



UNIVERSITI PUTRA MALAYSIA

**EFFICIENCY, TECHNOLOGICAL SHIFT AND HUMAN CAPITAL
IN THE K-ECONOMIES OF ASEAN FIVE PLUS THREE**

WONG MEI FOONG

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By

WONG MEI FOONG

**Thesis Submitted to the School of Graduate Studies, Universiti Putra Malaysia,
in Fulfilment of the Requirements for the Degree of Doctor of Philosophy**

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**DOCTOR OF PHILOSOPHY
UNIVERSITI PUTRA MALAYSIA**

2007



Specially dedicated to
My beloved parents, brother and sisters,
for their invaluable love, sacrifices and support
to make this dissertation possible in every way.



Abstract of thesis presented to the Senate of Universiti Putra Malaysia in
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Develop towards a knowledge-based economy is extremely important for the ASEAN five plus three countries, since the countries face challenges at the global fronts and technological changes; the rules of competition have changed. A country's competitive advantage is no longer dependent solely on factors such as labor, land and natural resources, but on its potential to produce, acquire, utilize and disseminate knowledge. Thus, this is essentially a shift from economic development based on resources to development based on knowledge where human capital (consequently education) emerges as crucial public policy themes for creating wealth and increasing the quality of life.

This thesis attempts to determine the level of knowledge-based development in Malaysia in terms of efficiency, technical change and human capital. This development is then compared with the other ASEAN five plus three countries,



which includes four members of the Association of Southeast Asian Nations (ASEAN) namely Indonesia, the Philippines, Singapore, and Thailand and the three Northeast Asian states, namely China, Japan and South Korea. In particular, the objectives of this study are to (1) determine the contribution of knowledge-based human capital to economic growth in the ASEAN five plus three countries, (2) identify the determinants of knowledge-based human capital in Malaysia and the selected ASEAN five plus three countries, (3) determine the efficiency of Malaysian in generating the knowledge-based outputs, as compared to other ASEAN five plus three countries, and (4) investigate whether there is any long-run convergence in the development of knowledge-based human capital among Malaysia and the ASEAN five plus three countries.

The empirical findings of the economic growth model using a panel cointegration framework and Fully Modified Ordinary Least Square (FMOLS) show that the human capital significantly influenced the economic growth in the ASEAN five plus three countries. Furthermore, the empirical results of the human capital analyses also indicate significant economic and demographic variables including the Gross Domestic Product (GDP) and fertility rate. However, the time series cointegration test did not detect a significant long-run convergence in the development of human capital among Malaysia and the ASEAN five plus three countries.



The empirical findings of the Stochastic Frontier Analysis (SFA) indicate that Malaysia, Korea, Singapore, Japan and China appear to be the most efficient countries in generating the knowledge-based outputs, followed by Thailand though Indonesia and Philippines appear to be the least efficient countries. In regard to the issue of catch-up and convergence, the results show that Malaysia and Korea are catching up with the developed country such as Japan while other ASEAN five plus three countries are failed to catch-up with developed countries over the period. Last but not least, all the ASEAN five plus three countries have enjoyed from technical progress and achieved positive total factor productivity (TFP) growth rates over the 1992-2005 period.



Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia
sebagai memenuhi keperluan untuk ijazah Doktor Falsafah

**KECEKAPAN, PEMINDAHAN TEKNOLOGI DAN SUMBER MANUSIA
DALAM ERA K-EKONOMI DI NEGARA ASEAN LIMA PLUS TIGA**

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Pembangunan ke arah ekonomi berasaskan pengetahuan adalah amat penting bagi negara ASEAN lima plus tiga, memandangkan negara ini berhadapan dengan pelbagai cabaran globalisasi dan pemindahan teknologi; peraturan daya saing telahpun berubah. Kelebihan daya saing sesebuah negara bukan sahaja bergantung pada faktor-faktor seperti buruh, tanah and sumber semulajadi, tetapi juga bergantung pada potensi negara untuk menghasilkan, memperolehi, menggunakan and menyebarkan pengetahuan. Dengan itu, adalah mustahak untuk ekonomi negara mengalih dari pembangunan berasaskan sumber kepada pembangunan berasaskan pengetahuan, di mana sumber manusia (pendidikan sebagai akibat) menjadi polisi kritikal kerajaan yang bertema menghasilkan kekayaan dan meningkatkan tahap kualiti hidup.



