



LUND UNIVERSITY

School of Economics and Management

**Master programme in Economic Growth,
Innovation and Spatial Dynamics**

Thailand's Competitive Advantage in ASEAN after Asian Crisis:

Among the five-selected ASEAN nations: Indonesia, Malaysia, Philippines,
Singapore and Vietnam

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Abstract: Analyzing Thailand's competitive advantage in ASEAN after Asian crisis in 1997 is vital for a nation's economic development in the region where the neighborhood could be both complementary and hostile. Utilizing Porter's diamond model with the quantitative approach has concluded that Thailand is ranked as the third-most competitive nation in ASEAN. Malaysia is identified as Thailand's most awful competitor that it has to defeat while Singapore could better be the complementary. Vietnam is a catching-up competitor with its rapid economic development during the past decade. Indonesia is coming up after Vietnam; however, it is well-highlighted on its highest potential domestic demand and largest labor force which should principally contribute to the growth of manufacturing, agriculture and services sectors. In order to beat Malaysia and improve its competitiveness, Thailand has to invest in advanced and specialized factors, especially, in the field of ICT and R&D which will bring up a nation's firms with more ability to produce higher-value of goods and services and more sophisticated buyers which ultimately improve a nation's competitive advantage.

Key words: Competitive advantage, diamond model, quantitative approach, factors, sophisticated demand and products, upgrading

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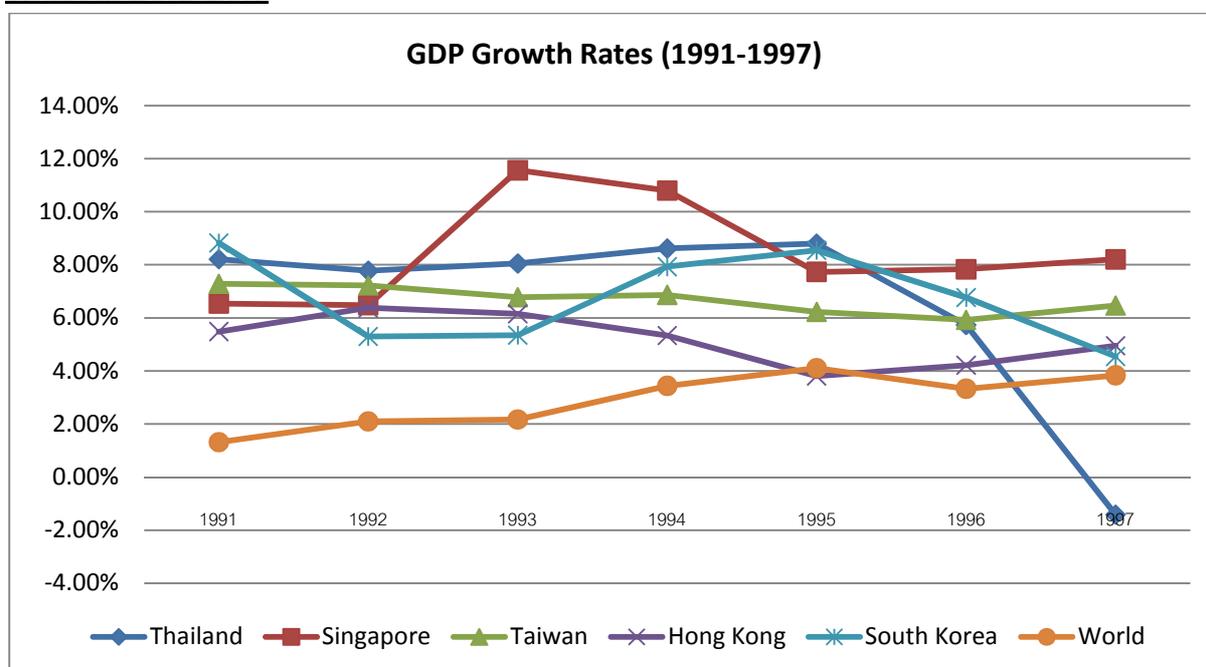
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I. Introduction

Thailand was regarded as East Asian Economic Miracle. During 1960 – 1995, its economic performance had been highly satisfactory with the average annual real gross domestic product (GDP) growth of 7.7 per cent.

¹ Particularly, in 1990s, Thailand was gaining international recognition of the sustained economic growth, structural change, and industrialization,² the GDP growth during this period was almost 2 digits and was expected to be the 5th Asian Tiger after the Four Asian Tigers: Singapore, Taiwan, Hong Kong, and South Korea, which were defined as the newly industrialized economies with exceptional high GDP growth rates and rapid industrialization³ before the Asian crisis hard hit the economy in 1997.

Figure 1: GDP growth rates of Thailand, Singapore, Taiwan, Hong Kong, South Korea and World in 1991-1997



Source: Data from Maddison, 1991-1997

Before the Asian crisis, Thailand's success story mostly relied on the business government relations;⁴ heavily foreign direct investment (FDI) that fostered Thai internationally competitive industrial capabilities along with the selective government interventions.⁵ However, both successful determinants had become the deterrent for Thailand's competitiveness and long-term economic growth compared with the higher economic performance of the four Tigers. Domestic political priorities and initiative had often neglected productivity-related policies, especially, technology policies. Their selective industrial policies unfortunately emphasized on the accumulated-capital-and/or-labor-to-growth policies and unproductive investments. Moreover, the foreign firms also served as

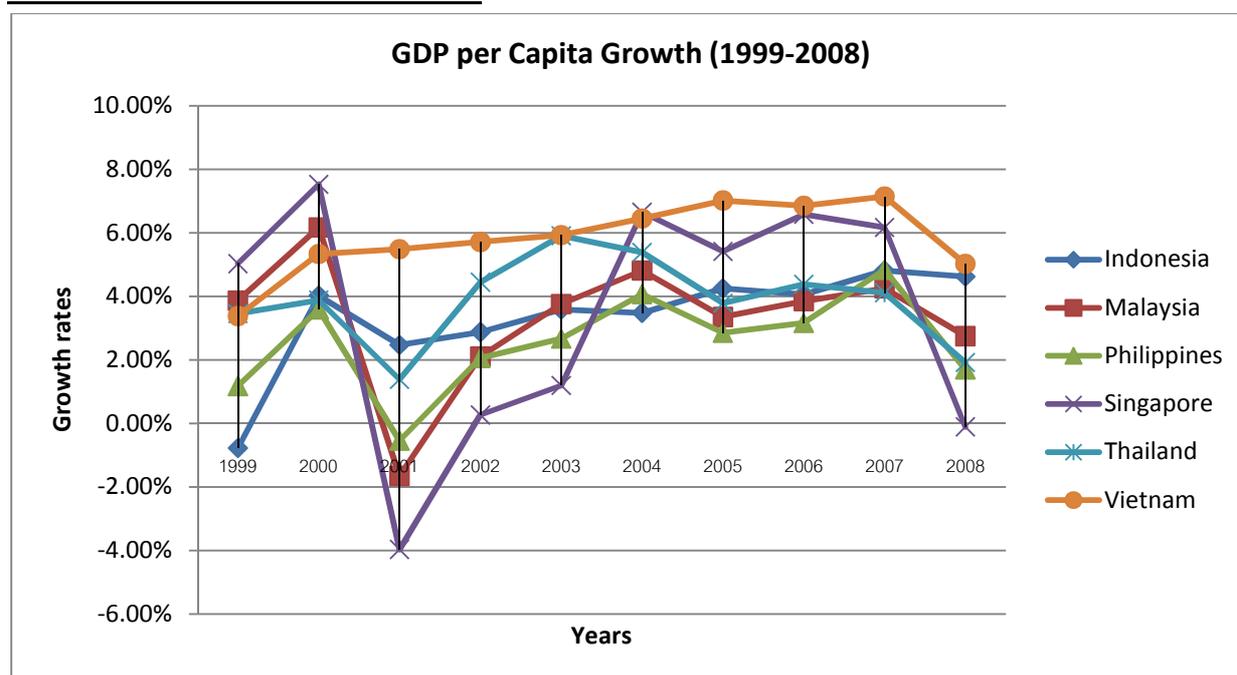
major hindrance for more pro-active technology development efforts.⁶ These less-developmental considerations had escalated the financial crisis in the mid-1997.⁷

The economic crisis has led to significant changes in Thai economic policy.⁸ In terms of the real sector, the government had shifted their attention to the healthy investments; matching the country's nature with the country's comparative advantages; and promoting the quality (productive) of investments. They encouraged the development of domestic technological capabilities and skills; reduced the negative restrictions for FDI; such as, foreign ownership limits and local content requirements; provided infrastructure and services designed to facilitate the investment environments, attract desired investments, and induce positive externality. The economic goal was set to be more sustaining development in the medium term.⁹ In terms of the financial sector, the government has developed: the better data for risk assessments and economic management, timely, appropriate and available for both the public and private sectors;¹⁰ the new monetary policy regime, the managed float system with inflation targeting monetary framework;¹¹ and the financial sector reform with more regulated and close-supervisions in order to respond to the global financial liberalization.¹² With the lessons learned from the crisis, the changes in both sectors would influence the Thai economic performance and competitiveness during the past decade (1999-2009). Therefore, Thailand's competitive advantage after the recovery of Asian crisis will be my focal study.

My investigation starts from 1999 to 2009. The studied countries are Indonesia, Malaysia, Philippines, Singapore, Thailand and Vietnam, which are the six ASEAN countries out of the ten countries. Cambodia, Laos and Burma are less-developed countries¹³ which would not be expected as competitive as the other six ASEAN countries while there is no sufficient data for Brunei.

