Maintaining the Economic Edge through Education in ASEAN

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Introduction

The World Bank, in its 1993 publication of a special report titled *The East Asian Miracle*, noted the growth enhancement of educational levels in the rapidly growing East Asian economies as follows:

In nearly all the rapidly growing East Asian economies, the growth and transformation of systems of education and training during the past three decades has been dramatic. The quantity of education children received increased at the same time that quality of schooling and training in the home, markedly improved. Today, the cognitive skill levels of secondary school graduates in some East Asian economies are also comparable to or higher than, those of graduates in high-income economies. (World Bank, 1993: 43)

Crafts (1999) examined East Asian growth before and after the Asian financial crisis and acknowledged that unusually strong efforts to accumulate human capital and to improve and develop imported technology are the "strong positives" in the Asian economies

The onset of the Asian financial crisis, however, changed all that. Countries badly hit by the crisis, included Indonesia with a -13.7% real GDP growth rate in 1998, followed by Thailand (-8.0%), Malaysia (-7.4%), South Korea (-5.84%) and the Philippines (-0.48%). Singapore was less affected by the crisis with a positive real GDP growth rate of 1.5% in 1998

Krugman (1994), in responding to the "East Asian Miracle," pointed out that the remarkable record of the East Asian miracle was matched by extremely rapid growth in inputs, so that Asia's economic growth ceases to be an incredible mystery. Nelson and Pack (1997) and Felipe (1997) further divided the theories of the "East Asian Miracle" into two groups: the first group are the "Fundamentalists," associated with accumulation theories, who claim that growth in the region was mainly input driven, as a result of investments in moving these economies "along their production function"; second, there are the "Assimilationists," associated with assimilation theories, who ague that the essential component of the recipe followed by the East Asian countries was the acquisition and mastery of foreign technology, and the capacity to put ideas into practice. These theories stress the entrepreneurship, innovation and learning that these economies had to go through before they could master the new technologies they were adopting from the more advanced industrial nations; and they see investment in human and physical capital as a necessary, but sufficient, part of the assimilation process. For the fundamentalists, rising human capital is treated as an increase in the quality of labor, while the assimilationists see the effects of sharply rising educational

attainments as creating the personnel for successful entrepreneurship. Both groups of theorists accept human capital investment as instrumental in creating the manpower needed for economic development.

The economic environment of the ASEAN countries has changed dramatically in the last decade in ways that have revolutionized business styles within East Asia. China has accelerated its open door policy since 1992, and as an export production base with lower labor costs, has attracted foreign direct investment (FDI). In this regard China has been overtaking ASEAN. The Asian currency crisis of 1997 had also affected China less than ASEAN. Rates of economies have declined in the ASEAN economies while China has maintained high growth rates. Moreover, China by opening its markets to a greater extent with its entry to the World trade Organization (WTO) has encouraged overseas investment firms to expand their business operations, not only for export but also for access to the domestic market. Even Japanese firms, which have always been pro-ASEAN in their investment operations, are expanding their business activities in China. The entry of China with lower labor costs and a growing market will gradually pull away the bulk of FDI flowing to the ASEAN region. There is widespread concern in some ASEAN countries that they may be loosing their edge in competition to China.

As most ASEAN countries are still relatively weak in the local technological capacity to innovate in the face of competition from China, they still view FDI as an important channel for gaining access to foreign technological capacities for the immediate future. Even though ASEAN countries in the short-term will have to depend on FDI for their continued industrial technological development strategies, these may not be adequate in the long run to compete with economies of China and India.

The changing economic environment in East Asia has propelled ASEAN to seek strategies that will allow them to overcome the challenges individually as well as collectively. As ASEAN is gradually loosing its comparative advantage of its abundant unskilled labor, it is faced with a number of strategies to follow in order to retain its edge in industrialization. Among the range of strategies available, ASEAN countries can follow two strategies in order to increase their human resource potential. Firstly, there is a need for them to transform themselves from a mass production-based economy to a knowledge-based economy. Secondly, there is a need in many ASEAN countries to increase the national levels of technology and skills. The former strategy will require ASEAN economies to transform themselves from mass production-based ones relying on unskilled or semi-skilled labor to knowledge-based ones. The pursuit of knowledge-based economic activities will comprise research and development, product and service design, high value added processing and marketing for the domestic, regional and global destinations. Knowledge-based economic activities will require human and intellectual capital with a mass of creativity and innovation potential (Ariff, 2003). The latter strategy involves the increase of local levels of technology and skills. Both rapidly industrialized economies, as well as those starting out on industrialization, either have low levels or inadequate levels of technology and skills. In all ASEAN countries, the capacity of technology transfer from foreign firms to indigenous firms has brought only limited successes. In Thailand, for instance, most firms do not invest in technological development (Punyasavatsut and Pooponskorn, 2003). Most firms in the Philippines are not aware of the importance of technology and how to improve their technological level (Lamberte et. al., 2003). In Singapore, which

has gone far ahead of other ASEAN countries to invest in increasing local levels of technology and skills, upgrading has been hampered by the absence of a local technology base and lack of other capabilities that are evident in developed economies (Lim, 2003). Because of their limited knowledge, indigenous firms are unable to develop core technologies and climb up the technology ladder.

Thus, each ASEAN country needs to change its industrial policy from those types most often followed, which provide subsidies and protection to specific sectors, to types encouraging more market competition of a kind that strengthens the formation of capacity for human resource development, and for technological and skill development.

This paper examines the attempt by ASEAN countries to develop their human resource potential in order to meet the new challenges of continued growth that they face. The first part of the paper comments on the individual approaches and efforts undertaken (or the lack thereof) by individual countries. The place of education in the macroeconomic performance of ASEAN countries is examined in the second section. The third part of the paper describes the restructuring efforts undertaken by Singapore to further strengthen its manpower resource. Singapore is used as case study to point out the path that may be followed by other ASEAN countries depending on their position in the industrialization ladder.

