

Developing Education and Human Resources in East Asian Knowledge-based Economies

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Abstract

This paper seeks to introduce some of the major issues related to the development of education and human resources in the context of a knowledge-based economy in East Asia. A competitive educational infrastructure is a pre-requisite for any knowledge-based economy to create the necessary knowledge workers. In a rapidly changing competitive world, the transformation of the educational sector is required for creating and maintaining the knowledge-based economy. In this case, this paper addresses broadly various issues related to the development of a competitive educational infrastructure in the East Asian knowledge-based economies. From the discussions and data analysis of East Asian countries in this paper, it is quite evident that the advanced knowledge-based economies such as Japan, Korea, Taiwan, Hong Kong and Singapore are highly successful in the development of education and human resources in the region. Furthermore, due to the demographic transition, some economies started considering foreign labor force as an additional solution to supply the necessary human resources for their economic development.

Keywords:

Human Capital Development, Quality Education System, Secondary Education, Tertiary Education, Knowledge-based Economy

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INTRODUCTION

The purpose of creating a knowledge-based economy (KBE) is to have a globally strong and competitive economy to maintain sustainable economic growth towards overall development of a country. The East Asian economies have been pursuing necessary policies to create a KBE in order to continue their economic development in the post-industrial era and to be globally competitive. In doing so, the countries have been putting enormous efforts to develop the education and human resources. Countries like Japan, Korea, Taiwan, Hong Kong and Singapore have shown remarkable achievements in creating a successful KBE by ensuring a highly competitive education infrastructure and a pool of highly competent human resources.

This paper seeks to introduce some of the major issues raised for the development of education and human resources in the context of a KBE in order to identify the key factors of education and human resources in East Asian knowledge-based economies (KBEs). A competitive educational infrastructure is a pre-requisite for any KBE to create the necessary knowledge workers. In a rapidly changing competitive world, the transformation of the educational sector is required for creating and maintaining the KBE. In this case, this paper addresses broadly various issues related to the development of a competitive educational infrastructure in the East Asian KBEs.

THE CONCEPT OF KBE AND UNDERSTANDING THE ROLE OF EDUCATION AND HUMAN RESOURCES IN A KBE

The term ‘KBE’ is quite new in the literature (OECD, 1996; Leydesdorff, 2006 and David and Foray, 2002). The term ‘KBE’ was first introduced by the Organization of Economic Cooperation and Development (OECD). OECD (1996:7) describes KBE as an economy that is directly based on the production, distribution and use of knowledge and information. Later, Asia Pacific Economic Cooperation (APEC) extended this idea and came up with a definition of KBE as “an economy in which the production, distribution, and use of knowledge is the main driver of growth, wealth creation and employment across all industries” (APEC, 2000:2).

Many scholars attempted to define KBE by looking at different aspects of

investments of knowledge. In doing so, Khan (2001:4) looked at the different possible components of 'Investment in Knowledge' (IK), and attempted to define the KBE. He tried to make a list of common components of IK considering the common factors such as innovation and research and development (R&D), software, marketing, human capital, and organizational capital. Khan (2001:4) suggested a more concrete list of IK by saying that the expenditures directed towards activities with the aim of enhancing existing knowledge and/or acquiring new knowledge or diffusing knowledge are called IK such as R&D expenditure, education expenditure, software expenditure, training expenditure, innovation expenditure, and industrial design expenditure.

The term 'KBE' stems from the fuller recognition of the place of knowledge and technology in modern OECD economies (Chartrand, 2006:8). Chartrand (2006:8) further argued that the importance of knowledge and technology diffusion requires better understanding of knowledge networks and national innovation systems. A knowledge economy is either focused on the economy of production and management of knowledge, or a KBE (Drucker, 1969). The second conceptualization of Drucker that is frequently used refers to the use of knowledge to produce economic benefits which provides more concrete understanding of the first conceptualization. The phrase was popularized if not invented by Peter Drucker as the heading to chapter 12 in his book 'The Age of Discontinuity' (1969:263).

In an introduction to a special issue on the topic of what is KBE, David and Foray (2002) warned against using the metaphor of KBE. They cautioned that the terminology was coined recently, and noted that "as such, it marks a break in the continuity with earlier periods, more a 'sea-change' than a sharp discontinuity" (David and Foray, 2002: 9). 'Knowledge' and 'information' should be more carefully distinguished by analyzing the development of a KBE in terms of codification processes (Cowan, David and Foray, 2000: 211–253). Indeed, some observers, such as David Wolfe (2002), argued that the so-called 'new economy' should more properly be called 'a learning economy' because of the transitory nature of knowledge.