These six nations belong to ASEAN (Association of Southeast Asian Nations) economic bloc which represents the group of Southeast Asian economies in the world economy. The countries that belong into the group must have something in similar; i.e. natural resources, cultures or located in the same geographic area. These countries both can be good neighbors and competitors to each other. To test Thailand's competitiveness among these six ASEAN nations is important for Thailand's long-term economic development. Thailand could learn other strengths from its neighbors as well as solve its relative weaknesses in order to be well-standing in this economic bloc; for example, in terms of negotiations and influencing the regional policies.

Figure 2: GDP per capita growth rates of Indonesia, Malaysia, Philippines, Singapore, Thailand and Vietnam in 1999-2008



Source: Data from Maddison, 1999-2008

Nonetheless, this evaluation is not one-year base analysis like what World Economic Forum (WEF) has done, but will be more emphasized on the intermediate-term analysis which covers the dynamic movements (of the variables) within the 11-year period after the crisis, which would give the better view of the sustainable competitive advantage than one-year base analysis. Therefore, either averaging the annual results from WEF or carrying out the quantitative research should be performed.

I would not disagree on the quality of the Global Competitiveness Index by World Economic Forum (WEF) that is an excellent one. It has 12 pillars or 12 main determinants for a nation's competitiveness with 110 sub-determinants as well as the research methodology were very well designed, which could reflect the reality. However, the criteria, the number of determinants and the data source were amended or changed over time, at least during the past decade; hence, it was difficult to judge the average performance or total competitiveness without any errors. That is WEF is a good measurement for a year period but not for a medium or long-term period due to its variability of criteria.

Table 1: Six ASEAN Global Competitiveness Ranking by WEF

Rank	1999	2000	2001	2002	2003	2004
1	Singapore	Singapore	Singapore	Singapore	Singapore	Singapore
2	Malaysia	Malaysia	Malaysia	Malaysia	Malaysia	Malaysia
3	Thailand	Thailand	Thailand	Thailand	Thailand	Thailand
4	Philippines	Philippines	Philippines	Philippines	Vietnam	Indonesia
5	Vietnam	Indonesia	Indonesia	Vietnam	Philippines	Philippines
6	Indonesia	Vietnam	Vietnam	Indonesia	Indonesia	Vietnam

Rank	2005	2006	2007	2008	2009
1	Singapore	Singapore	Singapore	Singapore	Singapore
2	Malaysia	Malaysia	Malaysia	Malaysia	Malaysia
3	Thailand	Thailand	Thailand	Thailand	Thailand
4	Indonesia	Indonesia	Indonesia	Indonesia	Indonesia
5	Philippines	Vietnam	Vietnam	Vietnam	Vietnam
6	Vietnam	Philippines	Philippines	Philippines	Philippines

Note: The indicators are collected from the Global Competitiveness Index reports that has done for all the nations.

Source: World Economic Forum, *Global Competitiveness reports, 2000-2009*

As we can observe, Singapore, Malaysia and Thailand are ranked respectively in the first three in the rank, but the difference would be the other three nations: Philippines, Vietnam and Indonesia that shifted in ranking positions throughout the period. To simply make the *average* ranking for all the six countries, I will do the calculation for Philippines, Vietnam and Indonesia, by giving 3 points as the full mark for the highest rank among these three nations and 1 point for the lowest rank. The result is Indonesia, Philippines and Vietnam, respectively. Thereby, the ranking for the six countries using the information from WEF for eleven-year period would be Singapore, Malaysia, Thailand, Indonesia, Philippines, and Vietnam, respectively.

Nevertheless, as I mentioned earlier about the disadvantages of the Global Competitiveness Index in determining the intermediate-term competitive advantage, the above result should not be correct. Furthermore, WEF has relied on the survey data more than the hard/secondary data in the analysis, which the information given by the respondents could be biased. Additionally, the sample size is too small for the target variables according to statistics.¹⁴ Therefore, in order to measure the medium-term competitiveness after the Asian crisis for the six ASEAN nations, I need to do the competitiveness research; cannot duplicate the result from WEF. The static measurement throughout the study period will be my prior concern; that is the same determinants, the same methodology, and the same number of countries. The numerical data (hard data) will also be used to avoid the subjectivity in the analysis. This would reflect the average performance or a nation's competitiveness in eleven-year period with the control of variables and errors.

For the variables that determine a nation's competitive advantage is a broad option either to focus on the traditional economic theory that emphasizes the role of the classical factors; such as, the real exchange rates, and the factor prices or the modern economic theory that emphasizes the roles of social, economic and political institutions. My preference would rest on the modern economic theory. Presently, firms can produce the heterogeneous products; for instance, telephone with differentiated characteristics and sell them worldwide. Thus, the market competitions rest on product/process's cost/differentiation which is influenced by the set of social, economic and political institutions, not only one or two types of the factors. In order to measure Thailand's

competitiveness, I will utilize Michael Porter's Diamond Model of Competitive Advantage, which he incorporates the four important sets of factors that determine a nation's competitiveness, which emphasizing on the role of productivity in the macroeconomic scale in determining a nation's competitiveness.

To sum up, with the lesson learned from the Asian crisis in 1997, Thailand's competitive advantage could be improved, but 'how competitive' compared to his neighbor nations, the five ASEAN countries: Indonesia, Malaysia, Philippines, Singapore and Vietnam? Arguably, I would not use the results from the Global Competitiveness reports done by World Economic Forum (WEF) due to its drawbacks in the variability of criteria over time, its most reliance on survey data which could result in biased conclusion, as well as its sample size which is too small for the target variables according to statistics. Instead, I will use the static measurement; that is the same determinants, the same methodology and the same number of countries throughout the period. Additionally, I will use the numerical data (hard data) in order to avoid the subjectivity in the analysis. The set of (competitiveness') determinants derive from Porter's Diamond Model of Competitive Advantage which believes to reflect the competitive advantage of a nation that results from the integrations of the social, economic and political institutions.

Aim of the study

My purpose of doing this paper is to identify the strengths and weaknesses of Thai economy relative to other 5 ASEAN countries: Indonesia, Malaysia, Philippines, Singapore and Vietnam, utilizing Porter's Diamond Model of Competitive Advantage. Not surprisingly, Singapore would be expected as the most competitive nation, due to its outstanding economic performance in terms of its ability to produce superior (value) products, which establish the higher rates of return, which result in the highest GDP per capita among the six ASEAN nations. However, this is only a hypothesis. Moreover, it would be very useful to know the relative strengths and weaknesses of Thailand to Singapore and to other four ASEAN nations. The result of this investigation will mark (rank) a competitive position of Thailand among the six ASEAN nations, and identify the ways to improve its competitive position.

II. Previous studies

A. Thailand's competitive advantage in the eyes of others

1. World Economic Forum (WEF) reviews¹⁵

Currently (2010), Thailand is ranked in 38th global competitive position among 139 countries around the world; it has fallen 2 places this year and 10 ranks since 2006. Its strengths rest on many factors: (1) its relatively large domestic and export markets; (2) its excellent transport infrastructure, particularly, the quality of air transport and road infrastructure; (3) its efficiency of its labor market in terms of the cooperation in labor-employer relations, the rigidity of employment, and pay and productivity; (4) a relatively well functioning goods market with high degree of customer orientation and intensity of

local competition; and (5) the relatively sophisticated business environment with developed clusters and companies operating across the value chain.

However, its weaknesses were in; (1) public institutions continues to deteriorate (70th) after a drop of 30 places over the past four years, likely related to recent problems of social unrest and political instability in the country; (2) the health and educational systems, especially, the quality of education system is ranked 66th among 139 nations; and (3) the scientific and technology infrastructure, low broadband internet subscribers and internet users.

2. International Institution for Management Development (IMD) reviews¹⁶

Currently (2011), Thailand's competitiveness ranking is 27th out of 59 economies which has slipped one place from last year surveyed by the Lausanne-based Institute for Management Development (IMD) in 2011, which this year, the survey was based two-thirds on statistical data and one-third on surveys of executives Thailand's relative strengths rest on 'business efficiency' and 'labor market,' while the relative weaknesses were in 'government efficiency,' 'economic performance,' 'technology infrastructure,' 'health and environment,' and 'education.'

The business efficiency ranking improved to 19th place. The productivity (increasing to 33rd from 49th) and attitudes and values (to 16th from 19th) led the gains. Nonetheless, the productivity in agricultural, manufacturing and services sectors are ranked very low, 55th, 54th and 52nd out of 59 nations.

Labor market was ranked the second most competitive which the labor market is underpinned by share (number) and skills of the labor force.

Government efficiency recorded the biggest decline, to 23rd from 18th in 2010, based on surveys undertaken from January to April this year. The decline in government efficiency were mostly caused by some of the top concerns as risk of political instability, openness to foreign investors, time spent for company startups, female participation in Parliament, government subsidies, transparency of administration, bribery and corruption, efficiency of customs, and inequity of income distribution.

Economic performance declined to 10th place from sixth. The decline in economic performance was attributed to a decline in the performance of international trade (6th from 5th) and price stability (23rd from 4th), while international investment and the strength of the domestic economy recorded improvements. Strength of the government and household consumption, income per capita, growth of the service sector, outbound direct investment, and consumer prices were other contributing factors to the decline.

The technological infrastructure, health and environment and education all deteriorated, which are scored very low among 59 nations: technological infrastructure (to 52nd from 48th), particularly, telecommunications and broadband subscribers (ranked 58th) health and environment (54th from 51st) and education (51st from 47th).

3. Michael Porter reviews¹⁷

In his journey to Thailand in 2003, Porter has used his diamond model to analyze Thailand's competitiveness. Briefly, I summarize his arguments in terms of strengths and weaknesses which he had made for Thailand, which mostly based on the information from Global Competitiveness report year 2002 from WEF, which he was also the co-editor.