Tesis ini bertujuan untuk menentukan tahap pembangunan berasaskan pengetahuan di Malaysia dari segi kecekapan, perubahan teknologi dan sumber manusia. Pembangunan ini kemudiannya dibandingkan dengan negara ASEAN lima plus tiga lain, yang termasuk empat ahli Pertubuhan Negara-negara Asia Tenggara (ASEAN), iaitu Indonesia, Filipina, Singapura dan Tailand serta tiga negara Asia Timur Laut, iaitu China, Jepun dan Korea Selatan. Secara khususnya, tujuan kajian ini adalah untuk (1) menentukan penyumbangan sumber manusia berasaskan pengetahuan kepada pertumbuhan ekonomi di negara ASEAN lima plus tiga, (2) mengesahkan penentu sumber manusia berasaskan pengetahuan di Malaysia dan negara ASEAN lima plus tiga yang terpilih, (3) menentukan kecekapan Malaysia dalam menghasilkan output berasaskan pengetahuan, apabila berbanding dengan negara ASEAN lima plus tiga lain, serta (4) mengkaji samaada wujudnya pemusatan jangka panjang dalam pembangunan sumber manusia berasaskan pengetahuan di antara Malaysia dan negara ASEAN lima plus tiga.

Empirikal kajian model pertumbuhan ekonomi dengan menggunakan panel kointegrasi kerangka dan Fully Modified Ordinary Least Square (FMOLS) menunjukkan sumber manusia mempunyai pengaruh yang bererti terhadap pertumbuhan ekonomi di negara ASEAN lima plus tiga. Tambahan pula, hasil empirikal kajian sumber manusia juga menunjukkan bahawa pembolehubah ekonomi dan demografi yang bererti termasuk Keluaran Dalam Negara Kasar (KDNK) dan kadar kesuburan. Namun demikian, ujian kointegrasi siri masa tidak



dapat mengesan sebarang pemusatan jangka panjang yang bererti dalam pembangunan sumber manusia di antara Malaysia dan negara ASEAN lima plus tiga.

Hasil empirikal daripada Stochastic Frontier Analysis (SFA) menunjukkan bahawa Malaysia, Korea, Singapura, Jepun dan China adalah negara yang paling cekap dalam menghasilkan output berasaskan pengetahuan, diikuti dengan Thailand, sementara Indonesia dan Filipina adalah negara yang kurang cekap. Bagi isu mengenai pembangunan hampir sama (catch-up) dan pemusatan, hasil kajian menunjukkan bahawa Malaysia dan Korea dapat mencapai tahap pembangunan yang hampir sama dengan negara maju seperti Jepun tetapi negara ASEAN lima plus tiga lain gagal mencapai tahap pembangunan yang hampir sama dengan negara maju dalam jangka masa itu. Akhir sekali, semua negara ASEAN lima plus tiga menikmati kemajuan teknikal dan mencapai positif kadar pertumbuhan produktiviti faktor keseluruhan (TFP) di antara tahun 1992 dan 2005.

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I certify that an Examination Committee has met on _____ to conduct the final examination of Wong Mei Foong on her Doctor of Philosophy thesis entitled “Efficiency, Technological Shift and Human Capital in the K-Economies of ASEAN-plus-Three Countries” in accordance with Universiti Pertanian Malaysia (Higher Degree) Act 1980 and Universiti Pertanian Malaysia (Higher Degree) Regulations 1981. The Committee recommends that the candidate be awarded the relevant degree. Members of the Examination Committee are as follows:

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DECLARATION

I hereby declare that the thesis is based on my original work except for quotations and citations which have been duly acknowledged. I also declare that it has not been previously or concurrently submitted for any other degree at UPM or other institutions.