Education in the macroeconomic performance of ASEAN

It is interesting to note that among the developed countries of Europe, formal education expansion appears to have followed rather than preceded economic growth. In the developing countries, in general, the process is reversed, with economic growth following the expansion of formal education. In the case of East Asian countries, educational growth preceded economic growth, as by the early 1960s there were high rates of literacy and enrolment ratios in schools (Tilak, 1998: 22).

Booth (1999) has noted that Southeast Asian countries, in coping with cultural and colonial barriers, were forced to undertake drastic measures, which included a heavy investment in education public housing and family planning programs in Singapore, pro-Malay affirmative action in Malaysia, a compulsory nine-year education cycle in Thailand, and increased government expenditures on education due to the oil-boom in Indonesia.

The gross enrolment ratios (GER) for ASEAN countries from 1960 to 1996 are shown in Table 1. Korea is included for historical and comparative purposes. The year 1960 is indicative as a base year before rapid economic growth began, while 1996 indicates the year before the onset of the Asian financial crisis. In the 1960-1965 period, Singapore and the Philippines appear to have a better human capital endowment with gross primary enrolment exceeding 100 percent and secondary GERs reaching 33 to 39 percent and tertiary GER reaching around 10 to 20 percent. The GER for Singapore and the Philippines were actually better than Korea during the period.

During the 1970 to 1975 period, the Philippines and Singapore were still leading with Vietnam starting to follow up. The primary and secondary GERs of the Philippines and Singapore were already comparable with Korea during this period. In the 1980 to 1985 period, almost all the countries of ASEAN had universal primary education. The highest GER for secondary schooling was the Philippines with 65.3

percent followed by Brunei (63.0%). Philippines also had the largest GER for tertiary (24.6%) followed by Thailand (16.8%).

Table 1: School Enrolment Ratios in ASEAN and Korea.

Country	Levels	1960-65	1970-75	1980-85	1986-90	1991-96
Brunei	Primary	N.A.	N.A.	106.8	114.2	109.8
	Secondary	N.A.	N.A.	63.8	65.3	77.5
	Tertiary	N.A.	N.A.	1.8	4.2	5.9
Indonesia	Primary	71.5	83.0	113.7	116.0	114.5
	Secondary	9.0	18.0	35.3	46.4	45.3
	Tertiary	1.0	N.A.	5.3	9.2	10.5
Korea	Primary	97.5	105.6	104.3	100.6	99.3
	Secondary	31.0	49.0	84.2	92.0	96.0
	Tertiary	6.0	N.A.	24.3	38.6	48.1
Laos	Primary	32.5	55.5	110.3	108.4	107.5
	Secondary	1.5	5.0	22.3	25.6	25.3
	Tertiary	0.1	N.A.	1.0	1.3	1.7
Malaysia	Primary	93.0	89.0	97.2	95.8	100.5
	Secondary	23.5	38.0	50.5	57.2	58.2
	Tertiary	2.0	N.A.	5.0	7.2	10.0
Myanmar	Primary	63.5	83.0	96.5	104.0	120.6
	Secondary	12.5	21.0	23.3	24.3	26.5
	Tertiary	1.0	N.A.	4.6	4.1	5.3
Philippines	Primary	104.0	107.5	109.2	110.4	111.5
	Secondary	33.5	50.0	65.3	70.6	76.8
	Tertiary	19.0	N.A.	24.6	27.4	28.6
Singapore	Primary	108.0	107.5	108.8	104.4	102.7
	Secondary	38.5	49.0	57.5	68.8	67.0
	Tertiary	10.0	N.A.	10.7	18.6	28.7
Thailand	Primary	80.5	83.0	97.7	98.0	92.5
	Secondary	13.5	21.5	30.2	28.6	45.0
	Tertiary	2.0	N.A.	16.8	16.2	19.3
Vietnam	Primary	N.A.	119.0	105.5	104.0	110.2
	Secondary	N.A.	46.0	42.5	39.0	37.4
	Tertiary	N.A.	N.A.	2.0	1.9	2.9

Source: World Bank Index, CD Rom.

Korea in this period had outpaced the Philippines and Singapore in terms of GER for secondary schooling. During the 1986 to 1990 period, Philippines and Singapore led again in the GER for secondary and tertiary education.

During the 1991 to 1996 years, Brunei outpaced Philippines and Singapore in

terms of secondary GER while Philippines and Singapore still led in GER for tertiary education.

The above observations indicate that Singapore and the Philippines were front-runners for educational achievements in ASEAN between 1960 and 1996. The two countries also had the highest educational attainments for ASEAN with total mean years of education during 1986 to 1987 reaching as high as eight years for the Philippines and seven years for Singapore (see Table 2).

Table 2: Total mean years of education attained in ASEAN and Korea.

Country	1960–65	1966–69	1970–75	1976–79	1980-85	1986-87
Indonesia	2.0	2.0	3.0	3.0	4.0	4.0
Korea	3.2	4.0	4.8	5.8	6.7	7.5
Malaysia	3.0	3.5	4.0	5.0	5.5	6.0
Myanmar	1.0	1.0	1.5	2.0	2.0	3.0
Philippines	5.0	5.5	6.0	6.5	7.0	8.0
Singapore	2.5	3.5	4.5	5.5	6.5	7.0
Thailand	4.0	4.0	4.5	5.0	5.2	6.0

Source: Easterly W. and Ross Levine (1999: 61).

Table 3: Scientists and Engineers in ASEAN and Korea, 1991 to 1996.

Country	Per million people
Brunei	N.A.
Indonesia	N.A.
Korea	2,636
Laos	N.A.
Malaysia	87
Myanmar	N.A.
Philippines	157
Singapore	2,728
Thailand	119
Vietnam	308

Source: Akhmad Bayhaqui, 2001.