Firm strategy, structure and rivalry:

Strength: Inward foreign investment raises the level of home competition, which then causes the domestic competition environment more intense which Porter believes it is good for the improvement and upgrading of a nation's firms' competitiveness and a country in overall, especially, the rivals that are from outside the host country, which they could bring new technology and create the new way of competing; for example, in terms of product quality.

Weaknesses: (1) Most companies compete on how input costs and invest little in creating capabilities; (2) Complex, high tariffs and weak anti-trust laws impede competition and (3) Government bureaucracy and corruption create significant costs. Porter emphasized the third weakness which has placed lots of obstacles for a country's development in terms of the real investment that goes to the economy and large firms dominate the industries due to their close relationship with the government.

Demand conditions:

Strength: The strong home demand for pick-up trucks, Thailand is one of the most developed markets in the world. Pick-up trucks are popular among Thai citizens, particularly, in the rural area. Pick-up cars are useful in terms of space for transporting, and at affordable prices. This strong demand will help the domestic producers, and also related and supporting industries to be more competitive in terms of reacting to the right demand.

Weakness: Generally, the local Thai demand tends to be unsophisticated and does not generally lead international trends; they generally follow the international trends.

Related and supporting industries:

Weaknesses: (1) Most Thai clusters are focused on a few labor-intensive stages of their industries' value chain; and (2) Cluster organizations exist, but tend to be focused solely on lobbying. That is Thailand is home to an array of clusters, but clusters are **shallow** and are characterized by **weak linkages** among cluster participants.

Factor conditions:

Strengths: (1) Thailand has a rich wildlife beautiful locations, and natural resources, which attract high quantity of tourists every year, as well as abundant natural resources have enriched Thai agricultural sector to become one of the World's food suppliers (2) it has a good physical infrastructure, particularly roads.

Weaknesses: (1) Infrastructure in Bangkok is overused (2) the general skill level of the Thai labor force is low, and educational programs do not match company needs; (3) Communication networks are expensive and weak outside Bangkok; (4) Inadequate development of financial markets; (5) Low level of domestic technological capacity; and (6)

Thailand is only slowly moving towards a system with high-quality research institutions and the appropriate incentives for R&D and commercialization.

Based on the current WEF and IMD's assessments, their consensus on the strength of Thailand is *its labor market* while the weaknesses are in *the public institutions (government), the health and education systems as well as technology infrastructure*.

Porter's review is a bit old, but it is the most up-to-date one I could find on his analysis for Thailand. However, his analysis was less systematic if compared with WEF and IMD. His analysis was based on WEF ranks; then he might go through each selected variables that potentially were strengths and weaknesses for each diamond's factor; and then, went in detail. Nevertheless, he has found out a few strengths for Thailand that were inward FDI which influenced the level of domestic rivalry and the strong demand for pick-up truck in Thailand. He also agreed on the weaknesses which were in education system and technology infrastructure.

B. Competitive advantage

The word 'competitive advantage' is often mentioned in the microeconomic perspective as how firms position themselves in the industry. There are two basic types of competitive advantage: lower cost and differentiation,¹⁸ which firms usually pursue as a strategy in order to compete with each other. Low-cost is the ability of a firm to produce a given output using fewer inputs than competitors require; therefore, firms can sell the comparable products but at the cheaper prices.¹⁹ On the other hand, differentiation is the ability of a firm to achieve higher revenues per unit than competitors.²⁰ This firm can provide unique and superior value to the buyer in terms of product quality, special features, or services;²¹ therefore, the firm is able to charge higher prices. That is, either type of competitive advantage renders the firms with the higher productivity.²² If a nation's firms have the competitive advantage over the foreign firms (firms located outside the country), it means in overall, the nation has a higher competitive position than other nations.

In macroeconomic perspective, the World Economic Forum and Michael Porter define competitiveness as the level of productivity of an economy which can be determined by the set of institutions, policies and factors.²³ The level of productivity establishes the sustainable level of prosperity that the economy can earn. That is, the productivity determines the rates of return obtained by investments in an economy. A higher competitive economy would reap the higher rates of return and possibly grow faster in intermediate and long-run.²⁴

The nation's productivity is a combination set of the nation's firms' productivity. In order for a nation's firms to pursue a proper strategy and gain a higher productivity and therefore, the competitive advantage for a particular industry or segment, the firms' environment or the country's circumstances should be favorable and support them.²⁵ In analyzing a country's attributes, to check whether a nation is supportive for its local firms,

Michael Porter proposed the model called 'Porter's Diamond Model of Competitive Advantage' which highlighted the four determinants of a nation's global competitiveness: (1) firm strategy, structure and rivalry, (2) demand conditions, (3) related and supporting industries, and (4) factor conditions. A nation's firms are most likely to succeed in industries or industry segments where the national diamond is the most favorable.²⁶

Figure 3: Porter's diamond model of competitive advantage

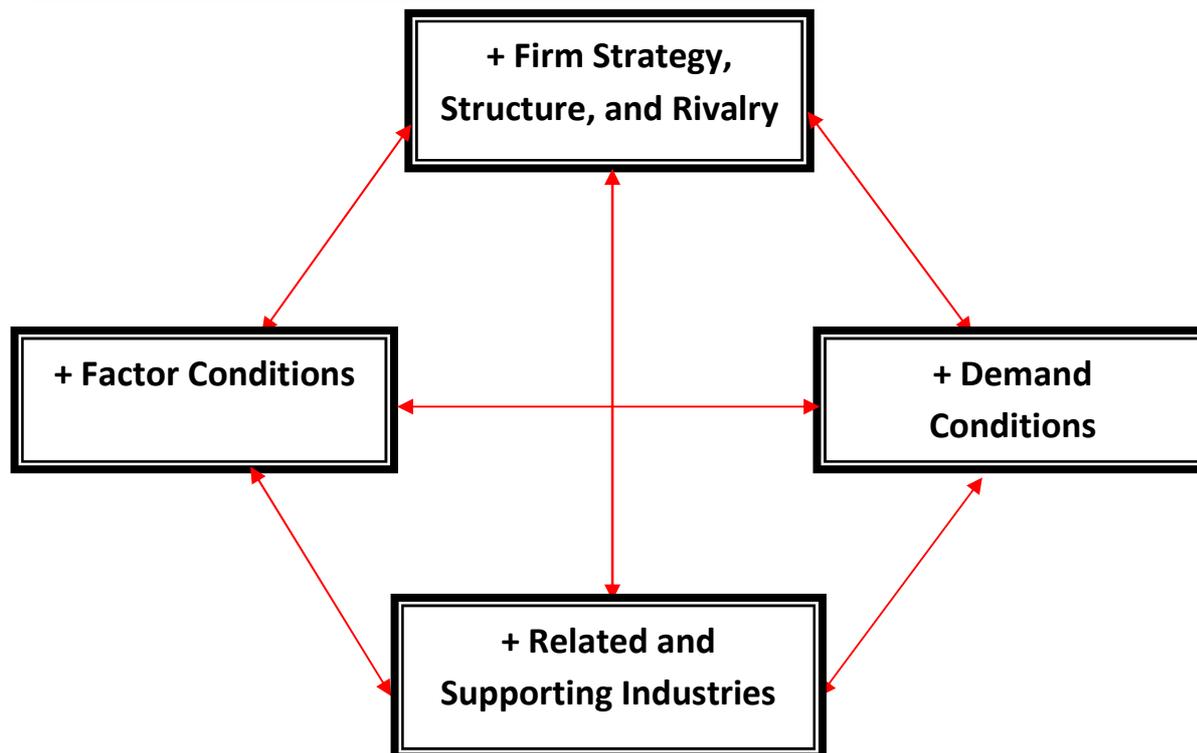


Figure 4: The two-way relationship between firm's competitive advantage and a nation's competitive advantage

Firms' competitive advantage <----->Nation's competitive advantage

C. Porter's Diamond Model of Competitive Advantage

1. Firm strategy, structure and rivalry

Firm strategy, structure and rivalry are the context in which firms are created, organized, and managed and the nature of domestic rivalry. The company's goals, strategies, and ways of organizing in industries differ extensively among countries. The national advantage results from a good match between these choices and the sources of competitive advantage in a particular industry. The pattern of home competition also has a profound role to play in the process of innovation and the ultimate prospects for international success.²⁷

There is no universal strategy that would guarantee the success for a firm implementing it. It depends on the contexts of situation, time and resources. Different countries have different contexts, which result from the integration of social, economic and political institutions of a particular nation. However, the globalization sometimes makes the strategy conditions similar; for instance, the global economic crisis like Subprime Crisis in 2009 which negatively hit the world economy, not only U.S. that was affected but the whole world that has the economic activities related to the U.S. This time, we face the same

strategic conditions and our aim is to counter the crisis. We can judge how good strategy firms or nations have used by assessing the economic outcome; such as profit or GDP growth rates.

In addition, any firm strategy that suits a nation's long-term competitiveness are the strategies that facilitate (upgrade) investments on physical resources; the productive capital stock, such as, plants and equipments or any specialized facilities (research institutions and scientific centers), and human resources; trainings and reward system (salary and fringe benefits).²⁸

Furthermore, industry structure varies widely among nations. It depends on the integration between nation's social, economic, and political institutions. The structure that supports firms' ability to use proper strategies and carry out their goals would be the most preferable one for a nation's competitiveness.

