaken the policy instrument of foresight to identify national research priorities. The foresight project study 'S&T 2020' (Foresight in Science and Technology) aims to formulate a coherent vision of Thailand's science and technology within a 20-year timeframe. The views about the national guidelines for future economic development are developed among 2,677 people including well-qualified personnel and experts from the public sector, private sector and disparate group of people. The brainstorming was held in 2 forums and oriented towards building up the knowledge-based industry. The foresight is applied in a wide range of economic sectors: agriculture; manufacturing; service; education, culture, healthcare and welfare system; environment, energy; and communication and telecommunication (Table 6)<sup>9</sup>. The far-right column of Table 6 shows some specific considerations when undertaking the research and development. Although foresight cannot point to a clear picture of future research, it identifies the base of scientific and technological activities that need to be stimulated over the years.

<sup>9</sup> *S&T 2020 Vision – Status and Strategies (The National Science and Technology Development Agency)*

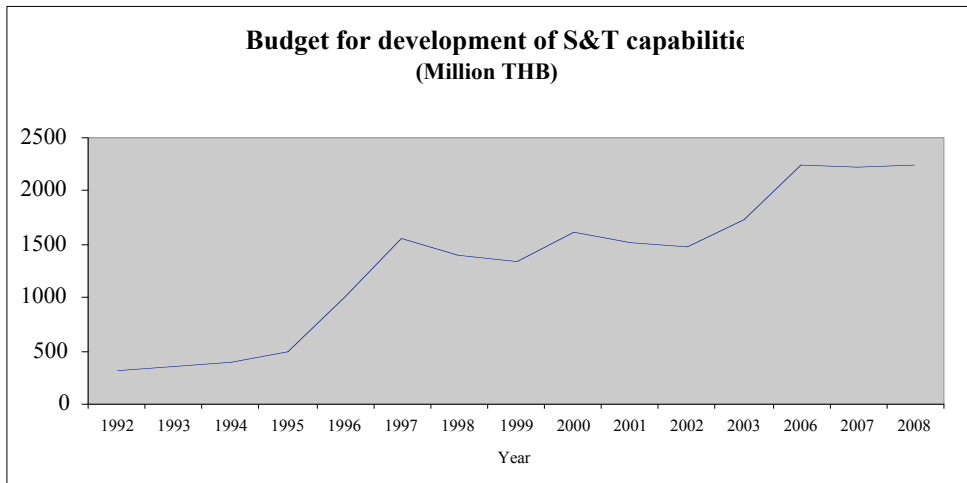
**Table 6: Considerations from Technology Foresighting in the Development of an Innovative Knowledge-based Economy**

<b>Economic sector</b>	<b>Specific considerations</b>
1 Agriculture	<ul style="list-style-type: none"> <li>• Biotechnology to improve plant and animal breeding</li> <li>• Food quality assurance system for export increase</li> </ul>
2 Manufacturing	<ul style="list-style-type: none"> <li>• Reduce vulnerability and risk of foreign technology dependency</li> <li>• Clean technology for reducing environmental impact</li> <li>• Improvements in materials - composite material for effective production</li> </ul>
3 Service	<ul style="list-style-type: none"> <li>• R&amp;D in supply chain management, customer relationship management, electronic commerce for online marketing</li> <li>• Multimodal transportation for improved service operation</li> <li>• Simulation for increased ability of aviation, shipping and transportation system</li> </ul>
4 Education, culture, healthcare and welfare system	<ul style="list-style-type: none"> <li>• Classroom instruction with wide applications to improve human capital</li> <li>• Advanced medical systems for replacement of traditional treatment to improve the quality of life for patients</li> <li>• Research in post-genomic medicine for improved genetic study</li> <li>• Production of essential pharmaceuticals for domestic use</li> </ul>
5 Environment	<ul style="list-style-type: none"> <li>• R&amp;D to improve and sustain the environment</li> <li>• Development of eco-system to protect the environment</li> <li>• Energy saving and pollution control</li> <li>• Clean technology for environmental quality</li> <li>• Contribution to technology recycling</li> </ul>
6 Energy	<ul style="list-style-type: none"> <li>• Energy-saving and energy-efficiency</li> <li>• Biomass – natural gas, water as alternative energy sources to aid sustainable economic development</li> <li>• Solar cell to improve electricity generation</li> </ul>
7 Communication and telecommunication	<ul style="list-style-type: none"> <li>• Hardware (computer components) and software to support high performance computing activities</li> <li>• Advanced network of internet protocol to better communication</li> </ul>