Although definition of KBE slightly varies among different scholars, the importance of education and human resources development is pointed out by all scholars as an integral pillar of KBE. One of the foremost important areas for

governments is to facilitate the education sector to grow aggressively to create the necessary human resources that is needed in a KBE. The main objective for the education system in a KBE is to bring out the best in every school child, developing sound morals and skills necessary to meet the demands of the rapidly changing world. Education in the KBEs plays a very important role in promoting social and economic changes by expanding the pool of professionals and executives as the governments' education policy is designed clearly to create the human resources that the KBEs require for sustainable development. As a result, the education policy in all the KBEs emphasized science and technological aspects of education. However, other fields of studies are also emphasized but left to the demand for the economic growth. Kong (2004), in this regard, mentioned:

“In most recent times, even while great emphasis has come to be placed on the life sciences in particular, and increasingly nanoscience and nano-engineering, a simultaneous acknowledgement of the importance of broad-based multidisciplinary learning is also evident. In all these varied thrusts, one motivation remains paramount – finding an educational emphasis that will provide the country with the requisite human resources to fuel the economy. Thus, educational strategies have in large part been used to meet economic needs through the production of a suitably qualified workforce.”

Kong (2004:1)

In the KBEs, the governments' main goal in formulating education policies was to expand science and technology education to meet the demand for science and technology human resources in the competitive global economy. Time to time, the governments re-examine their educational policies and re-enforce the old policies with new initiatives and in some cases, they also create new policies. Regarding this, Kong (2004) pointed out:

“In responding to these key developments in the economy, educational policies have been once again re-examined. It became necessary to reshape education towards placing a higher premium on innovation, flexibility, entrepreneurship, creativity and a commitment to lifelong learning. The role of science and technology remains important but increasing attention has come to be given to broad-based multi-disciplinary efforts in curricula, including some expectations that scientists and engineers learn humanistic modes of inquiry”.

Kong (2004:5)

To foster greater creativity and innovation among students, many countries launched special program in the education development which focuses on developing students into active learners with critical thinking skills, and on developing a creative and critical thinking culture within schools. In the recent policy formulations for education, many governments are moving towards making information technology, biotechnology and some other core science subjects obligatory for undergraduate study. Special policies, too, have been formulated to address life sciences and biotechnology. Over the years since 2000, the governments created a number of systems to provide funds for R&D in the universities.

THE EAST ASIAN KNOWLEDGE-BASED ECONOMIES

Most East Asian countries including Japan were poor in the mid-1960s. There was no significant gap between the selected East Asian and African countries in terms of per capita income. However, by the end of twentieth century, the selected East Asian countries achieved remarkable economic growth compared to African countries. Similarly, international competitiveness of selected countries in the two regions in Table 1, defined as $(X-M)/(X+M)$ where X and M are exports and imports respectively, shows although most of the East Asian countries had a negative international competitiveness index in the 1960s, just similar to the African countries, they have managed to overcome their structural constraints and become internationally competitive; while their African counterparts are still experiencing negative competitive indexes.

Among the East Asian countries, some countries performed extraordinarily well in this regard by transforming their economies into KBEs while others are still remaining behind. Japan, Korea, Taiwan, Hong Kong and Singapore are the most successful KBEs in the region (See Table 2). Malaysia, Thailand, China and some other East Asian economies although have shown some meaningful progress in this regard, are still running behind Japan and the other East Asian tigers.

Table 1
International competitiveness index for selected East Asian and African countries

Country	Years	
	1965	2004
Sub-Saharan Africa		
Cameroon	-0.38	-0.06
Ethiopia	-0.36	-0.62
Ghana	-.53	-0.70
Kenya	-0.25	-0.24
Nigeria	-0.49	0.24
South Africa	-0.04	0.06
East Asia		
Taiwan	0.09	0.11
Indonesia	-0.38	0.17
Japan	0.07	0.1
Korea	-0.33	0.06
Malaysia	-0.01	0.07
Singapore	-0.11	0.08

Source: Calculated based on the data obtained from UNCTAD (2004)

Table 2
East Asian knowledge-based economies

Country	KBE Index	Economic Incentives & Institutional Regimes	Education & Human Resources	ICT Index	Innovations Index
Taiwan	8.77	7.77	9.38	8.87	9.06
Hong Kong	8.52	9.57	9.1	6.38	9.04
Japan	8.28	7.55	9.08	8.43	8.07
Singapore	8.26	9.66	9.49	5.09	8.78
Korea	7.97	5.93	8.8	9.09	8.05
Malaysia	6.1	5.67	6.91	5.22	6.61
Thailand	5.21	5.12	5.95	4.23	5.55
China	4.37	3.79	5.99	3.93	3.79
Philippines	3.94	4.32	3.77	4.64	3.03
Vietnam	3.4	2.8	2.75	2.99	5.05
Indonesia	3.11	3.47	3.24	3.2	2.52

Source: Knowledge Assessment Methodology Online (2013).

HISTORICAL BACKGROUNDS OF EDUCATIONAL SECTOR DEVELOPMENT IN EAST ASIA

A number of historical factors influenced the educational development of the major East Asian KBEs. Colonization was a common feature of East Asian societies although countries differ greatly in terms of the colonial period and the depth of colonization. All the advanced economies of East Asia except Japan either had been under Japanese or Western colonization and some had been colonized by both. The Japanese defeat in the World War II and strong domestic movements against colonial occupation brought independence to most of the advanced economies in East Asia. Hong Kong has been the last to get independence from the British in 1997. Although the end of the colonial era changed political scenario of the countries, yet most of the countries were able to keep the good traditions of the colonial period. The education sector, in this regard, particularly kept the legacy of the colonial era and was rebuilt on the foundation that the colonial era brought to these countries. The education sector in Korea and Taiwan had been influenced by the Japanese education system during the colonial era and that continued even after the colonial era. The case of Singapore and Hong Kong is also similar under the British rule. However, all these countries adjusted their education system focusing towards more job creation by revising curriculum and reorienting educational policies to the new perceptions of national interest (Bray and Lee, 2001:4).