In addition, Porter emphasizes the role of domestic rivalry as one of the most important factors for a nation's competitiveness.²⁹ It creates pressure on firms to improve and innovate. Local competitions, for example, push each other to lower costs, improve quality of products and services as well as creating new products and processes, which therefore upgrade the competitive advantage of a nation's firms,³⁰ especially, an intense competition which creates visible pressures on each other to improve and attract a new entrant to the industry. Additionally, a strong local competition would pressure the domestic firms to sell abroad in order to grow; for instances, seeking the economies of scale and higher profitability.³¹ The vigorous domestic rivalry would also strengthen the ability of a nation's firms when competing abroad.³² However, this would only happen if the industries have the sufficient high profitability and high expected return otherwise the vigorous competition would drive down the price and profits and unattractive for a new entrant to begin their business. That is, the industries that have a vibrant domestic rivalry would perform better in contributing for a nation's competitiveness than the industries that have dull competition; there is always an improvement, upgrading and new businesses for the former than the latter which highly influence the nation's competitive advantage over other nations.

In order to evaluate this factor, I have selected twelve sub-factors to represent the determinant for a nation's competitiveness which are total reserves, gross saving, gross domestic investment, sustainable investment (gross saving minus gross domestic investment), GDP per capita employed, energy efficiency, total factor productivity growth, growth in ICT capital services, FDI, export and import, high-technology export, and growth in new business registered.

2. Demand conditions

Home demand conditions influence the economies of scale, can bestow static efficiencies and are vital for the rate and character of upgrading and innovation by a nation's firms.³³

The size of home demand indicates the home-market quantity demand or the potential income that a nation's firms can wish to sell their products with less risky than selling the products in the foreign markets. Moreover, if the size of domestic market is big, the market dimensions are most likely diverse, which encourage a nation's firms to do the experiments on their products, which would result in higher rates of innovation. Alternatively, it would allow more businesses and firms within the country which result in the favorable domestic rivalry condition that brings more efficiency to the market economy.

The growth of home demand is the growth of the potential income that a nation's firms can expect to gain if they can do better than today. This encourages more productivity and innovation, which are the source of competitiveness.

Besides the quantity demand that is important for a nation's firms' competitive advantage, the quality demand, how sophisticated buyers the nation has is also vital for creating a sustainable competitive advantage. Sophisticated buyers will push the firms to upgrade their products to meet their preferences which would result in product innovations. Home sophisticated buyers are easy and more sensitive for a nation's firms to perceive than interpreting the foreign demand. That means for the upgrading and innovation which are vital for competitive advantage, a more obvious or earlier picture of buyer needs than foreign rivals can have is the major requirement for gaining sustainable competitive advantage over the foreign competitors. Home demand makes this easily achieve and less costly; for example, local firms are more sensitive (e.g. in terms of proximity and culture) to the local demand than the foreign demand, which then easy to make a right interpretation. If a nation has as many as sophisticated buyers, that nation acquires a useful source of competitiveness.

Globalization could make the home market less important. Either the quantity or quality of home demand importance is nullified by the transport and communication technologies. The small nations like Singapore or Taiwan could attain more and faster economic development than some bigger nations like Indonesia or Thailand. This would be another issue which Porter called 'selective factor disadvantages'³⁴; when a nation lacks in one comparative factor, it will try to find the created factor or substitute that offsets the selective weakness. This would enhance the innovation mechanisms in a nation; more effort and ambition to improve itself.³⁵ That is, the home demand is the advantage if one nation has, that nation has a potential to be more competitive than other nations. Yet, if that nation does not have, other factors that determine the competitiveness might be well-pushed, which may in turn enhance the ability of demand (quality) and make the total competitiveness better than other nations. That is, along with other determinants of the competitive advantage of a nation, we should not ignore the home demand conditions.

The size, growth rate and sophisticated home demand play an important role in determining a nation's competitiveness. The size of home demand helps a nation's firms to achieve economies of scale and static efficiencies. The growth rate of home demand stimulates a nation's firms to upgrade their product and process innovation, so does the

sophisticated home demand. Hence, the representative factors for home demand would be population, GDP, GDP growth, GDP per capita, labor force to GDP ratio, adult literacy rate and internet users.

3. Related and supporting industries

The presence of internationally competitive related and supporting industries in a nation creates advantages in the value-chain activities.³⁶ If for instance, the supplier industries are competitive, they could provide the efficient, early, rapid and preferential access to the most cost-effective inputs³⁷ as well as the process of innovation and upgrading by ongoing coordination.³⁸ If industries are related, these related industries can coordinate or share activities, which also increase the information flow and technical interchange in the value-chain,³⁹ either in terms of competing or complementary. This creates more efficiency and synergistic outcome (more than the sum of output) to the economy. The most favorable outcome would be creating a new competitive industry.⁴⁰

To rely on the competitive foreign related and supporting industries; for example, by foreign outsourcing is less favorable for a nation's competitiveness. Porter argues that the proximity of managerial and technical personnel, along with cultural similarity tends to facilitate free and open information flow,⁴¹ which is vital for upgrading process and spawning a new competitive industry. That is the presence of internationally competitive related and supporting industries in a nation is essential for a sustainable competitive advantage of a nation.

Besides Porter's argument on the importance of the related and supporting industries, Paul Krugman emphasized the role of external economies. If firms are located near each other, this will result in a cluster of firms. With ability of a cluster, it would support and enhanced the ability of specialized suppliers. The ways that a geographically concentrated industry would allow labor market pooling and help foster knowledge spillovers.⁴² Firms which are located proximate to each other as a cluster, besides the allocation and mobility of the resources that can be effectively shared, the positive externality; such as, knowledge spillovers would be activated. That is if a nation has as many as industrial estates, parks or areas, the competitiveness in industries will be enhanced.

Regional and national innovation systems apply the same way as Porter and Krugman but more emphasized on knowledge competency. The level of knowledge sharing within a region or nation is influenced by the degree to which the capability of transport and communication technologies available in the country. Indeed, the knowledge and capability can be shared easier within the region, but less easy when being shared between regions. If a nation acquires a well-developed advanced infrastructure, it is most likely that the integration among industrial districts and the flow of knowledge will be developed, especially, from the 'core region to the periphery'⁴³. This is more important than having as many as isolated industrial estates. Besides evaluating the advanced factors in order to check a nation's knowledge competency, the growth of industrial output as well as labor

productivity are the another way to assess the effectiveness of the national innovation system.

To assess a nation's performance in related and supporting industries, I have selected four determinants which are industrial growth rates, labor productivity, local supplier quantity and number of industrial estates.

4. Factor conditions (factors of production)

If a nation's firms possess low-cost or uniquely high-quality factors of the particular types that are significant to competition in a particular industry, they gain competitive advantage.⁴⁴ The factors can be either physical or human resources.

Factor endowment *Versus* Factor creation

The traditional economic theory based on comparative advantage emphasized on the role of a national endowment of factors, which plays an important role in the competitive advantage of a nation's firms; for instance, the case of the rapid growth of manufacturing in low-wage countries; such as, Hong Kong, Taiwan and Thailand.⁴⁵ Yet, Porter argues that the stock of endowment factors at any particular time is less important than the rate at which they are created, upgraded, and made more specialized to particular industries.⁴⁶

Basic and generalized factors *Versus* Advanced and specialized factors

Both types of factors are important for a country's competitive advantage. However, Porter claims that the latter is more vital in terms of creating a sustainable competitive advantage. The advanced factors, for instance, are necessary to accomplish higher-order competitive advantages: differentiated products and proprietary production technology. They are scarcer, more complex and difficult to imitate; their development demands huge and frequently sustained investments in both human and physical capital.⁴⁷

The competitive advantage based on basic or generalized factors is unsophisticated and often fleeting by for example, foreign activities or sourcing on international markets.⁴⁸ Nevertheless, this type of factor is still essential for the nation's competitiveness since it is a basic requirement for the country's development and the advanced/specialized factors are often built upon basic factors.⁴⁹ Particularly, ASEAN countries, which the agricultural base and unsophisticated products are counted as one of the most important drivers that stimulated the economic growth in the past. That is, considering the basic/generalized factors are important for relatively analyzing a country's competitive advantage in ASEAN.

To sum up, in general, Porter gives more important on the created factors which are advanced and specialized factors than the endowed factors or unsophisticated factors which are basic and generalized factors in terms of a more sustainable source of competitive advantage. Above all, I agree on his point that any available domestic factors need to be upgraded either the endowed or created factors.

For a nation in overall, the extensive and qualified factors either are endowed or created are the essential drivers for a nation's competitiveness. These factors can be

understood in terms of a country's infrastructures: transport and communication infrastructure, and utilities. If the nation acquires the well-developed infrastructure and extensiveness of infrastructure networks, the national market, the economic activities and the connections to other countries and regions will be integrated and enhanced, which result in higher productivity and a competitiveness of the nation.⁵⁰ Additionally, the upgrading of these factors is also important for a long-term competitive advantage of a nation since (1) there is always uncertainty in the economies, one most influential on this determinant is the change of technology (2) general and advanced factors can be imitated by other countries over time; the upgrading is important for making the system more complex and unique which are therefore difficult for others to imitate.

Therefore, this determinant should cover both the useful endowed factors and advanced factors for eleven-year period in order to determine a medium or sustainable competitive advantage. The selected sub-factors are: arable land, labor force, air transport, contain port traffic, electric power consumption, paved road, ICT expenditure, fixed broadband internet subscribers, secure internet servers, telecommunication, R&D expenditure, researchers, scientific and technical journals, and expenditure per tertiary students.

D. The determinants as a system

The four determinants in diamond are not only interrelated but they also reinforce each other as a system. That is the effect of one determinant is dependent on the state of others.⁵¹ When it comes as a system, the combination of each effect of one determinant would not be only a summation of the total effect; the total competitiveness would also count on the result from the interactions among each variable within the diamond, which could be both negative and positive reinforcement. A complex interaction in the diamond system would give the nation a sustainable competitive advantage since it is difficult for other nations to imitate the system.