However, Singapore seems to have made more improvement since the 1960s, as its human capital stock was lower than the Philippines, Thailand and Malaysia during the 1960 to 1965 period. By 1991 to 1996 period, Singapore had the highest numbers of scientists and engineers in Research and Development (R&D), compared with Korea and other ASEAN countries (see Table 3).

Table 4: Annual GDP growth in ASEAN and Korea Percent (%).

Country	1960–65	1970–75	1980-85	1986-87	1991-1996
Brunei	N.A.	2.5	-3.9	0.4	0.8
Indonesia	2.0	7.9	6.2	7.1	7.8
Korea	5.9	8.1	6.3	10.0	7.4
Malaysia	3.0	3.5	4.0	5.0	5.5
Laos	N.A.	N.A.	N.A.	10.5	6.5
Myanmar	N.A.	N.A.	N.A.	N.A.	N.A.
Philippines	5.2	5.4	-0.1	4.7	2.8
Singapore	7.0	10.4	6.8	8.4	8.3
Thailand	7.2	6.7	5.4	10.3	8.1
Vietnam	N.A.	N.A.	3.8	4.8	8.4

Source: Source: Akhmad Bayhaqui, 2000: 25.

Comparison of GDP growth also shows that Singapore was the only country with growth rate at or even higher than 7% for the period 1991-1996 (see Table 4). For the Philippines, some observers have argued that natural disasters often stalled the growth process, while Thailand, Indonesia and Malaysia showed good growth records in GDP. Soon (1992) has noted that the Singapore government's early and continued emphasis on education and manpower development and its subsequent upgrading of its skilled manpower contributed significantly to its rapid economic growth.

Since 1960, Singapore has produced the highest output per worker. This is followed closely by Malaysia (see Table 5). By the late 1980s, Singapore had outstripped all ASEAN countries in output per worker. The Philippines lacked improvement even though the amount of output per worker outpaced Thailand's by the early 1980s. The depreciation of the *baht* in 1986 improved the price competitiveness of Thai exports, resulting in manufacturing exports increasing by an average of 29% per year in volume in the 1986-1990 period. Thailand also benefited from the surge of direct investment from Japan and the Asian newly industrialized economies in their effort to generate offshore production. The booming Thai economy of the 1980s created strains in both the physical and human infrastructure (Wahawisan, 1992). Shortages of skilled labor, like engineers and technicians, critically affected the growth of the Thai economy. This is reflected in the number of scientists and engineers who were engaged in R&D (see Table 3).

From the available data on educational expenditure by ASEAN governments, we notice that Singapore devoted more resources, especially to tertiary education.

Malaysia, again emerges second in ASEAN, in allocating resources to education. During the period 1965-1995, developed and developing countries spent 5 to 6 percent and 3 to 4 percent respectively of their GNP for education. When this figure is translated into the share of education in the governments' total budgets, the developed countries appear to have spent 15 to 20 percent (Tilak, 1998: 31-32). In the case of Malaysia and Singapore, the shares of education in the governments' budgets were only 5 percent and 4 percent respectively (see Table 6).

Table 5: Output per worker in ASEAN.
[International price]

Country	1960–65	1966–69	1970–75	1976–79	1980-85	1986-87
Brunei	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Indonesia	1,635.5	1,673.5	2,158.5	2,892.0	4,013.7	4,593.0
Laos	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Malaysia	4,499.5	5,178.3	6,962.8	8,392.8	10,594.8	10,793.6
Myanmar	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Philippines	3,177.5	3,598.5	4,125.5	4,844.0	4,917.5	4,529.4
Singapore	5,344.5	6,782.3	11,278.3	14,017.0	17,136.8	21,325.0
Thailand	2,648.0	2,646.3	3,195.3	3,908.8	4,519.5	5,709.0

Source: Akhmad Bayhaqui, 2000.

ASEAN at the crossroads in human resource development.

Industrial upgrading and the formation of knowledge-based economies require a large and highly qualified human resource base, in particular scientists and engineers. In order to meet the human resource demand, ASEAN countries need to increase their human resources, both in terms of numbers and levels of skill. ASEAN governments are cooperating in the implementation of high quality education programs.

The Singapore government is restructuring its education sector so as to accommodate a shift towards a knowledge-based economy. In line with this goal, Singapore is building up an education hub in the rapidly changing Asia Pacific region. This will provide Singapore with its own pool of talent to engage in research and develop new knowledge-driven companies. The Singapore government is planning to increase the number of foreign students studying in the country. Many of them will be provided with scholarships and will be sent to work for various Singapore based organizations after their education is finished. Singapore is also concerned with the issues of entrepreneurship and risk-taking among its people.

Table 6: Expenditure on education by governments in ASEAN and Korea [Percent (%) of GDP].

Country	1960–65	1970–75	1980-85	1986-87	1991-96
Brunei	N.A.	N.A.	N.A.	N.A.	N.A.
Indonesia	1.4	1.8	2.0	1.8	1.6
Korea	2.3	2.6	3.2	2.9	3.3
Malaysia	5.4	5.4	5.6	5.9	5.2
Laos	N.A.	N.A.	N.A.	N.A.	N.A.
Myanmar	2.2	1.6	1.8	2.1	1.6
Philippines	N.A.	N.A.	N.A.	N.A.	N.A.
Singapore	2.9	3.1	4.6	4.6	3.8
Thailand	2.9	3.5	3.9	3.1	3.3
Vietnam	N.A.	N.A.	N.A.	N.A.	N.A.

Source: International Monetary Fund, 2000.

Malaysia has launched many education programs to meet the demand for human capital in a knowledge-based economy. The government aims to achieve a 60 to 40 ratio of science and engineering course students from the present ratio of 40 to 60. The teaching of science and mathematics in English was introduced in schools and universities in 2003. The government has converted all secondary vocational schools to secondary technical schools. A consortium of eleven public universities has provided a distance-learning course for students, and technical and business courses have been set up. Meanwhile several advanced skill-training courses have been introduced. At the Japan-Malaysian Institute, German-Malaysian institute, British-Malaysian institute, and Malaysia-France Institute, specialized courses are offered in mechanics, industrial engineering technology, avionics engineering and multimedia development . Besides these formal types of education, employers in all economic sectors can apply to the Human Resources Development Fund, which provides financial assistance for apprenticeship training and computer purchases, enabling firms to retrain and upgrade the skills of their workers. To increase the number of skilled employees, the government has awarded "Multimedia Super Corridor" status to companies to employ foreign knowledge workers.