The rapid economic growth may be the most notable feature of the advanced countries in East Asia such as Korea, Taiwan, Hong Kong and Singapore during the post-colonial era (Morris: 1996). Japan was the leading goose in the five nations flying geese model of East Asian development (Kojima: 2000). This economic development also shaped the education sector in the East Asian countries drastically. There has been huge investment in the education sector in almost all the newly independent countries. This effortless commitment towards education helped the East Asian economies to create an educated workforce that eventually attracted external investments. Later, the 'adapt and adopt' policies and the spillover effects from the foreign direct investment (FDI) boosted the economic growth of East Asia. High commitment to education and training has been very influential factor in the rapid development of both human resources and economy. Bray and Lee (2001) revealed the heavy investment in education in East Asia by stating that the tigers' single biggest source of comparative

advantage is their well-educated workers.

Strong international competitiveness due to globalization forced the governments in the advanced East Asian countries to reconsider the state's role in education sector to bring more competitiveness internationally. The privatization of the education sector in the East Asian KBEs has reduced state's role in education allowing the education sector to become competitive. This has had positive impact both on the overall student enrollment and the student mobility across the region as well as across the globe.

It is very usual that among the East Asian countries, Japan is the first country to develop very comprehensive educational infrastructure. Other East Asian countries such as Korea, Taiwan, Hong Kong and Singapore, and later Malaysia, Thailand and China have aspired to build their educational infrastructure following the footsteps of Japan. As the economies of these countries have been growing, there had been vigorous steps taken by the concerned governments to build comprehensive educational infrastructure to create necessary human resources to attract more FDI since the Japanese high growth era. As the KBE has been advancing in East Asia, the governments of most East Asian countries have been embracing for wider education reform policy to create a competitive educational infrastructure.

Development of a competitive educational infrastructure is one of the most basic requirements for becoming a KBE. Two other infrastructures such as Information and Communications Technology (ICT) and innovation are also highly dependent on the development of the education infrastructure. Thus, any country trying to become a KBE is placing enormous efforts to build the educational infrastructure as the first step. The East Asian economies are no exception of this.

PUBLIC SPENDING ON EDUCATION

Public spending on education has been the single most important driving force for the education sector in East Asia. The advanced KBEs of East Asia such as Japan, Korea, Taiwan, Hong Kong and Singapore spend more than 3% of their GDP in education sector while Malaysia and Thailand are trying to catch up in this sector by spending more than 4% of their GDP. As seen in Table 3

Japan spends more than any other East Asian countries in terms of the public expenditure on education per capita, which indicates the fact that Japan still strongly focus on creating and maintaining a globally competitive educational infrastructure. Other East Asian KBEs such as Korea, Taiwan, Hong Kong and Singapore are also well ahead of the latecomers such as Malaysia, China and Thailand in terms of per capita spending on education (See Table 3).

Table 3
Total public expenditure on education per capita (US\$) in the countries of East Asia, 1998–2007

Countries	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
China	21.51	23.78	26.32	31.22	35.66	39.40	45.61	N/A	45.61	70.86
Hong Kong	965.41	989.46	999.27	1,006.66	1,051.07	1,086.70	1,024.95	1,017.91	974.92	996.32
Indonesia	2.29	5.16	4.83	4.54	6.75	11.39	9.17	12.22	22.30	24.73
Japan	1,120.75	1,230.59	1,346.69	1,337.66	1,265.06	1,659.04	1,417.45	N/A	1,324.95	N/A
Korea	279.97	301.76	343.87	363.69	464.81	587.89	655.42	N/A	830.53	N/A
Malaysia	142.81	154.63	157.73	203.87	318.83	275.18	246.26	168.95	316.44	392.81
Philippines	30.57	32.15	28.87	25.51	31.39	29.51	27.63	28.78	31.69	39.29
Singapore	738.39	723.92	844.96	841.59	882.37	852.11	867.41	844.41	995.12	1,090.16
Taiwan	587.25	635.64	612.71	580.47	584.98	597.67	626.39	667.77	672.58	676.99
Thailand	79.70	84.31	82.26	73.27	79.06	87.18	97.62	109.57	130.33	164.97

Source: IMD World Competitiveness Online. Updated: May 2009.

DEVELOPMENTS IN SECONDARY AND TERTIARY EDUCATION SECTOR

Public spending on education has clear impact on secondary school enrollment in most of the East Asian countries (See Table 4). Here too, the advanced KBEs have been showing better performance than the latecomers. Sound secondary education system has been the key in creating mass semi-skilled workers during the high growth period of many East Asian countries that became a key attracting force for FDI inflows in the East Asian KBEs.

The governments of the concerned economies have been very active in formulating necessary policies to facilitate more enrollments in the tertiary level education. This was because of the growing need for highly skilled human resources for a competitive KBE. The governments were forced to create a very

competitive tertiary educational infrastructure. The outcome of the government efforts is very evident in Table 5 where most of the advanced KBEs in the region were able to attain more than 50% tertiary enrollment among their population aged 25 to 34.