The four determinants of national advantage reinforce each other and multiple over time in fostering competitive advantage in a nation.⁵² These are the examples on how each variable are related:

Firm strategy, structure, and rivalry: [Large, growing or sophisticated home demand], [the existence of related and supporting industries], and [sufficient and qualified factor conditions] support a nation's firms to implement a proper strategy and compete effectively.

Demand condition: Intense rivalry makes home demand larger and more sophisticated. Sophisticated factors attract foreigners such as students or expatriates into a country (increased quantity demand) and upgrade the quality of buyers. Related and supporting industries increase the income (through more industrial output) and brain (knowledge spillovers) for buyers.⁵³

Related and supporting industries: A group of domestic competitors encourages the formation of more specialized suppliers and related industries. Large or growing domestic

demand stimulates the growth and deepening of supplier industries. Basic and particularly specialized factor pools are transferable to related and supporting industries.⁵⁴

Factor conditions: A cluster of domestic rivals and perceived national challenges stimulate factor creation; e.g. capital investments on advanced factors. Home demand influences priorities for factor-creating investments. Related and supporting industries create or stimulate the creation of transferable factors (e.g. skilled labors).⁵⁵

To sum-up, a good quality in one determinant affects positively to other determinants. We see in this way, if each determinant performs their best in what it should do, the nation's competitive advantage will be multiplied and outperform other nations. Nevertheless, it is difficult to judge each factor systemically without combining too much subjectivity.

III. Theoretical Framework

Besides the clever Porter's diamond has made on integrating the important variables determining a nation's global competitiveness,⁵⁶ there were controversial critics on the quality of Diamond model, and whether for me to use this model. Chang Moon et al (1998) argues that the single diamond does not incorporate multinational activities or international activities, which the single diamond only focuses on the concept of the home base, which may distort the real explanation of a nation's competitiveness; for example, the case of Singapore, Singapore, besides its competitive advantage in basic and advanced factors, its inbound and outbound FDI are also important for Singapore's competitiveness. That is, Moon means that a Porter's diamond model is incomplete to explain the nation's competitiveness. The incompleteness of the model was also criticized by many researchers who tried to use his model in their researches. However, it is rather normal to find some imperfection in the model than to find the perfect model. Michael Porter also has his standing-point in his home-base concept. In the nation mass, most of the nation's firms are located within the nation or alternatively, a few nation's firms are located abroad, hence, the conditions; for instances, the quantity and quality of domestic factors or the quantity and quality of home demand are vital for a nation's firms to compete successfully both in the nation and international stages. Therefore, in order to analyze the whole country, a mass perspective needs to apply.

Another important drawback of the diamond model is subjectivity. Analysts, by using the diamond model can use their arguments and judge the competitiveness. To restrict the use of casual values and intangible measures, Stone and Ranchhod (2006) offered the use of the quantitative approach onto the diamond model. They use **an economic-value** formula to position a nation with respect to the rest.⁵⁷

$$C_A = \frac{(Value - \min)}{\left(\frac{\max - \min}{10}\right)}$$

C_A = Relative value of factor A for a nation A

Value = Numerical value (data) of factor A for a nation A

Min (minimum) = Minimum value (data) of factor A in all nations

Max (maximum) = Maximum value (data) of factor A in all nations

10 = Graph scale full points to compare among the nations

Another formula is for calculating the area of the nation's diamond; this is to determine the **total relative competitiveness** among the nations (total result).

$$\sum A_{ij} = A_{SD} + A_{RD} + A_{FR} + A_{SF}$$

A_{SD} = Strategy*0.5Demand

A_{RD} = Related*0.5Demand

A_{FR} = Related*0.5Factor condition

A_{SF} = Strategy*0.5Factor condition

The economic-value formula will be utilized first to find the relative economic value for each determinant and for each country. For example, if I use the total reserves as a proxy for the strategy factor. To analyze Thailand, if in six countries, the maximum total reserves are \$118,302,328,973 (Singapore) and the minimum are \$10,368,663,154 (Vietnam) and Thailand has \$59,997,555,358. Therefore, the marks for Thailand will be 4.6 out of 10. Singapore will earn 10 marks while Vietnam will earn zero mark. In the end, I will derive the relative economic value of each determinant for all six countries. Then, I will sum up all the relative economic value using the second formula to find the total relative competitiveness or the area of the nation's diamond for each country and rank them. The largest size of diamond is the most competitive one.

It is also important to plot the diamond graph. In order to compute the vector, which called resultant vector, we use Pythagoras resultant = $(X^2+Y^2)^{1/2}$. The relative position to each arm of the diamond bounding the quadrant is another important characteristic of the vector,⁵⁸ which we can see the relative area where the competitive advantage is biased to; illustrating relative strengths and weaknesses.⁵⁹ This is a similar approach used by SPACE analysis, which the SPACE analysis is utilized to position a company strategically in a competitive, conservative, defensive or aggressive quadrant depending on its performance on a range of factors.⁶⁰

There are four determinants for a nation's competitiveness stated by Porter: (1) firm strategy, structure and rivalry, (2) demand conditions, (3) related and supporting industries, and (4) factor conditions. I propose 37 sub-determinants categorized into the four main

determinants. The selected sub-determinants or variables will be criteria for determining the competitive advantage of a nation.

Table 2: The four main factors from Porter's diamond model and the sub-factors listed in each main factor

Factors	Sub-factors
1. Firm strategy, structure, and rivalry	(1) Total reserves, (2) Gross saving, (3) Gross domestic investment, (4) Sustainable investment (gross saving-gross domestic investment), (5) GDP per capita employed, (6) Energy efficiency, (7) Total factor productivity growth, (8) Growth in ICT capital services, (9) FDI, (10) Export and import, (11) High-technology export, and (12) growth in new business registered.
2. Demand conditions	(1) Population, (2) GDP, (3) GDP growth, (4) GDP per capita, (5) Labor force to GDP ratio, (6) Adult literacy rate, and (7) internet users
3. Related and supporting industries	(1) Industrial growth rates, (2) Labor productivity, (3) Local supplier quantity, and (4) Number of industrial estates.
4. Factor conditions	(1) Arable land, (2) Labor force, (3) Air transport, (4) Contain port traffic, (5) Electric power consumption, (6) Pave road (7) ICT expenditure, (8) Fixed broadband internet subscribers, (9) Secure internet servers, (10) Telecommunication, (11) R&D expenditure, (12) Researchers, (13) Scientific and technical journals, and (14) Expenditure per tertiary students.

IV. Descriptions of the sub-factors in this study

A. Firm strategy, structure, and rivalry

1. Firm strategy

Total reserves (current US\$) (*Source: World Bank, 1999-2009*)

If a nation's firms are profitable than foreign firms, the total reserves increase. This indicates the effectiveness of their strategy over foreign competitors. The profitability earned from the international competition constitutes the sustainable business condition for a nation's firms. Moreover, if a nation acquires the large reserves, it is easy for them (the central bank) to implement any policies that produce the results that increase the nation's competitive advantage.

Gross domestic saving (% of GDP): (*Source: Index Mundi, 1999-2009*)

Of the total income, how much people save. High saving constitutes the secured and sustainable investment for a country. Furthermore, the saving also facilitates the effectiveness of the money supply in an economy.

Gross domestic investment (% of GDP): (*Source: Index Mundi, 1999-2009*)

Of the total income, how much people invest. The decisions to invest or the investment strategies either of private companies or the government are important for a nation's competitiveness in terms of upgrading the facilities and improving a nation's business capacity.

Gross saving – Gross domestic investment

If the number is positive, a nation has a healthy/sustainable investment, which relies less on debt-finance-investment but more on saving-finance-investment. Healthy investment positively influences the long-term competitive advantage of the nation.

Growth in ICT capital services: (*Source: Maddison, 1999-2008*)

The use of ICT assets on the productive activities indicates the firms' operational strategy that relies on the use of high-tech capital to carry out their economic activities. ICT capital would make their decision-making process and company's activities more up-to-date and efficient which then influences the firm's sustainable competitive advantage.

GDP per capita employed (constant 1990 PPP\$) (*Source: World Bank, 1999-2008*)

It indicates how well firms use the rewarding system to attract and keep their labor force (firm's human resource strategy). GDP per capita employed or income per employee implies the attractiveness of the return on investment for the labor supply to enter the work force. It also reflects the willingness of the labor supply to work for a company.

Energy efficiency (GDP per unit of energy use) (*Source: World Bank, 2011*)

It indicates how many outputs one unit of energy use can produce, illustrating the firms' energy strategy. If the number increases over time, it means that a nation's firms use less energy or the output increases more than the inefficiency of energy use; thereby, that nation has positive energy efficiency and thus, it constitutes the sustainable competitive advantage. Energy fuels all the economic activities; however, it is scarce resource.

Total factor productivity growth (*Source: Maddison, 1999-2008*)

It indicates firms' production strategy. Total factor productivity (TFP) growth represents the effect of technological change and efficiency improvements in a nation. In the growth theory, it indicates the economic growth without the contributions of the accumulation of capital and labor, which illustrating the technological improvement. With a positive TFP, it can be interpreted that there is a technological improvement (product, process or new technology breakthrough) and firms perform better than before.

2. Structure and rivalry

Foreign Direct Investment (FDI), net inflows (current US\$) (*Source: World Bank, 1999-2009*)

Foreign activities bring new skills and increased specializations to the host country as well as increase the income and investments (especially, advance factors) into the host country. New skills, increased specializations, income and investments are essential for improving and sustaining a nation's competitiveness.

Export and import (% of total GDP) (*Source: World Bank, 2001-2008*)

Exports plus imports determine the degree of a nation's open-to-trade, which influences the dynamic learning of domestic entities. A variety of knowledge, skills, and

innovations that are embedded in the exported products and particularly the imported products constitute the benefits of the open-to-trade on the nation's competitiveness.