Most workers in Thailand have completed only elementary school education. In addition, entrepreneurs themselves also lack modern management insights. As a result, Thailand will find it difficult to shift to a knowledge-based economy. The 9th Five Year

National and Social Development Plan, which started in 2002, includes a human resource development strategy for increasing the number of those who have completed secondary school and who have graduated in science fields. Subsidies will be given for tuition fees and food, and plans that promote science study will be exempted from taxation. By initiating teacher-training projects, Thailand plans to develop and promote basic knowledge at all levels of education, and especially in elementary, secondary and vocational education. Meanwhile teachers will be trained in the special techniques necessary for teaching entrepreneurs to improve their knowledge and skills. Training will be provided in fields necessary for business operations, and links will be established between educational institutions and the business sector, with the aim of facilitating teaching in educational institutions by industrial specialist volunteers.

Indonesia has an education policy for improving the quality of primary school and secondary education by reforming the examination system, curriculum, textbooks, teachers and the management and administration of education. Tertiary education institutions such as universities have been given autonomy in the administration of education activities. But, Indonesia has budgetary constraints in supporting much-needed vocational schools.

The Philippines government has not been able to align its education system toward a globally and technologically competitive economy. Schools in the Philippines do not provide the requisite technical skills and knowledge. Recognizing the importance of education, policymakers implemented in the school year 2002-2003 a new curriculum called the Basic Curriculum, aiming to raise the quality of school graduates. Tertiary education is expected to supply the higher-level skills needed for competitiveness while middle-level skills will be acquired during the technical and vocational education and training for which the Technical Skills Development Authority is responsible.

In its 2001-2010 strategy on education and training development, Vietnam will give priority to improving the quality of education and training in human resources among managers, entrepreneurs and skilled workers. The Vietnamese government plans to revise the school curriculum and will introduce textbooks that combine theory with reality, and knowledge with experiment. Teaching capacity and education methodology will be improved, and education management will be reformed so as to provide more autonomy. Schools and universities will develop in directions conducive to promoting collaboration between Vietnamese schools and foreign partners in providing education and training. In order to meet the social needs of a changing country, education is expected to be standardized, diversified, modernized and systematized. The government is also studying the possibility of establishing an indicator system needed for training, which will help to provide education services to meet the practical needs of the economy.

From the above it will be evident that formal education has been emphasized with regards to development. It has received subsidies to a large extent for human capital development. As formal education alone is not seen as sufficient for an indigenous technological and skill development strategy, a broad policy framework is needed for indigenous firms to develop their technological and skill levels. The ASEAN governments, apparently, have not provided enough programs and facilities to nurture indigenous technology and skill development.

Issues of creating a cadre of entrepreneurs in centrally planned educational

systems have received much public discussion in Singapore. The Singapore government is planning strategies to overhaul the education system. Malaysia too has to initiate systematically changes to its science and technology policy in order to persuade MNCs to foster "technopreneurship" so that indigenous technology development will follow. Thailand has not established a skill and technological learning system to enable it to compete with new technologies. Skill formation and technological capability development obviously depends not only on economic incentives but also on policy environments. Improvement of education may be inadequate for skills formation and production activities. Supporting institutions are necessary for industrial upgrading processes. Provision of public goods such as education for the labor force, physical infrastructure, an R&D environment, and law and order will provide clear signals of the development orientation.

Singapore, Malaysia and Thailand have definite plans for developing knowledge-based economies, whereas Indonesia and the Philippines do not have substantive plans due to budgetary constraints. Vietnam has an industrial policy for the period 2001 to 2010 aimed at targeted industries, but has no overall policy framework for the improvement of indigenous technological and skill levels.

Singapore has established a task force and committees to review the economic and industrial restructuring for the knowledge-based economy. One of these is the Technopreneurship 21 Ministerial Committee, set up in 1999, aimed to develop pro-enterprise environment.

Malaysia has launched an industrial master plan, IMP2 (1996-2005) that focuses on raising competitiveness. An aspect of IMP2 is to promote and nurture local small and medium enterprises (SMEs) to become reliable and competitive manufacturers and suppliers to leading industries. Other supplementary strategic supports include fiscal incentives, business matching, programs supporting technological development, skill upgrading, export and market development, and provision of industrial sites for SMEs. Malaysia's industrial technology planning has also provided for research and development grants, tax incentives for research and development, loan and venture capital programs, and a venture capital fund.

Thailand's 9th Five Year Plan from 2002 is also designed to encourage technological development. The government has planned to allocate funds to stimulate enterprises that are currently unaware of their development potential. A Skill Development Fund has been started to promote training courses in cooperation with the private sector and the educational institutes. Subsidies for firms investing in technological development have also been announced. A testing center for the products of SMEs will also be established. While planning for improving entrepreneurship skills, the government has also volunteered to provide long-term credit for the purchase of new technological machinery.

The Philippines apparently lacks the comprehensive institutions and support industries to enhance technological capability. A handful of the larger firms benefit from innovative packages, while the government-private sector linkages are extremely weak. Though various plans have been formulated, most of them remain largely on paper awaiting implementation.

The 1997-98 Asian financial crisis scuttled all plans by Indonesia to develop its technology base. Macroeconomic stability and economic recovery remain the major focus of Indonesia at the present moment.

Education as an Industry: The Case of Singapore.