Table 4
Secondary school enrollment (Percentage of relevant age group receiving full-time education) in the countries of East Asia, 1995–2006

Countries	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
China	N/A	N/A	N/A	88.60	88.70	90.00	92.70	94.10	95.00	97.00
Hong Kong	76.00	76.40	74.70	75.00	73.79	74.27	75.00	75.99	77.14	77.91
Indonesia	N/A	54.41	56.17	48.20	55.86	56.93	54.29	56.14	57.44	60.37
Japan	100.00	N/A	99.36	99.46	99.56	99.67	99.82	99.90	99.99	98.69
Korea	99.00	97.20	94.49	90.98	88.75	87.31	88.28	90.40	93.86	96.05
Malaysia	N/A	N/A	65.15	64.83	64.86	65.43	70.92	72.02	68.73	N/A
Philippines	N/A	N/A	50.73	N/A	52.40	56.31	59.04	60.81	60.22	60.38
Singapore	93.00	91.00	91.00	92.00	93.00	92.00	94.00	93.00	94.00	95.00
Taiwan	90.80	91.68	92.56	92.19	92.92	93.74	93.83	93.63	93.66	94.93
Thailand	N/A	66.80	68.70	69.70	70.60	71.20	72.00	N/A	N/A	71.01

Source: IMD World Competitiveness Online. Updated: May 2009.

Table 5
Percentage of population that has attained at least tertiary education for persons 25–34 in the countries of East Asia, 1997–2006

Countries	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
China	N/A	5.00	N/A	N/A	N/A	N/A	N/A	N/A	21.00	22.00
HongKong	28.50	29.30	30.30	32.00	34.40	36.80	37.90	37.90	39.80	40.50
Indonesia	N/A	3.00	6.00	6.00	4.60	5.00	5.00	N/A	N/A	N/A
Japan	45.24	45.42	45.14	47.25	47.68	50.00	52.00	52.00	53.00	54.00
Korea	N/A	34.02	35.10	37.19	39.51	41.00	47.00	49.00	51.00	53.00
Malaysia	N/A	11.00	11.40	11.00	13.00	16.00	18.00	18.50	19.86	19.92
Philippines	N/A	26.00	N/A	N/A	N/A	24.00	27.70	27.70	27.70	N/A
Singapore	29.90	33.50	36.40	35.30	42.50	45.40	49.00	51.90	51.40	56.70
Taiwan	29.70	31.70	33.50	36.20	37.80	40.60	43.20	45.00	47.80	51.20
Thailand	N/A	12.00	13.00	13.80	14.50	14.00	18.00	N/A	N/A	N/A

Source: IMD World Competitiveness Online. Updated: May 2009.

Together with secondary and tertiary enrollment rates, there has been a particular emphasis on science education both in the secondary and tertiary

level. This effort has been very successful as there has been growing emphasis on science in schools and consequently, youth interest in science has been increasing in the recent years in most of the East Asian economies (Debnath: 2013).

Table 6
Science degrees, East Asia
(Percentage of total first university degrees in science and engineering)

Countries	1997	1999	2001	2002	2004
China	72.30	73.29	59.41	57.40	56.21
Hong Kong	47.70	47.75	47.75	37.28	37.74
Indonesia	67.30	67.28	67.28	67.28	N/A
Japan	66.50	65.84	66.20	64.00	63.34
Korea	46.40	44.92	47.35	47.16	44.69
Malaysia	45.30	45.29	45.29	45.29	N/A
Philippines	N/A	N/A	N/A	N/A	25.46
Singapore	N/A	N/A	N/A	N/A	58.50
Taiwan	39.20	39.72	41.41	41.21	40.75
Thailand	26.10	26.13	26.13	26.13	68.90

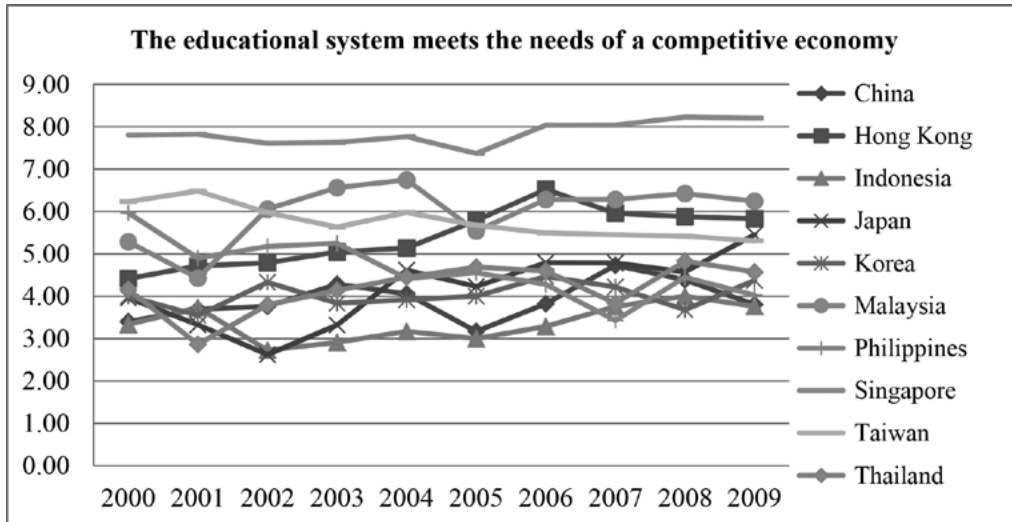
Source: National Science Foundation Science & Engineering Indicators 2008.