High-technology exports (current US\$) (*Source: World Bank, 1999-2008*)

The ability to produce high-technology products and especially, the products that are able to compete in the international market is important for a nation's competitiveness.

Growth in new businesses registered (*Source: Index Mundi, 2004-2005*)

The growth of new firms indicates the prosperity of business condition in a nation as well as the degree of domestic rivalry. The high growth of new firms would bring pressures on the existing firms and push them to upgrade their products and processes. The upgrading and improvement are essential for sustaining the competitive advantage of a nation's firms.

3. Interrelations among sub-variables

Gross saving and gross domestic investment Versus Sustainable investment

(Positive relationship)

Gross saving and gross domestic investment influence the degree of the sustainable investment (saving – investment) a nation has.

FDI Versus TFP growth, Gross domestic investment, Total reserves, High-technology export

(Positive relationship)

FDI influences the growth of the technology (total factor productivity growth) that a host nation could benefit from the technological transfer by the multinational firms. FDI also escalates the level of gross domestic investment, the level of foreign currency a nation could gain (total reserves), and the quantity and quality of high-technology export (in terms of helping a nation's firms to produce sophisticated products (either directly or externality)) which ultimately determine a nation's competitiveness.

Growth in ICT capital services Versus High technology export

(Positive relationship)

The more use of ICT capital would influence the more ability of a nation's firms to produce the high technology export which may require a complex software to design and complicated production process to develop the products, which this more ability will positively influence a nation's competitiveness.

Export and import Versus Total reserves, TFP growth, High-technology export, Growth in new business registered.

(Positive relationship)

The level of export and import would influence the net foreign revenues (net export) that a nation could gain which determines the level of a nation's total reserves. A nation's firms can also learn the new technology embedded in the imported products and try to substitute it with their capability. The new technology learned would develop the ambition of a nation's firms to substitute or increase product innovation in order to compete with foreign producers, which ultimately improve the firm's production process (TFP growth) and product innovation (high-technology export). The vibrant home market would attract more new businesses into the market.

High-technology export Versus Total reserves, Energy efficiency

(Positive relationship)

High-technology export would bring higher foreign revenues into the export country which thereby increases the total reserves. The high-technology export would also bring a higher GDP to a country; therefore, increases the energy efficiency.

B. Demand conditions

1. Demand size and growth

Population (*Source: World Bank, 2009*)

Population indicates home demand's size which influences the economies of scale, static efficiencies and self-sufficiency of a nation's firms. For some industries which need the heavy R&D investment and face a high level of uncertainty, the proximity to large domestic demand is predominantly comforting in making investment decision.

Gross Domestic Product (current US\$) (*Source: World Bank, 1999-2009*)

It indicates the result of the economic performance of a nation. A higher national income interprets a higher competitiveness a nation is relative to others. Moreover, it also indicates the total demand a nation's firms could potentially take. Like the population, it guarantees the economies of scale, static efficiencies and self-sufficiency for a nation's firms with the lower risks (than selling in abroad).

GDP growth (annual %) (*Source: World Bank, 1999-2009*)

It illustrates the growth of a nation in terms of the production and income. The positive growth interprets a higher production (business expansion) and higher income (yield more return). Consequently, the demand size and the national income are bigger, the prosperity of the economy is enhanced; therefore, more competitive.

2. People's income

GDP per capita (current US\$) (*Source: World Bank, 1999-2009*)

ASEAN nations have a comparable purchasing power on goods and services, meaning that the prices of goods and services are about the same for all countries. The level of individual income indicates the ability of the people to consume more, save more and invest more which affects the nation's supply and the demand-creates-supply capacity for upgrading and innovating new products.

Labor force to GDP ratio (labor force divided by GDP)

'How much is each labor worker worth to a nation.'⁶¹ It indicates the importance of a labor worker in an economy. The importance of the labor indicates the labor's long-term wealth (always replacing labor with capital is not an ultimate way of a sustainable economy.) The labor's long-term wealth indicates the long-term demand for goods and services, which is the income and profits for the growth of a nation's firms; for example, they can use their profit to reinvest in specialized factors which then create innovated products into the economy.

3. Sophisticated consumers

‘A nation’s firms gain competitive advantage if domestic buyers are, or are among, the world’s most sophisticated and demanding buyers for the product or service’.⁶² Such buyers assist a nation’s firms perceive new needs, allow close contact in the product development process as well as pressure local firms to satisfy their high standards in terms of product quality, features and services.⁶³ Additionally, Porter claims that ‘the presence of sophisticated and demanding buyers is as or more important to sustaining advantage as to creating it.’⁶⁴

Literacy rate, adult (total) (*Source: World Bank, 2005, 2008, 2009*)

Internet users (% of the total demand (population)) (*Source: World Bank, 2009*)

4. Interrelation among sub-variables

Population Versus GDP

(Positive relationship)

The population size would affect the level of a country’s GDP in general. In terms of the aggregate production, the larger labor force would provide more goods and services for the economy. Alternatively, in terms of the aggregate spending, the larger population would demand more goods and services. That is the more population, the more GDP a nation should have.

Sophisticated buyers Versus GDP growth

(Positive relationship)

Sophisticated buyers are the qualified demand in an economy. If qualified demand dominates the total demand, then, the supply has to improve and produce more sophisticated products in order to survive in the market. This pressure will improve and upgrade production process and increase product innovation into the economy, which ultimately positively influence a nation’s competitiveness and sustainable growth of a nation.

C. Related and supporting industries

Industrial growth (*Source: World Bank, 1999-2008*)

Like GDP is a measurement of the overall economic performance, the industry growth rate gauges the performance of the industry. It gauges the effectiveness of the firms’ actions in relating and supporting each other. If there is a positive growth rate, it can be interpreted that there is at least an improvement and upgrading in the industry, which result in a better performance of the industry.

Labor productivity (GDP per capita) (*Source: World Bank, 1999-2009*)

Well-related and supporting industries can result in labor pooling which leads to higher productivity of labor; labor productivity is be enhanced by knowledge spillovers and labor mobility. Labor productivity is a very important source for a nation’s competitiveness in ASEAN where the use of labor in the production is relatively more intensive to capital. A good quality of labor means a nation’s long-term competitiveness. Labor productivity is also

important for attracting more FDI into the country, which is an essential source for the economic growth in Asia.

Local supplier quantity (*Source: World Economic Forum, 2010*)

The availability of the local suppliers is important for the lean/flexible supply-chain management; e.g. in terms of proximity (cost) and culture (communication). Local firms are most likely to establish the closer relationship with the local suppliers. The close-relationship between producers and suppliers is the source of long-term competitiveness for both entities; the cost of negotiation (bargaining power) between them is low; the exchange of business information that benefits each other's competitive advantage; and the lean/flexible supply-chain management is enhanced. Additionally, a number of suppliers available in a country would give a variety of choices to the local firms.

Number of industrial estates/parks in a nation (*Source: multiple sources (see References)*)

Industrial district/estate/park creates a cluster of firms, knowledge spillovers and externality in the region and the nearby regions, which enhance the overall performance of the industry. It is also believed to be the source of product and process innovations.

Interrelations among sub-variables

Industrial growth Versus Local supplier quantity, labor productivity

(Positive relationship)

The growth of industry would attract more local suppliers into the market, in order to fill up a more demanding input. The growth of the industry output would also influence the level of labor productivity; more output with stable work force would increase the labor productivity. Indirectly, the growth of industry might result from well-related and supporting mechanisms in the industry which then enhances more output. By this, the labor productivity is gained from knowledge spillovers or/and the mobility of labor to the higher productive sector.

Number of industrial estates Versus Industrial growth

(Positive relationship)

By leveraging the benefits which resulted from a cluster of firms (resource mobility, knowledge spillovers and externality) would enhance the ability of firms in the cluster to be competitive in terms of producing and developing new products that positively impact the growth of the industry; for example, more effective production process and knowledge sharing which results in product and process innovations.

D. Factor conditions

1. Basic factors

Arable land (in hectares) (*Source: Index Mundi, 2007*)

ASEAN countries are the kitchen of the world where the supply of agricultural products is vital for the world's wealth-being. The quantity of arable land is a measure for an ASEAN nation's competitiveness.

Labor force (*Source: Index Mundi, 1999-2009*)

Labor is undeniably a vital source for economic activities especially in ASEAN. ASEAN countries are the labor-intensive economy where the unskilled, semi-skilled and skilled labors are relatively cheaper than other developed regions. The more the number of labor force are the more potential for the economy to produce more goods and services.

Basic infrastructure

Air transport (*Source: World Bank, 1999-2009*)

Air transport physically moves goods and services around the globe. It facilitates the international trades and cross-border investments. The air carriers registered in the country departing worldwide is interpreted as the quality of a nation's air transport observed by the number they are deployed. (The quality is good so why people use it.)

Contain port traffic: (*Source: World Bank, 2000-2009*)

Sea ports are vital for the flows of goods around the globe and it is also the source of a country's income (port taxes). A country that has the advantage on port facilities would for example bring a lot of foreign activities into the country; such as FDI. Alternatively, it also establishes the free flows of information that journeys can exchange the new business information and learn with each other. That is the more diverse people use a nation's port, the more new things and improvement a nation can learn. This will eventually upgrade a nation's competitiveness. Shipping is also the world's most popular transportation mode for international trade. The quality of port can be measured by the number of port container flows (inflows and outflows), implying the quality of the port infrastructure (such as accessible, effective, or comfortable), so people use it.