Malaysia and Singapore are two countries in Southeast Asia to have identified education as a potential area for profitable growth. Many of the institutions in Malaysia, however, are offshore establishments by foreign universities, set up to recruit the Malaysian students need for their twinning programs and overseas university degrees. Singapore resisted this kind of development, and instead developed its own national institutions like the National University of Singapore, the Nanyang Technological University, and later the Singapore Management University. It has allowed the operation of some off-shore programs operated by outside universities and colleges so that Singaporean and migrant students can obtain such degrees, but the government remains reluctant to recognize all degrees obtained in off-campus programs or through distance learning. University of London programs, for instance, remained unrecognized as long as they were obtained through distance learning. Such a policy, however, did not deter thousands of students from continuing to seek off-campus degrees taught by private education colleges in Singapore.

By the mid-1980s, Singapore recognized the education sector as one of the eighteen service sectors to be nurtured and promoted, in order to remain economically competitive (*The Singapore Economy: New directions*, February 1986). Education was identified as having the potential to bring considerable revenue, both adding to the net worth of the economy as well as having an export potential.

In facing the challenge of becoming a KBE, Singapore believes developing as an education hub is one solution to the problem of developing a technology base as advanced as that of developed economies. It has committed itself to developing a talent pool to pursue advanced research and also creating the necessary atmosphere and educational infrastructure to draw on the best talents worldwide so as to engage them in research, teaching, study and work in new knowledge driven companies. A larger talent pool is not only expected to benefit the existing companies but also to attract more global companies to Singapore.

As an effort to boost knowledge based industries, the government has drawn up a plan to transform education into an industry. Currently education constitutes 1.9% of GDP and is expected to increase to 5% of GDP in a decade. The government is building on Singapore's long reputation of educational excellence in order to help increase the number of private institutions by attracting established universities from the developed countries.

In line with the policy of reinventing Singapore in the 21st century, an Economic Review committee was established by the government. The group examined the existing economic and non-economic policies and recommended major policy changes for economic growth in a knowledge-based economy. A 'Subcommittee on enhancing Human Capital' examined the areas related to education.

Singapore has developed a highly proactive policy to import "foreign talent" to bolster its intellectual base. The search for global talent has multi-faceted directions. In recent years, students from China, India and Indonesia have been encouraged to come to Singapore. In the of China, there are currently 50,000 Chinese students studying in 200 schools in Singapore, and the government hopes to increase this number to 150,000 in a decade. Most of these students are provided with scholarships and bonded

to serve in various organizations in Singapore after their education. It is hoped that at least 15 per cent of them will remain on in Singapore. Foreign research talent is also being recruited from China and India. The surge in the number of foreign students over the next decade is expected to generate 22,000 new jobs. This will increase the education sector's contribution to GDP from 1.9% to 5% (*Straits Times*, September 22, 2002).

Two approaches have been proposed to develop education as a business in Singapore. At one level, a concerted effort has been undertaken to implement the plan to attract at least ten world-class universities to establish a significant presence in Singapore within ten years. This is to ensure Singapore as a center of educational excellence at the post-graduate level in the Asia Pacific. At the second level, the contribution of education as an industry generating revenue, jobs and services has been examined and plans drawn up.

As the first of these approaches could be facilitated through government investment, the Economic Development Board in 1998 embarked on the plan to attract universities with advanced post-graduate research to establish links with the national universities in Singapore. Even though the national universities in Singapore have always been encouraged to form links with leading universities in developed countries, the new approach was intended to create a talent pool for both R&D as well to generate revenues. Table 7 shows the universities that have been attracted to set up joint programs at Singapore. As shown in the table, most of these universities are recognized for their cutting edge research and promoting revenues through R&D.

At the second level, the contribution of education as an industry generating talent, jobs and revenue was taken up for policy formulation. In 2000, the education industry contributed S$3 billion to the Singapore economy. This accounted for 1.9 percent of the GDP. Worldwide, education is a U.S.$2.2 trillion industry and employs 5% of the global workforce. *Business Week* (2002) has estimated that the United States education industry, as the world's largest, brings in U.S.$800 billion in annual revenue for both public and private institutions. Education is a significant service export for Australia and the United Kingdom. Education contributed 5.5% to Australia's GDP, and 5.6% to UK's GDP in 1999. Australia has responded aggressively in building both on-shore and offshore learning facilities to expand its participation in the education industry.

The global export market for higher education has been estimated to be U.S.$30 billion in 2000 (APEC services Group). There were already 1.8 million international students pursuing their higher education abroad (UNESCO, 2000). About 45% of these students come from Asia with China, Korea, Japan, Malaysia and India identified as the top five source countries. The demand for quality higher education is expected to increase significantly, especially with a growing middle class in the region. Singapore's plans to maintain its excellent public infrastructure for quality education has bestowed on it both competitive advantages as well as constraints. Among the first of these advantages is the fact that Singapore is ideally located in the midst of countries with large populations, including China, Korea, Japan, Malaysia, India and Indonesia. It is has frequent air-links to all these countries. Second, it has already established itself as a country of educational excellence. It has already evolved an education system, the students from which perform well above expectation at top universities worldwide.

Table 7: World Class Universities (WCU) links in Singapore.