*Source: S&T 2020 Vision – Status and Strategies  
(The National Science and Technology Development Agency)*

The foresight exercise provides valuable information for science and technology policy in the private sector. To turn foresight directions into practice, the results from technology foresighting have been refined as an input to the national policies. In any case, technological advances are often a result of appropriability conditions. Of course, the successful implementation needs co-ordination among actors in the innovation system.

Therefore, the government must implement an intensive policy with R&D budget large enough to enable the move into the future. The support of government to develop an innovative knowledge-based economy through budget is shown in the graph below.



*Source: The National Science and Technology Development Agency, Budget report to defend fund availability for RDDE before the Parliament.*

*Note: The declining budget in the year 1998 is a result of economic recession.*

**Figure 8: Budget for Development of Scientific and Technological Capabilities**

Before the financial crisis developed, the economy of Thailand was growing without restraint (the gross domestic product (GDP) from 1987 to 1991 grew at around 10 percent annually and 7-8 percent thereafter<sup>10</sup>). Thailand is a newly industrialising country whose government emphasises various policy measures to build entrepreneurs of knowledge. The budget for developing technological capabilities can be seen as policy enabler. From the year 1992 to 1997, it can be seen that the budget increased by 1,229 million THB or 387%. However, after years of economic growth, then things changed. The currency crisis forced Thailand to float the THB currency on July 2, 1997. This devaluation plunged the country into a financial turmoil and had an important influence on the budget allocated to support the government's planned activities. The downward trend outlined in this graph after the year 1997 was a consequence of a financial crisis. Even so, the overall budget in the forthcoming years is increasing (although at the decreasing rate). This increase could be seen as a deliberate commitment throughout the economic uncertainty to maintain the momentum in developing S&T capabilities.

## **CONCLUSIONS AND POLICY IMPLICATIONS**

In this paper, the discussion has highlighted some interesting issues about the attempts of Thailand to develop technological capabilities and support SMEs towards the

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<sup>10</sup> *The GDP information obtained from the National Economic and Social Development Board (source: [www.nesdb.go.th](http://www.nesdb.go.th)) [Comment: This reference appears incomplete. Is there a publication or report linked to this?]*

knowledge-based economy. The study builds upon the combination of the innovation life cycle and the industry life cycle models. From the discussion, it can be seen that, of all the various innovation models, it is the 5<sup>th</sup> generation of Rothwell (Rothwell's concept of "System Integration and Networking Model" that is best able to explain the innovation process development. The Rothwell framework provides implication for managing innovations: emphasis on fostering networking in the economy.

Thailand will be able to survive in the rapidly changing economy provided the organisations and industrial sectors learn through R&D activities (not copy and development activities). This is because the method of learning, to some extent, determines the accumulation of technological capabilities. In effect, there needs to be collaboration between the public and private sectors in terms of developing the linkages and networks to push forward the governmental policy measures. This paper discusses the role of government, especially NSTDA, in producing effective mechanisms to support private enterprises. The focus throughout this paper has been on the technology and innovation management. As shown in the discussion section, the NSTDA's policy is in line with the National Economic and Social Development 9<sup>th</sup> plan in emphasising the development of R&D activities. The foresight about the Science and Technology 2020 (S&T 2020) suggests that the Thai government must attach importance to the national programmes covering 7 economic sectors. The way in which technology foresight would be attained needs aggressive entrepreneurial approach to rejuvenate the economy.