Wong Mei Foong

Date: 23 August 2007



TABLE OF CONTENTS

	Page
DEDICATION	ii
ABSTRACT	iii
ABSTRAK	vi
ACKNOWLEDGEMENTS	ix
APPROVAL	x
DECLARATION	xii
LIST OF TABLES	xv
LIST OF FIGURES	xvii
CHAPTER	
I INTRODUCTION	1
New Economy in ASEAN-plus-3 Countries	1
Statement of Problem	17
Objectives of Study	22
Significance of the Study	23
Organization of the Study	27
II LITERATURE REVIEW	28
Human Capital and Economic Growth	29
Human Capital Concept	37
The Measurement of Human Capital	42
Determinants of Human Capital	58
Definition of Knowledge-Based Economy (KBE)	62
Knowledge-Based Economy Measures	73
Endogenous Growth Model	80
Stochastic Frontier Analysis (SFA)	85
Summary	93
III THEORETICAL FRAMEWORK	99
Economic Growth	100
Human Capital	108
Efficiency and Productivity	115



IV	METHODOLOGY	131
	Panel Cointegration Analysis	131
	Panel Unit Root	132
	Panel Cointegration Test	135
	Fully Modified Ordinary Least Square (FMOLS)	141
	Empirical Specification of Growth Model	144
	Empirical Specification of Human Capital Model	146
	Stochastic Frontier Analysis (SFA)	153
	Translog Production Function	153
	Decomposing of Total Factor Productivity Change	156
	Hypothesis Testing	158
	Time Series Vector Autoregressive (VAR) Model	162
	Stationary versus Nonstationary Data	162
	Multivariate Cointegration Test	168
	Data	172
	Summary of the Methodology	177
V	RESULT AND DISCUSSIONS	179
	Contribution of Human Capital to Economic Growth	181
	Determinants of Human Capital	190
	Efficiency in Generating the Knowledge-Based Output	198
	Estimation of Stochastic Frontier Production Function	199
	Decomposition Results	204
	Hypothesis Tests	209
	Convergence in the Development of Human Capital	213
	Summary	219
VI	CONCLUSION	220
	Limitations of the Study and Recommendations for Further Research	231
	REFERENCES	234
	APPENDICES	259
	BIODATA OF THE AUTHOR	271



LIST OF TABLES

Table		Page
1.1	ASEAN plus three Countries: Structural Divide (in Percentage)	6
1.2	ASEAN plus three Countries: Income Divide, 2004	7
1.3	ASEAN plus three Countries: Openness Divide, 2004	8
1.4	IT Infrastructure in ASEAN plus three Countries	10
1.5	ASEAN plus three Countries: Knowledge Divide, 2005 (Percentage of Relevant Age Group)	11
1.6	ASEAN Five Plus Three Countries: Employment by Major Sectors, 1980 and 2001 (Percentage of Total Employment)	17
2.1	Summary for Indicators Related to Human Capital	54
2.2	Summaries for Determinants of Long-Term Economic Growth	94
2.3	Summary for Estimates of Technical Efficiency and Productivity at the Regional Level for the Whole Economy Using a Production Frontier Approach	96
4.1	Types of Hypotheses Tests for the Full Model	161
4.2	Knowledge-Based Output, Knowledge-Based Input and Its Unit of Measurement	174
4.3	Summary Statistics for Variables in the Stochastic Frontier Production Function for ASEAN-plus-three Countries	176
4.4	Summary of Methodology, Purpose and Data	177
5.1	Panel Unit Root Tests (ADF Test Statistics)	183
5.2	Johansen Multivariate Cointegration Tests of 1965 to 2004	185
5.3	Cointegration Tests in Heterogeneous Panels with Multiple Regressors	186
5.4	Single Equation and Panel Fully Modified Ordinary Least Square (FMOLS) Estimates	190