Year	World Class Institution	Links/Alliances	Purpose
1998	Massachusetts Institute of Technology (MIT)	NU.S. and NTU The Singapore MIT Alliance (SMA)	Singapore – MIT alliance to set a new standard for global engineering and boost technopreneurship. E.g. Advanced Materials and High Performance Computation for Engineering Systems & Innovation in Manufacturing Systems Technology, Computer Science, Molecular Engineering of Biological and Chemical Systems.
	Johns Hopkins University	Johns Hopkins-NUH International Medical Center.	12 projects focusing on diseases in the region. To produce scientific advances, to produce patents, spin-off companies and international conferences.
1999	Georgia Institute of Technology	The Logistics Institute – Asia Pacific (TLI-AP)	18 month dual Masters Program by adopting leaders in logistics program to work with leading companies like HP, UPS. Research on air - sea cargo transportation, petrochemical manufacturing etc.
	The Wharton School of the University of Pennsylvania	The Wharton- SMU Research Center	Focus on business research in Singapore & the Asian region, E.g. Technological innovation, entrepreneurship, management of technology, e-commerce etc.
2000	INSEAD	S$60 million campus at the Science Hub	MBA programs, executive programs and Asia related research.
	The University of Chicago Graduate School of Business.	A residential school of business.	International MBA Executive programs to attract executives from the Asia Pacific region taught by same faculty that teaches at Chicago and Barcelona campus.
2001	Technische Universiteit Eindhoven (TU/e), Netherlands	Design Technology Institute (DTI) at the NU.S.	Master of Technological Design (MTD) degree to train engineers to translate technical concepts into real products for competitive markets.
2002	Technische Universitat Munches (TUM)	Joint Masters degree in Industrial Chemistry	Specialized skills for the chemical industry incorporating business and managerial Concepts.

Source: Various newspaper reports.

Thirdly, Singapore already serves as a business hub for all types of corporations from China to India and has clear policies that facilitate the movement of people, goods, money and information. Finally, Singapore remains a cosmopolitan and progressive place in which to live and work, with low crime rates, and strict law enforcement. The

constraints on developing education as an industry stem from its historical development. While education was viewed as highly valued public good requiring the investment of scarce financial resources, it was mainly oriented to providing education for Singaporeans. Even when education expanded to allow 30% participation by overseas students in the tertiary sector, this was done to meet manpower requirements for Singapore's industrial development.

A second constraint is that the education provided by the private sector has largely remained non-accredited, and students of privately-run university programs were not recognized as having had valid training. As a result the private sector provision of education lacked a system of quality assurance. This has resulted in uneven quality among the professors, teachers and instructors employed in privately funded institutions. A third constraint has been the high cost of land and building space in Singapore. This is compounded by a lack of student housing, stringent immigration rules and shortage of related services.

Based on a comparative study of the approaches undertaken by Australia, United States and United Kingdom, Singapore's Economic Restructuring Committee has proposed the development of a "self-sustaining education ecosystem" offering a diverse mix of quality education services that can contribute to economic growth, capacity development and attracting talent to Singapore. It is envisaged that this ecosystem will create a network of institutions that will raise educational standards, and create more choice for Singapore students. It will also ensure that education as an industry will contribute to Singapore, and is expected to increase the contribution of the education services sector to the Singaporean economy beyond the current 1.9%. The money from institutional and fee-paying international students is seen as a form of exports earnings for Singapore. Besides allowing broader human capital investment, it is also expected to produce life-long learning opportunities, as the government sector will not be able to cater for all forms of capacity development. The education ecosystem is to become a magnet for attracting talent as a result of an increased flow of international students. Even if all the international students do not work in Singapore after graduation, they are expected to create a global network of Singapore alumni around the world.

In order to realize the proposed vision, well-known institutions are to be encouraged to use Singapore as their offshore education centers, constituting a wide range of educational service providers. The aim in this vision is to attract fee-paying students. Most of the present public investment will continue to be concerned with Singapore's needs, while the private sector will be encouraged to look after the needs of the international students. Thus, the proposed strategy is to encourage differentiation and the establishment of more institutions at various levels of education.

The market potential for treating education as an industry is immense, given that Singapore has an estimated 1% of the global population of 1.8 million international tertiary students. NU.S. and NTU are already recognized as being among the top regional universities (*Asiaweek*, 2001). Both universities attract good undergraduate and postgraduate students from overseas. Thus, with a bigger pool of branded universities, Singapore will become an educational hub, attracting even more tertiary students from overseas. The presence of branded universities in Singapore may also reverse the present talent flight among graduates of Singapore's polytechnics seeking degrees from overseas universities. Currently, it is estimated that 40-50% of students

from polytechnics are looking for a degree outside Singapore.

A sectoral approach has been planned for the education hub concept (Figure 1). The four educational sectors of the education hub are as follows: "preparatory and boarding schools," "tertiary institutions," "commercial and specialty schools," and "corporate training centers." They would work towards meeting the consumer and corporate demand for skilled manpower, both local and regional. As the East Asian region integrates economically, more students are expected to view the Singapore education hub as a destination for education. The four sectors would also require supporting services that will include not only education-related activities but also housing, food and health care among many others. The next section elaborates the generative capacities of each of the four sectors of the Singapore education hub.

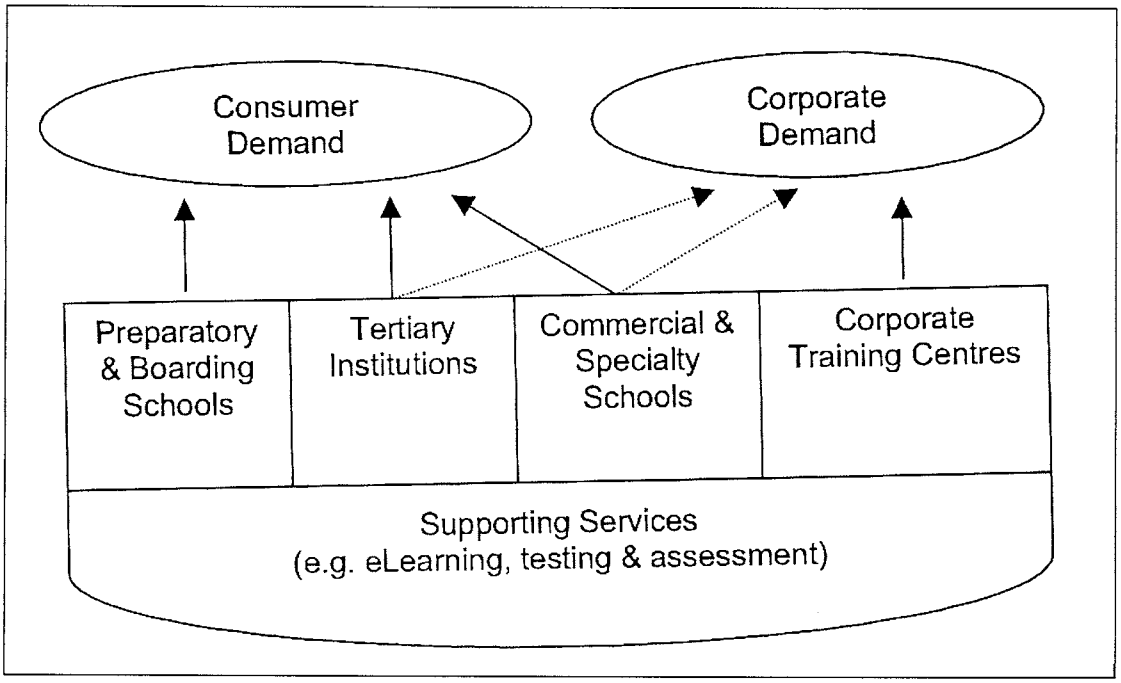
Tertiary education segment will be of crucial importance as Singapore's economy becomes knowledge based. A multi-tiered system of tertiary education has been planned to attract fee-paying students (see Figure 2). The highest level would attract top rated universities from across the world, to either establish offshore campuses in Singapore or run joint programs with established national universities in Singapore. These programs help create specific niches for world-class R&D and help transfer knowledge to industry. Thus, the presence of world-class universities (WCUs) will help develop postgraduate education in R&D areas, as well as provide limited undergraduate education in selected areas.