Electric power consumption (kWh per capita) (*Source: World Bank, 1999-2008*)

The civilization's evolution can be measured by their use of energy. The electric power consumption indicates how advanced a nation is in its supporting technologies.⁶⁵ Presently, economic activities are driven by the electricity; the more electric power consumption per capita, the more output a nation can have into the economy. You may argue that not all output that electricity produces is valuable for economy; some electricity is wasted for non-productive activities; however, as long as it is being produced means someone is using it, for any purpose, it would directly or indirectly contribute to the growth of economy more or less, at least it is running.

Road, paved (% of total roads) (*Source: World Bank, 2000*)

The quality of road is vital for the effective supply-chain management in a country and across the country. The time consuming, transport costs and vehicle maintenance costs would be minimized if a country has paved road. The effective supply-chain management would contribute to more competitive advantage for a nation's firms.

2. Advanced factors

Information and Communication Technology expenditure (% of GDP) (*Source: Index Mundi, 2003-2009*)

Upgrading the information and communication technology each year is very important for a nation's firms' competitive advantage; keeping up with up-to-date

technology as well as increasing the wider use of ICT technology in the economic activities (GDP) enhance the overall nation's competitiveness (work more effectively and efficiently.)

Fixed broadband internet subscribers (per 100 people) (*Source: World Bank, 2009*)

It represents the use of the internet in a country. Internet is a power tool for everything, especially for work. Accessibility of a nation's firms to the guaranteed source of internet connection would enhance their ability to have a stable successful economic activity. The supply for fixed broadband internet guarantees the connection to the internet; hence, the source of working effectively.

Secure internet servers (per million people) (*Source: World Bank, 2009*)

This indicates the level of the internet technology a nation has, which implies how advanced ICT infrastructure a nation possesses.

Telecommunications:

Telephone line and Mobile cellular subscriptions (per 100 people) (*Source: Index Mundi, 2009*)

This factor makes the way of doing businesses more productive as well as enhances the rapid and free flow of information;⁶⁶ it therefore enhances more output or reduces the cost of operations. The free flows of information and the network connection are essential for linking all economic activities; and it is the way to incorporate or compete effectively which result in higher competitiveness of a nation's firms.

Research and Development expenditure (% of GDP) (*Source: World Bank, 2002*)

The R&D investment is an important source of innovations and competitiveness of a firm and a nation.⁶⁷ Research and development activities create the new knowledge and ideas which can bring out as inventions and innovations that upgrade the competitive advantage of a nation's firms. Therefore, the level of R&D investment is important for a nation's competitive advantage. A nation that has the most invested in R&D is the most competitive one in this category.

Researchers in R&D (per million people) (*Source: World Bank, 2001-2003*)

Researchers can represent the skilled labor force in a nation. The skilled labors are sophisticated human resources that are important for creating the ideas, knowledge, and innovations. By having these people the economy is being always upgraded; thus, resulting in a sustainable competitive advantage to a nation.

Scientific and technical journal articles (*Source: World Bank, 1999-2007*)

The quantity of the scientific and technical journal articles indicate the availability/abundance of the useful knowledge to the mass, which are an important source of competitiveness.

Expenditure per tertiary student (*Source: World Bank, 2007-2009*)

It indicates the level of importance a nation gives on the potential qualified work force. Most Equipped or well-supported students are likely to become skilled workers, which eventually, lead to a higher level of competitiveness of a nation.

3. Interrelations among sub-variables

ICT expenditure Versus Fixed broadband internet subscribers, Secure internet servers *(Positive relationship)*

The more ICT expenditure a nation has the more fixed broadband internet subscribers and secure internet services in the nation; therefore, the more competitive a nation is.

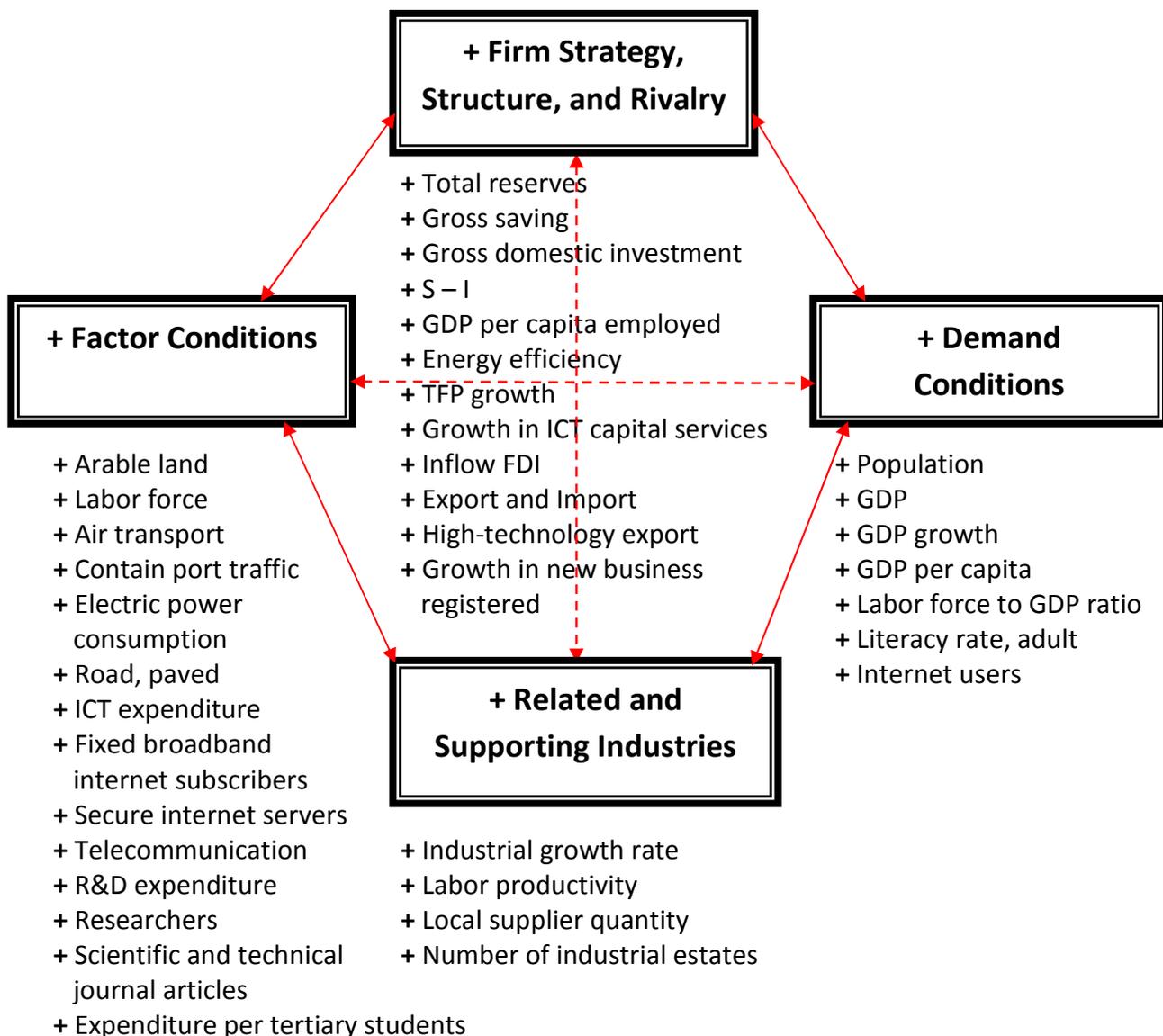
R&D expenditure Versus Researchers, Scientific and technical journal articles *(Positive relationship)*

The more R&D expenditure a nation has the more likely researchers and scientific and technical journal articles a nation will have; therefore, the more competitive a nation is.

Researchers Versus Scientific and technical journal articles *(Positive relationship)*

The more researchers a nation has, the more scientific and technical journal articles will be published in a nation; therefore, the more competitive a nation is.

Figure 5: The determinants of a nation's competitive advantage



The ultimate dependent variable is a nation's competitive advantage. The positive sign illustrates the *positive relationship* between the independent variable and the dependent variable; for instance, the demand conditions has a positive relationship with a nation's competitive advantage, that is the more favorable demand conditions a nation has, the more competitive a nation is; alternatively, the total reserves has a positive relationship with a firm strategy, structure and rivalry, that is the more total reserves a nation possesses, the more favorable firm strategy, structure and rivalry a nation has.

V. Limitations of the study

Brunei was crossed out from my studied nations due to the lack of its data availability. However, it was ranked in 28th (2010), 32nd (2009) and 39th (2008) in the Global Competitiveness report by World Economic Forum. In 2009 and 2010, it was ranked as the third ASEAN competitive nation while in 2008; it was in the fourth place. This was a hindrance for my research conclusion for representing the whole ASEAN. The best I can do was to conclude that, for example, Thailand is ranked as the third-most competitive nation among the six ASEAN economies.

The government factor is left out from the Porter's diamond model here. Firstly, it is because I follow the theoretical framework from Stone and Ranchhod (2006). Secondly, it is difficult to judge the government performance with the (real) quantitative data, and especially, with the comparison with other nations. Finally, I also agree that the impact of the government efficiency could be evaluated through the performance of the real sector which considers firm strategy, structure, and rivalry, demand conditions, related and supporting industries, and factor conditions; that is if all factors perform good, the government is supportive to them; since the country's development and competitiveness are the government's vital goals.

My investigation period was 1999-2009, eleven-year period. Within the period, some data were averaged while some was selected only a year or a few years and some utilized the data in 2010. The problem was due to the data availability. However, for my opinion, this was acceptable. Since my aim was to investigate the relative competitiveness of the six nations after the Asian crisis in 1997, any indicating data that were available after that year had represented the countries' performance. Nevertheless, I agree that some data had to be averaged in order to minimize the risk of chances that came particularly in the economic cycle; thus, we can have a fair view over the period. Yet, for some data, since it was difficult to find for all years and its data character is acceptable for analyzing only a year that is the most up-to-date one, the one-year data is adequate; such as, population and arable land . The rare case for using data in 2010 only happened for 'local supplier quantity' which there was no earlier-year data that was available. That is, if I could not achieve the best scenario (all data were averaged), I would not get down to the worst one. The trade-off which minimizes the ineffectiveness of the research result was applied and especially it was applied the same rule for all countries; that is to see the relative competitiveness, this is acceptable.