5.5	Panel Unit Root Tests (ADF Test Statistics)	192
5.6	Johansen Multivariate Cointegration Tests of 1970 to 2004	194
5.7	Cointegration Tests in Heterogeneous Panels with Multiple Regressors	195
5.8	Single Equation and Panel Fully Modified Ordinary Least Square (FMOLS) Estimates	198
5.9	Panel Estimation of Stochastic Frontier Production Function and Technical Inefficiency Model for ASEAN-plus-three Countries	200
5.10	Knowledge-Based Output Elasticities	203
5.11	Annual Averages of Efficiency Levels and Total Factor Productivity Growth Components for ASEAN-plus-three Countries over the 1992-2005 Period	205
5.12	Generalised Likelihood Ratios of Hypotheses for Parameters of the Stochastic Frontier Production Function and Technical Inefficiency Model for the ASEAN-plus-three Countries	212
5.13	The Augmented Dickey-Fuller (ADF), Phillips-Perron (PP) and Kwiatkowski, Phillips, Schmidt, and Shin (KPSS) Unit Root Tests For Level and First Differences Data from 1965 to 2005	217
5.14	Johansen Multivariate Cointegration Test of 1965 to 2005	219



LIST OF FIGURES

Figure		Page
2.1	Human Capital Production and Common Approaches to Human Capital Measurement	43
3.1	The Steady State of the Solow-Swan Model	107
3.2	Investment in Human Capital: College Education	109
3.3	Productivity, Technical Efficiency, Scale Economies and Technical Change	119
3.4	The Stochastic Frontier Production Function	125
3.5	Decomposing Output Growth	128



CHAPTER I

INTRODUCTION

New Economy in ASEAN Plus Three Countries

The ASEAN plus three cooperation commenced in December 1997 with the convening of an informal Summit among the Leaders of ASEAN¹ and their counterparts from East Asia that is China, Japan and the Republic of Korea (ROK) at the tangential of the Second ASEAN Informal Summit in Malaysia. The ASEAN plus three process was institutionalised in 1999 when the Leaders issued a Joint Statement on East Asia Cooperation at their 3rd ASEAN plus three Summit in Manila. The ASEAN plus three Leaders expressed greater resolve and confidence in further strengthening and deepening East Asia cooperation at various levels and in various areas, particularly in economic and social, political, and other fields.

As the region enters the digital age of the 21st century with the new economy, the Association of Southeast Asian Nations (ASEAN) members especially Cambodia, Laos, Myanmar and Vietnam (CLMV) are worried that there will be a wider gap between the old members and the new ones. According to an Organization for Economic Co-operation and Development (OECD) report (2000), this is due to the notion of a new economy is closely tied to the effects of technological

¹ The members of ASEAN are Brunei, Burma/Myanmar, Cambodia, Indonesia, Laos, Malaysia, the Philippines, Singapore, Thailand, and Vietnam.



progress, for the most part of information and communications technology (ICT). To be more accurate, this new economic phenomenon came into existence after the outstanding economic performance of the United States, which was accompanied by growth in multi-factor productivity, followed by some OECD nations. The main essentials of the new economy could be recognized as strong non-inflationary growth, low unemployment, a rapidly increasing role for ICT, still-high stock-market valuations, particularly in the high-tech sector, and continued restructuring of enterprises and markets.

A nation needs capital and skilled workers and the government's commitment in order to have a new economy. Those developed countries that are already well advanced in science and technology, education, economic reforms and ways of thinking will go faster and even push further ahead than less-developed nations which lack these important conditions. In short, there will be the digital divide, or information haves and have nots, which creates inequality of different types among the nations. Digital divide includes divides such as income divide, structural divide, openness divide, knowledge divide, IT divide and perception divide. (World Bank, 2000)

This modern growth is always going along with structural change and generally structural change brings industrialization. While most industrialized countries are pushy for high-tech IT industry which the ratio is of manufactured to total merchandised exports and high-tech exports to manufactured exports disclose the degree of IT development of specific countries. Table 1.1 demonstrate the sectoral



share of GDP of the ASEAN countries by using economic and export structures as the indicators of the level of IT development. The table implies that all the new member countries (Cambodia, Laos, Myanmar and Vietnam) are dependent on the agricultural sector whereas all the pioneering member countries and East Asia are more dependent on the industrial and services sectors. With the exclusion of Laos and Myanmar, the structure of the economies of ASEAN plus three members has changed significantly since the 1980s. This signifies that the introduction of the IT sector in new member countries may be difficult.