The existing universities – NU.S., NTU and SMU – will continue to train the necessary manpower along the lines proposed by the Singapore government in directing its human capital growth. The three universities will continue to attract the most talented students from the Singapore school system, as well as top students from outside through incentives like scholarships to study at these universities.

The third tier would consist of additional private universities. These could be local in origin or foreign universities working together with local partners. They would attract both local and international students, all of which would be fee-paying.

The above model may require that Singapore review its university cohort participation rate (UCPR) among students. As of now, around 21% of each Primary 1 cohort carries on to universities in Singapore. In addition, another 8,000 Singapore students who go overseas for their university education, and working adults pursuing degrees in various programs in Singapore could be attracted to study at the new universities. The Ministry of Education is already exploring the possibility of a university student population that would have 60,000 undergraduates and 12,500 postgraduates. Of these, 40,000 undergraduates and 10,000 postgraduates are expected to come from overseas. This would automatically create a larger proportion of international students than Singapore students.

Figure 1: Sectors of the Singapore Education Hub.

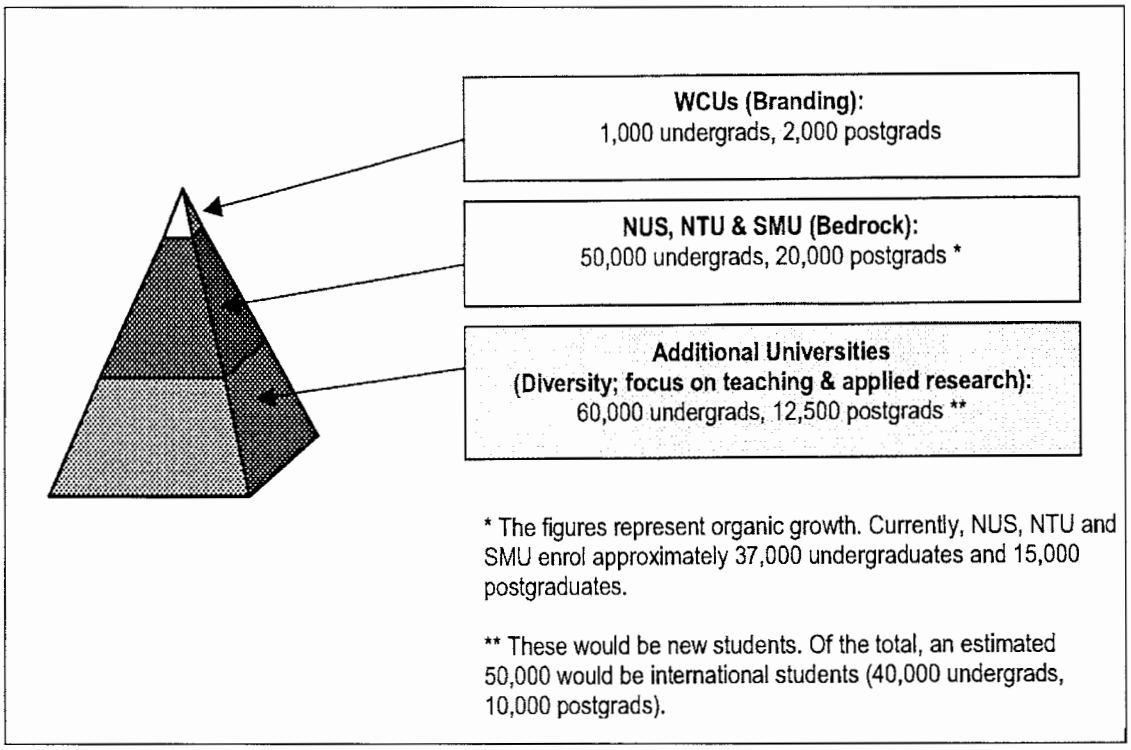


Source: *Economic Review Committee Report*, Singapore, 2002

The 'commercial and specialty' schools have already blossomed into an industry. They have been the route for obtaining educational credentials by most young people unable to continue up the competitive education ladder in Singapore. In 2002, there were a total of 110,000 students, both local and international, enrolled in more than 300 private schools, teaching commerce, information technology, fine arts and languages (MOE Statistics, 2002). The schools are market-driven and are profit-oriented. Some of them offer professional diploma and degree programs, but they suffer from challenges such as uneven instructional quality, lack of quality teachers and lack of recognition of their qualifications by the public sector.