In order to achieve an economic recovery and attain higher economic development, the policy implications from the study are as follows:

- 1) The government has to develop the quality of personnel in the field of science and technology in order to survive the increasing competition. This is because human capital is the key for national competitiveness. Attempts to improve the quality of the manpower should be made through dissemination of knowledge to people at every level by using technology advancement in electronics, computers, communication, and telecommunication.
- 2) In setting the national aim, the government should look forward to the international trend and assess its position with determination to make policy changes for moving towards the knowledge-based economy. By this is meant the educational system needs adjustment in terms of stimulating self-learning to gain knowledge. In other words, the educational system should be changed from teaching-teacher to learning-learner system. The adjustment of curriculum and learning process is required to ensure that scientific and technological activities are part of the educational system. Virtual education through the use of internet is seen as an opportunity to promote 'learn without limit'. The web-based courses, therefore, need to be developed with the help of academics from various educational institutions.
- 3) As intellectual property rights are the important mechanism to promote the knowledge-based economy, the government should revise its policy regarding the protection of the rights that would benefit the SMEs. The laws dealing with the intellectual property rights should be revised and amended to promote knowledge production, knowledge transfer and knowledge dissemination.
- 4) Recognising the need to revive an economic recovery, the government should take the lead in initiating the research projects that would benefit the SMEs. The governmental budget should be used to invest in the research that would help resolve economic, social and environmental problems. When a long term perspective is taken into account, it is suggested that the resources be directed to

the projects that the SMEs cannot do or can do but not producing worthwhile returns to their investments.

- 5) The government should reformulate the measures to eradicate poverty. It should also undertake the policies to promote economic stability, construct basic economic infrastructure, devise efficient management system across industries. Unless the policy measures are applied to and accepted by all economic sectors, the industrialisation process cannot be achieved and the problems encountered by the industries cannot be rectified.
- 6) In undertaking the policy to support the SMEs for economic development, the government should facilitate the process of granting loans and render the protection of know-how by intellectual property law. In terms of mechanisms to help Thailand augment the ability to carry out further innovations, the red-taped process should be rectified and the maintenance fee with respect to the intellectual property rights should be inexpensive.
- 7) The government should help the SMEs to administer successfully the quality management system. To do so, it is necessary to educate SMEs to understand the requirement of the system so that they can apply to benefit their organisation. The ISO 9000 can give a contribution to the SMEs on the development of competitiveness. The SMEs would then gain confidence in building up competencies in industry competition. Furthermore, the successful implementation of quality management system would provide a basis to achieve sustainable economy.

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## Program and Schedule

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Symposium on Entrepreneurship in Knowledge-based Industry  
[23-26 July 2002, Republic of China]

### Day 1 - Tuesday, 23 July 2002

Forenoon

Opening Ceremony

*“Corporate Entrepreneurship and Innovation: Key Thrusts in the Knowledge-based Economy (KBE)”*

by Prof. Tan Wee Liang, Professor, Singapore Management University, Singapore

Afternoon

*“Entrepreneurship Development Program in Higher Education Institution in ROC”*

by Prof. Yue-Shan Chang, Director, Institute of Communication Management & Management Studies Research Center, National Sun Yat-sen University, Republic of China

Country Paper Presentation (I)

### Day 2 - Wednesday, 24 July 2002

Forenoon

*“Entrepreneurship and Innovation—Towards the Application of Knowledge Management in Malaysia”*

by Dato Mustafa bin Mansur, Executive Chairman, Manewtech-Belle Sdn. Bhd., Malaysia

*“Internet—the Driving Force for Transition to a Knowledge-based Society”*

by Dr. Chingteng Hsiao, Chief Knowledge Officer / Vice President, Yam Digital Technology Co., Ltd., Republic of China

Afternoon

Field Visit (Industrial Technology and Research Institute [ITRI])

### Day 3 – Thursday, 25 July 2002

Forenoon

*“The Role of Venture Capital for Knowledge-based Industry”*

by Mr. Gilbert Ma, President, Fortune Consulting Group, Inc., Republic of China

Country Paper Presentation (II)

Afternoon

*“A Knowledge Management Model for SMEs in the Knowledge-based Economy”*

by Dr. Moon-Kyum Kim, Professor of Entrepreneurial Finance, School of Entrepreneurship and SME Management, Soongsil University, Republic of Korea

Country Paper Presentation (III)

Day 4 – Friday, 26 July 2002

Forenoon

Syndicate discussion

Outcome Presentation by Group

Summing-up Session and Closing