The manufactures as a percentage of total merchandised exports reports that the manufactures' share of the total exports of old members and East Asia in 1998 were in the range of 45 to 95 percent. Furthermore, the ratio of manufactures to total merchandised exports increased significantly during the decade. In contrast, the ratio is very low for new member countries, which ranges from 6 percent (Myanmar) to 39 percent (Cambodia) in 1998. (Refer to Table 1.1) Unlike the old member countries, the new member countries almost no high-technology export items in their countries but most of their manufactured export items are textiles and garments. In short, there is no contribution of the IT industry to GDP in new member countries.

Meanwhile, old member countries such as Singapore is building a new economy - knowledge-based economy (KBE) - by establishing its own intelligent island with the help of 'SingaporeOne', and Malaysia is already prepared for a Multimedia

Super Corridor (MSC). Brunei, Indonesia and the Philippines put into practice their own IT programmes of RaGAM21, Nusantara 21 and IT21 respectively. The regional leaders called for the development of an ASEAN Information Infrastructure (AII) which would connect all the national information infrastructure of ASEAN member countries at the ASEAN Summit in Hanoi in 1998. Consequently, ASEAN structured a team to expand a regional action plan on the IT sector in early 2000. In brief, following the United States, Southeast Asia together with East Asia are joining Europe and Latin America in trying to compete in this race to generate new sources of economic growth.

A different fundamental state for developing the new economy is the level of development in terms of income and human resources. Table 1.2 demonstrates the per capita income levels of ASEAN five plus three members in 2004. It implies that new member countries have low GDP and low per capita GDP in absolute terms as well as in relation to founding member countries. The per capita GDP of new member countries ranges between US\$300 and US\$502, which is about 28 times less than that of the average of the other ASEAN six and East Asia. This specifies that the potential for the establishment of the IT sector in new member countries is very low from both the supply side and the demand side. From the supply side, without receive official development assistance (ODA); it is too capital-intensive to create an IT industry in new member countries given the size of GDP. While from the demand side, the market is very small since people are living in rural areas and their per capita income is so low. As such, the



prerequisites for developing an IT sector are very weak unless Cambodia, Laos, Myanmar and Vietnam (CLMV) take advantage of leap-frogging with help from the rest of ASEAN and other developed nations.



Table 1.1 ASEAN Plus Three Countries: Structural Divide (in Percentage)

	Sectoral Structure of GDP									Manufactures as Percentage of			
	Agriculture			Industry			Services			Merchandised Exports		Merchandised Imports	
	1970	1980	2006	1970	1980	2006	1970	1980	2006	1990	1998	1990	1998
Indonesia	35.0	24.4	12.9	28.0	41.3	47.0	37.0	34.3	40.1	35	45	77	69
Malaysia	-	22.9	8.7	-	35.8	49.9	-	41.3	43.5	54	79	82	85
Philippines	28.2	23.5	14.2	33.7	40.5	31.6	38.1	36.0	54.2	38	90	53	80
Singapore	2.2	1.1	0.1	36.4	38.8	33.0	61.4	60.0	66.9	72	86	73	84
Thailand	30.2	20.2	10.7	25.7	30.1	44.6	44.1	49.7	44.7	63	74	75	78
Cambodia	-	-	30.1	-	-	26.2	-	-	38.6	-	39.0	-	-
Laos	-	-	44.8	-	-	29.5	-	-	25.7	28.6	33.4	-	-
Myanmar	49.5	47.9	48.4	12.0	12.3	16.2	38.5	39.8	35.4	10	5.5	-	-
Vietnam	-	42.7	20.4	-	26.3	41.6	-	31.0	38.1	7.9	36.8	33	23
China	-	30.1	11.8	-	48.5	48.7	-	21.4	39.5	72	87.3	80	81
Japan	-	3.6	1.3	-	40.5	30.5	-	55.9	68.2	96	94.3	44	58
Korea	-	14.8	2.9	-	39.9	35.2	-	45.3	61.9	94	91.3	63	61

Sources: Asian Development Bank (2007) and World Bank (2006)