Science based degree holders increased as a consequence of the new policies pursued by the governments of the East Asian KBEs. The National Science Foundation Science and Engineering Indicators 2008 shows a clear indication that the advanced East Asian countries have been producing more skilled human resources who are science degree holders over the years (See Table 6). The private and public R&D sector also has been positively affected with the growth of science degree holders in the tertiary level.

QUALITY EDUCATION SYSTEM FOR A COMPETITIVE ECONOMY

As the economies of the East Asian countries have been shifting towards a KBE, the need for efficient education system has become a must to remain competitive in the global market. All the major KBEs have achieved great success in this regard, while the four tigers even performed better than Japan, the leading KBE in East Asia (See Figure 1).

Figure 1
Educational system in the countries of East Asia, 2000–2009*



* IMD WCY Executive Opinion Survey based on an index from 0 to 10.

Source: Computed from data collected from IMD World Competitiveness Online.

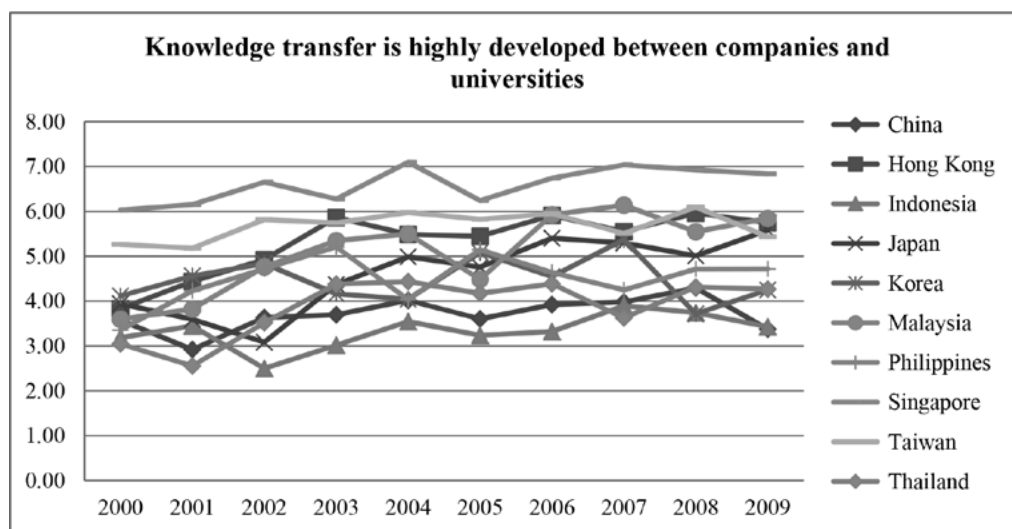
Updated: May 2009.

The competitive education system is molding the future of the East Asian KBEs by providing the best education required to create the best human resources to compete at the global level. Today, international student mobility is not only heading towards the Western countries but also to the advanced East Asian KBEs. Singapore's education system is considered as one of the best educational systems in the world. Other economies are also greatly influenced by Singapore's development in this regard and are moving rapidly towards creating a competitive educational system in the region. Overall, countries like Singapore, Hong Kong, Taiwan, Korea and Japan have been keen in maintaining world-class quality university education for the last couple of decades. The ability to provide world-class university education in East Asia is playing a significant role in the development of KBE by supplying the best human resources to the advanced and growing KBEs in the region.

One of the very key concerns in the development of a KBE is how to transfer knowledge between companies and universities. The education policies of the advanced KBEs in East Asia clearly indicate that the universities are the training

places for the students to be placed in the companies for their future career and thus, the universities serve the interests of the companies. Keeping this in mind, the governments have been creating new and dynamic avenues for the easy knowledge transfer between the universities and companies. Over the years, the knowledge transfer between the companies and universities has significantly increased in all the major KBEs in East Asia (See Figure 2).

Figure 2
Knowledge transfer in the countries of East Asia, 2000–2009*



* IMD WCY Executive Opinion Survey based on an index from 0 to 10.

Source: Computed from data collected from IMD World Competitiveness Online.

Updated: May 2009.

EAST ASIA’S HUMAN CAPITAL DEVELOPMENT

In the late 20th century, East Asian countries like Korea, Taiwan, Hong Kong and Singapore achieved unprecedented economic growth led by Japan. Indeed, today, the region is one of the most dynamic economic zones where the development of KBE is shaping the development patterns of the economic giant Japan and the other Asian tigers. First, there is a close connection between demographic dynamics, human capital and economic growth in East Asia. Second, all the advanced KBEs are committed to the development of human

capital since the post-World War II era. Third, there had been strong government involvement in the human capital development. Fourth, strong government commitment had led to rapid adoption and adaption of foreign technology through FDI that had quickly improved the productivity in the East Asian economies. The last two were so prominent that some scholars like Wade argued that ‘East Asian development model’ is a ‘state interventionist development model’ that is clearly different from the so-called Western free market economy. Ogawa *et. al.* (1993) also indicated the above four factors that have been instrumental in East Asia and Pacific during the high growth era.