Of the 6,000 multinational corporations (MNCs) in Singapore, around 50% of them also undertake regional operations. Many of them provide training to their own employees in technical, operational and management skills. Currently, most MNCs try to have a minimal training staff, preferring instead to hire professional trainers or use online training programs. There are no corporate universities or research centers in Singapore. This is an area awaiting significant development, and offers considerable potential for Singapore becoming an educational hub for corporate and executive education.

Figure 2: The tertiary sector of the Education Hub.



Source: *Economic Review Committee Report*, Singapore, 2002.

In the preparatory and boarding schools sector, there has been a steady expansion in the number of students coming from outside Singapore. The public schools operated by the Ministry of Education, attract a significant number of students from the Malaysian state of Johore. Most of them study in schools in the northern part of Singapore where they commute daily between their homes in Johore and Singapore. There are also private international schools that cater to the children of multinational corporate families. Schools like the Australian International School and the United World College take in children of foreign executives based in the region. There is also an increasing international demand for spaces in local schools. Those secondary schools that are independent of the close supervision of the Ministry of Education admit a large number of fee-paying students. If the preparatory and boarding schools sector could be developed, they are expected play an important feeder role for the tertiary sector of the education hub. The four sectors of the educational hub will also promote a range of support service industries related to learning, including publishing, content production, testing and assessment, and licensing and franchising.

Conclusion

This paper has attempted to develop the notion of education as an industry, focusing on the case of Singapore as well as that of the ASEAN region. The possibility in some countries in the ASEAN region to use education as a source of economic development. The experience of Australia and the United Kingdom show that education can

contribute to a country's GDP. Each country has over 100,000 full-time international students.

The ASEAN countries have worked together to provide education as a common good to their citizens. There have been only sporadic attempts to make education a growth sector of the economy. The Philippines, Malaysia and Singapore had opportunities in the past to develop education as a growth sector. Given their historical use of English and a large national market for education, all three countries have moved to expand education, following the examples of Japan, South Korea and Taiwan. Malaysia, in the last decade, had allowed the creation of twinning programs and the establishment of campuses by Australian and British universities. This, however, was an attempt by overseas institutions to establish offshore campuses and programs in Malaysia to offset the decline in students traveling overseas as a result of the Asian financial crisis. This has left Singapore as the only country with an international reputation for educational quality and manpower training. It was also the country that was affected least by the financial turmoil that upset the other member of ASEAN in the late 1990s.

Singapore, in its economic restructuring efforts, has developed the notion of creating an education hub which will make education a sector of economic growth. This policy is exceptional within the ASEAN region. Singapore plans to increase education from to between 3 and 5 percent of GDP. Employment would rise to 22,000 (estimated) jobs, of which 13,000 would be teaching-related, and 9,000 would in the administrative, managerial and specialist areas. The current existing stock of 50,000 international students would be increased to 100,000 full-time international students and 100,000 foreign executives coming to Singapore for shorter training courses of a week on average. According to the projections, the tertiary segment would be the biggest incremental contributor to the economy, followed by the commercial and specialty schools, corporate training centers and executive education, and finally the preparatory and boarding schools.

As the participation of fee paying Asian students in the international student movement is expected to rise to slightly more than 50%, Singapore's vision of using education as an industrial sector will be possible if it removes some of the obstacles that have existed historically. Singapore will also face issues related to educational quality, student visas, manpower, land and space and finally a change in its ideological framework. Singapore will have to extend the quality assurance that it provides for public education to private sector education. Its current view of education as a public good that is to be given to only those who will benefit the society will have to be abandoned. It will have to treat education as a commodity that can be bought at a price by consumers. Singapore would also have to extend public sector recognition to all forms of educational training in Singapore, and allow the market to identify and rank its institutions of learning. Educational planning may need to be decentralized while providing minimal guarantees for educational quality. In regulating the sector, the government will have to allow its operators the freedom to develop the sector. The MOE will have to set up accreditation mechanisms so that consumers will be convinced of the quality and credibility of courses offered by the various institutions. These are difficult decisions that Singapore will have to make in order to develop its education hub.

Student visas have always been restrictive, requiring a range of documents from

applicants intending to study in Singapore. These include the originals of marriage certificates, educational certificates of parents, parental income-tax assessments for the past three years and records of money in the bank. Once a visa is approved, students face problems of restrictions on working, short-term visas, and a lack of transparency in the methods used by the Singapore immigration authorities allowing changes in visa status.

Private schools face insurmountable challenges in the availability of quality teachers as the single institution empowered to train them, the National Institute of Education, is only committed to training teachers for the public schools.

As the cost of land and space is comparatively high in Singapore, the existing private schools are uneven in their basic infrastructure. Currently, a section of the city along Bras Basah Road and Selegie Road is being developed as an educational area housing many institutions. But more purpose-built campuses and buildings may be needed to establish the industry. Student housing is another area that needs to be looked into in order avoid exploitation of international students by unscrupulous landlords.

All these factors may be easily overcome, given Singapore's ability to devise measures that encourage economic growth. Singapore's land and population size is similar to that of Victoria State in Australia, or the Boston area in the United States. The former supports 8 universities and 40 smaller colleges, while the latter has 65 universities and colleges. Singapore is confident of emulating these models and making education a growth sector. Beyond the administrative capacity for transformation, however, Singapore will have to come to terms with its ideological views of itself as a nation-state. So far, students in Singapore have been led by socialization at schools to believe in the nation-state. This may have to be adjusted and renegotiated if international students form the core of the education industry, and instilling the notion of the nation-state ceases to be a major priority. As education becomes an integral part of the industrial sector, Singapore faces a critical challenge of having citizens who may not want to view citizenship as involving rights and obligations, but more as something that gives them personal advantages. Singapore may also face competition if its neighbors view the industrialization of education as something that could contribute to their own individual growth and regional integration. If other ASEAN countries also join in the race to develop educational hubs, Singapore may face newer challenges.

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