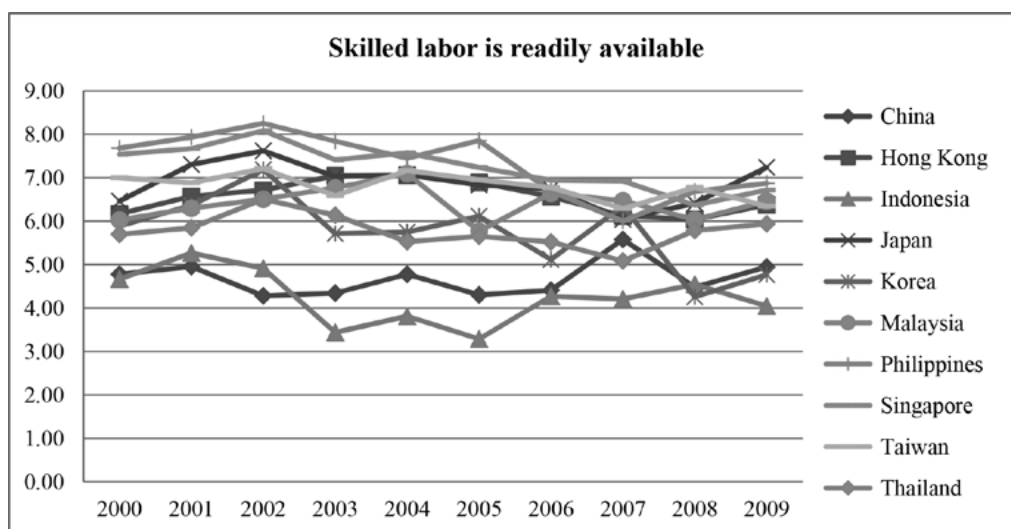
It is evident from various studies (Lucas: 1988, and Ogawa *et. al.*: 1993) that public intervention in the development of human capital in the East Asian economies has been the most influential factor. Governments of the East Asian economies directed the human capital development by subsidizing the supply of human capital, giving favor to the expansion of the selected sectors that were most promising to develop skills through learning by doing, twisting the terms of trade in order to receive FDI and so on (Krugman: 1987; Locus: 1988 and Ogawa *et. al.*: 1993).

Lucas (1988) argued that the rate of human capital accumulation is an increasing function of the level of human capital. Educational investment has created strong and permanent effects on the long-run growth potential in the advanced East Asian economies through passing the available stock of knowledge from generation to generation (Ogawa *et. al.*: 1993). Barro’s (1991) empirical research also showed that the above average schooling attainment has greatly contributed to the annual growth in the advanced East Asian economies in the 1960s. Alternatively, it is also true that countries with poor human capital endowment could not keep pace with the advanced East Asian economies. Thus, it is evident that human resource development has consistently contributed to the economic growth of the major East Asian countries during the high growth era and is still contributing in the development of KBE in the region. As the governments of the advanced East Asian countries put more emphasis on secondary and tertiary education to keep pace with the development of KBE, there has been a stable supply of labor force with secondary and tertiary education in the concerned economies.

As many of the advanced East Asian economies have been very consistent

in supplying necessary labor with secondary and tertiary education, the skill of the overall labor force has also increased. This has helped both the domestic industries to grow as well as attract more FDI from the developed countries both from within and outside the region. Figure 3 shows the overall availability of skilled labor force in the East Asian economies for the 2000–2009 period, which clearly established the fact that most of the economically advanced East Asian countries are very successful in creating necessary skilled labor force for the development of a KBE.

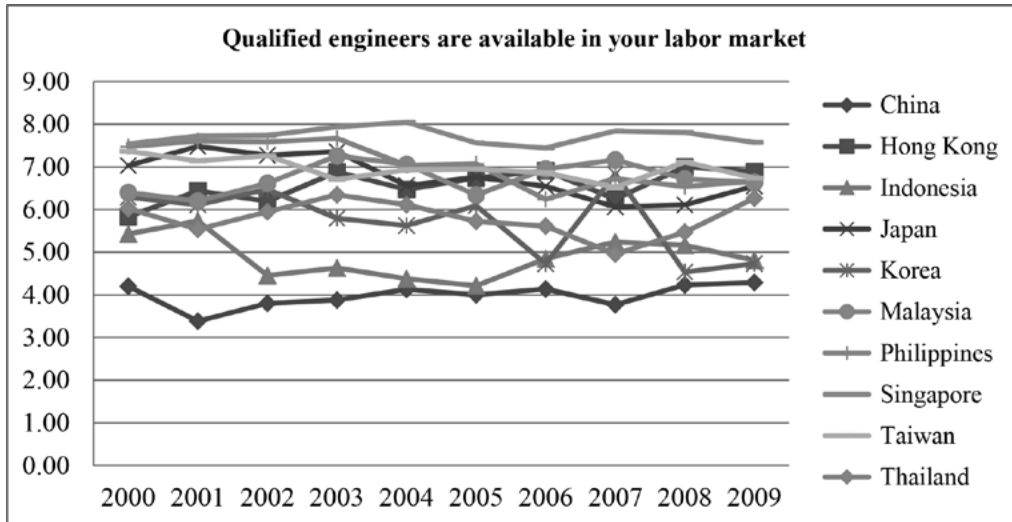
Figure 3
Skilled labor in the countries of East Asia, 2000–2009*



* IMD WCY Executive Opinion Survey based on an index from 0 to 10.

Source: *IMD World Competitiveness Online*. Updated: May 2009.

Figure 4
Qualified engineers in the countries of East Asia, 2000–2009*



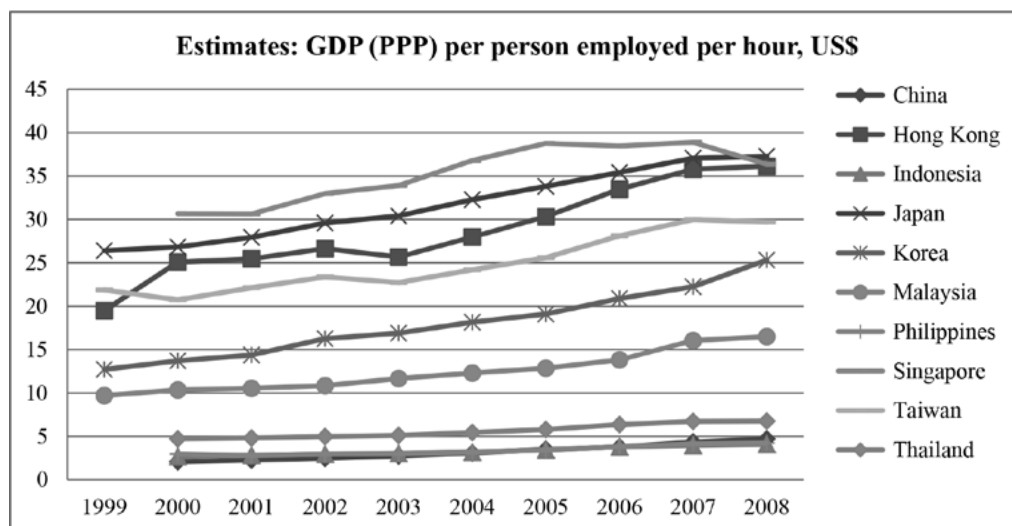
* IMD WCY Executive Opinion Survey based on an index from 0 to 10.

Source: *IMD World Competitiveness Online*. Updated: May 2009.

The earlier achievements in higher education boosted the number of qualified engineers in most of the East Asian economies. IMD carried out surveys (IMD World Competitiveness Yearbook Executive Opinion Survey) for each year from 2000 to 2009 to study the availability of qualified engineers in all countries. The survey from 2000 to 2009 shows that the advanced KBEs have clear advantages in the region (See Figure 4).

It is arguable that the consistent supply of skilled and educated labor force should contribute to the increase of labor productivity in East Asia. If we consider the labor productivity growth for the 1999–2008 period, we see that the advanced KBEs in East Asia are far ahead of the other East Asian economies (See Figure 5). This indicates the fact that the advanced economies such as Japan, Korea, Taiwan, Hong Kong and Singapore have been quite successfully capitalizing the availability of skilled labor force in their markets to boost up the overall productivity.

Figure 5
Labor productivity in the countries of East Asia, 1999–2008



Source: World Development Indicators, World Bank, April 2009, National Sources.

DEMOGRAPHIC TRANSITION

Population size and growth, both are in transition in most of the East Asian KBEs. During the high growth era of East Asia for the period of 1970s to 1990s, many scholars argued that population growth and the growth of real GNP per capita has negative relationship which means that the economic development in East Asia by and large, is faster with slower rate of population growth (Ogawa and Tsuya, 1993:24). However, such conclusion is not consistent with the real picture in East Asia now where most of the advanced economies are facing the problem of declining population. Kelly (1988a) argued that the net impact of population growth varies over time for any nation and varies from nation to nation. So, it will not be wise to conclude that population growth over time has a negative correlation with the economic growth.

The fertility rate in most of the advanced KBEs in East Asia has been sharply dropping while the life expectancy at birth has been gradually increasing (Debnath: 2013). This, indeed, is changing the demographic structure of the concerned economies. In the most recent years, the governments of all the

advanced KBEs started paying special attention to a sustainable population growth whereby the economies will be able to keep balance with the demand and supply of human resources needed for a growing economy.

With the rapid decline in the fertility rate and increase in the life expectancy at birth, the age composition of the advanced East Asian economies has been changing very fast. There has been decrease in the population of 0 to 15 age group while there has been consistent increase in the population of above 65 age group. Although population between the age of 15 and 65 did not change that much, there has been decreasing sign in some advanced countries in East Asia such as Japan. This is a very important issue for all the advanced economies in East Asia and they have to work out how to increase the population between the age of 0 and 15 so that the supply of labor force remains very consistent with the demand of the market.

As all the economically developed countries in East Asia have an ageing population, the dependency ratio also has been changing very fast. If we consider the change in the ageing index for 1960 and 1990, we clearly see that the East Asian economies by 2025 will be highly ageing societies forcing the governments of the concerned countries to think of various possible ways to increase the total work force. One of them is to increase the overall fertility rate while some countries are considering bringing in skilled foreign labors.

So, it is quite understandable that the advanced KBEs are facing the challenge of rapid ageing population and trying to address this issue by creating high skilled workforce along with high rate of automation. In addition to this, there has been gradual increase of labor movement across the region, particularly in the advanced KBEs.

KEY CONTRIBUTING FACTORS OF EDUCATION AND HUMAN RESOURCES DEVELOPMENT

From the above discussion and data analysis of the East Asian countries, it is quite evident that the advanced KBEs such as Japan, Korea, Taiwan, Hong Kong and Singapore are highly successful in the development of education and human resources in the region. Public spending on education and other necessary policies in these economies helped to increase the secondary and tertiary

level enrollment and at the same time, the countries were also able to develop quality education system, quality university education, provision of qualified engineers for the labor market, and efficient management in knowledge transfer between the companies and universities. These factors contributed greatly to the development of human resources in the region. There has been very consistent supply of skilled labor force with secondary and tertiary education in most of the advanced economies in the region. Due to the demographic transition, some economies started considering foreign labor force as an additional solution to supply the necessary human resources for their economic development.

TRACKING THE RELATIONSHIP BETWEEN EDUCATION AND HUMAN RESOURCES DEVELOPMENT AND EAST ASIA'S OVERALL DEVELOPMENT

The purpose of creating a KBE is to have a globally strong and competitive economy to maintain sustainable economic growth towards overall development of a country. The East Asian economies have been pursuing necessary policies to create a KBE in order to continue their economic development in the post-industrial era and to be globally competitive. In doing so, some economies in the region became exceptionally successful in creating a functional KBE while some others are still behind. The advanced countries have been putting enormous efforts to develop the education and human resources. Countries like Japan, Korea, Taiwan, Hong Kong and Singapore have shown remarkable achievements in creating a successful KBE by ensuring a highly competitive education infrastructure and a pool of highly competent human resources. To understand the development trend of education and human resources in the East Asian KBEs, we did not investigate the GDP growth because the bigger the economy grows, the lower the GDP growth rate becomes although the absolute value of GDP is always higher in the advanced countries. For this reason, we considered the human development index (HDI), which is a composite measure of three components: longevity (measured by life expectancy); knowledge (adult literacy rate and mean years of schooling); and standard of living (real GDP per capita in purchasing power parity) to understand the development pattern in the East Asian KBEs.

Table 7 shows the HDI for the East Asian economies for the year 1980, 1985, 1990, 1995, 2000, 2005, 2006 and 2007. From the table, we observe

that there has been a positive growth trend of human development in all the economies of East Asia while the advanced KBEs achieved incredible success in this regard which can be compared with the most advanced nations of the world. From this finding, it is obvious that most of the East Asian economies have achieved excellent growth in life expectancy, adult literacy rate and mean years of schooling, and real GDP per capita in purchasing power parity. This is indeed a clear evidence of the education and human resources development in the advanced KBEs in East Asia.

Table 7
Human development index trend in East Asia

Country	1980	1985	1990	1995	2000	2005	2006	2007
China	0.533	0.556	0.608	0.657	0.719	0.756	0.763	0.772
Hong Kong	N/A	N/A	N/A	N/A	N/A	0.939	0.943	0.944
Indonesia	0.522	0.562	0.624	0.658	0.673	0.723	0.729	0.734
Japan	0.887	0.902	0.918	0.931	0.943	0.956	0.958	0.960
Korea	0.722	0.760	0.802	0.837	0.869	0.927	0.933	0.937
Malaysia	0.666	0.689	0.737	0.767	0.797	0.821	0.825	0.829
Philippines	0.652	0.651	0.697	0.713	0.726	0.744	0.747	0.751
Singapore	0.785	0.805	0.851	0.884	N/A	N/A	0.942	0.944
Taiwan	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.943
Thailand	0.658	0.684	0.706	0.727	0.753	0.777	0.780	0.783

*Source: Human Development Report 2009 available at
<http://hdrstats.undp.org/en/indicators/81.html> and
<http://www.dgbas.gov.tw/public/Data/910616273671.pdf> for Taiwan's data*

CONCLUSION

This paper discussed broadly various issues related to the development of a competitive educational infrastructure and capable human resources for a KBE in East Asia. The discussion began with the historical background of education sector in East Asia followed by various arguments on public spending on education, developments in secondary and tertiary education sector and creation of a quality education system for a competitive economy. Next, the paper shed lights on East Asia's human capital development by investigating various output factors for the input factors in education development. For education and human resource development, the main contributing factors identified

are gross secondary and tertiary level enrollments, quality education system, quality university education, provision of qualified engineers for the labor market, and efficient management in knowledge transfer between the companies and universities. Finally, this paper made a big point about the demographic transition in the East Asian KBEs which is more likely to shape the future of knowledge-based economic growth in the region.

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