VI. Results and discussion

In order to measure Thailand's competitive advantage, the five ASEAN nations have been chosen: Indonesia, Malaysia, Philippines, Singapore and Vietnam as competitiveness' comparisons. The quantitative approach was applied onto Porter's diamond model to assess the relative competitive capability of each nation. The data were collected from the three internet sources: World Bank, Index Mundi, and the Conference Board. The results can be found in the table result.

Table 3: Table of results

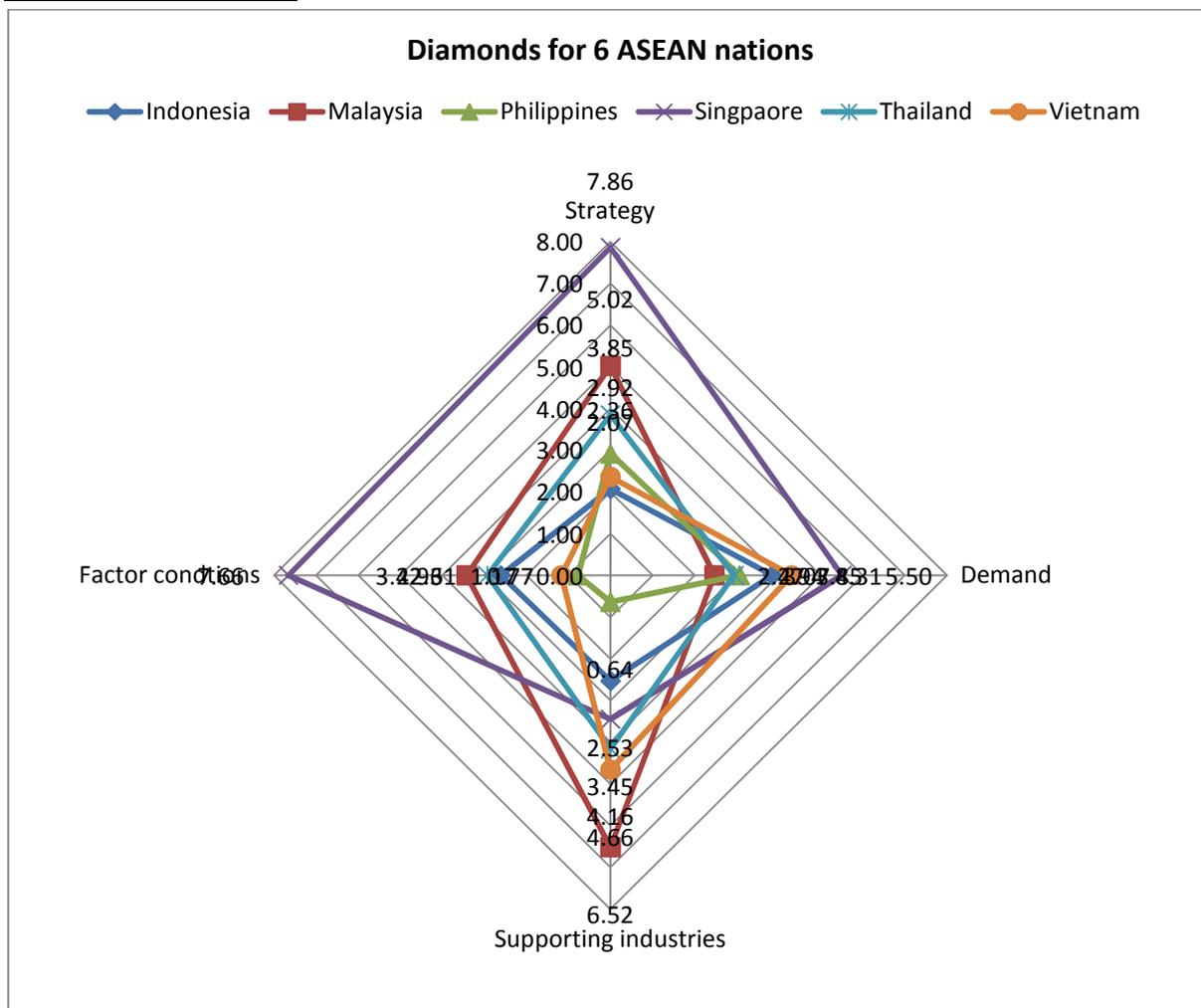
Descriptions	Indonesia	Malaysia	Philippines	Singapore	Thailand	Vietnam
Firm strategy, Structure, Rivalry						
Total reserves	2.8	4.8	1.2	10.0	4.6	0
Gross saving	0	6.4	5.6	10.0	3.7	4.9
Gross domestic investment	3.7	2.7	0	4.2	4.7	10.0
Gross saving – Gross domestic investment	0.3	7.6	9.0	10.0	3.3	0
GDP per capita employed	1.1	4.4	0.7	10.0	2.3	0
Energy efficiency	0.6	2.7	4.2	10.0	2.1	0
Total factor productivity growth	10.0	9.8	6.9	7.5	8.9	0
Growth in ICT capital services	1.4	0.7	2.6	0	1.6	10.0
FDI, net inflows	0.5	1.6	0	10.0	3.0	1.1
Export + import	0	4.1	1.1	10.0	2.1	2.4
High-technology exports	0.5	5.6	2.8	10.0	2.3	0
Growth in new businesses registered	4.0	10.0	0.9	2.7	7.6	0
(4.0) Average	2.1	5.0	2.9	7.9	3.9	2.4
Demand Conditions						
Population	10.0	1	3.9	0	2.8	3.7
GDP	10.0	3.4	2.1	2.9	5.1	0
GDP growth	2.0	2.8	1.2	5.6	0	10.0
GDP per capita	0.26	1.7	0.2	10.0	0.7	0
Labor force/GDP ratio	4.3	0.8	4.1	0	2.4	10.0
Literacy rate, adult	0	0	10.0	10.0	6.7	3.3
Internet users	0.3	7.6	0	10.0	2.9	3.1
(3.7) Average	3.6	2.5	3.1	5.5	2.9	4.3
Related and Supporting Industries						
Industrial growth rate	0	1.9	0	2.1	4.0	10.0
Labor productivity	1.2	4.9	0.8	10.0	2.7	0
Local supplier quantity	6.0	9.3	0	1.2	10.0	1.7
Number of industrial estates	3.0	10.0	1.8	0.5	0	7.0
(3.7) Average	-2.5	-6.5	-0.6	-3.5	-4.2	-4.7

Factor Conditions						
Arable land	10.0	0.8	2.3	0	6.9	0.5
Labor force	10.0	0.8	3.2	0	3.3	3.9
Air transport	10.0	6.1	0.5	1.3	3.1	0
Contain port traffic	1.3	4.5	0.5	10.0	1.1	0
Electric power consumption	0	3.5	0.1	10.0	1.7	0.03
Road, paved	4.60	7.0	0	10.0	9.9	0.6
ICT expenditure	0	10.0	3.0	5.9	3.4	3.4
Fixed broadband internet subscribers	0	2.5	0.5	10.0	0.3	1.1
Secure internet servers	0.02	0.8	0.1	10.0	0.2	0
Telecommunication	0	5.0	0.1	10.0	5.7	6.0
R&D expenditure	0	2.9	0.5	10.0	0.9	0.7
Researchers	0.3	0.5	0	10.0	0.5	0.1
Scientific-tech journals	0.03	1.4	0	10.0	3.1	0.03
Expenditure per tertiary student	0.2	2.3	0	10.0	0.7	0.5
(3.1) Average	-2.6	-3.4	-0.8	-7.7	-2.9	-1.2
Total relative competitiveness	14.8	34.0	6.8	74.4	23.5	19.2
Rank	5	2	6	1	3	4

Singapore is the most competitive nation among the six ASEAN nations. The least competitive nation is Philippines. Thailand is ranked in the third place of competitiveness; that is, Thailand can outperform three ASEAN countries (Vietnam, Indonesia, and Philippines), but is defeated by Singapore and Malaysia. The result was contrast with the **Table 1**, which is the eleven-year average ranking from WEF; that is Singapore, Malaysia, Thailand, Indonesia, Philippines and Vietnam. Indonesia is ranked ahead of Vietnam while Vietnam is ranked the lowest among the six ASEAN nations which is different from my result which Vietnam is ranked fourth and ahead of Indonesia. The difference is due to the difference in the criteria for determining a nation's competitiveness, which is to be honest, the WEF's criteria is indeed better than mine. Nonetheless, my standing-points (contribution) are using the static measurement and quantitative data (non-survey data), which WEF did not have throughout the period for determining the medium-term competitiveness.

A. Thailand and ASEAN

Figure 6: Diamonds of competitiveness for Indonesia, Malaysia, Philippines, Singapore, Thailand and Vietnam



Thailand relatively performs 'OK' in all four main factors, which ranks fifth only in the demand conditions, while the rest factors ranks third. That is, **Thailand has no absolute strength**. Thailand has to improve its capability in all areas, especially in the demand conditions, given the assumption that each factor affects a nation's competitiveness equally. When I made the mean score for each factor, I found out that Thailand was scored below the mean score in every factor except in related and supporting industries. To prioritize, if a country can allocate its resources to only one factor at one time, the first priority to solve would be demand conditions; then, factor conditions, firm strategy, structure, and rivalry, and related and supporting industries, respectively.

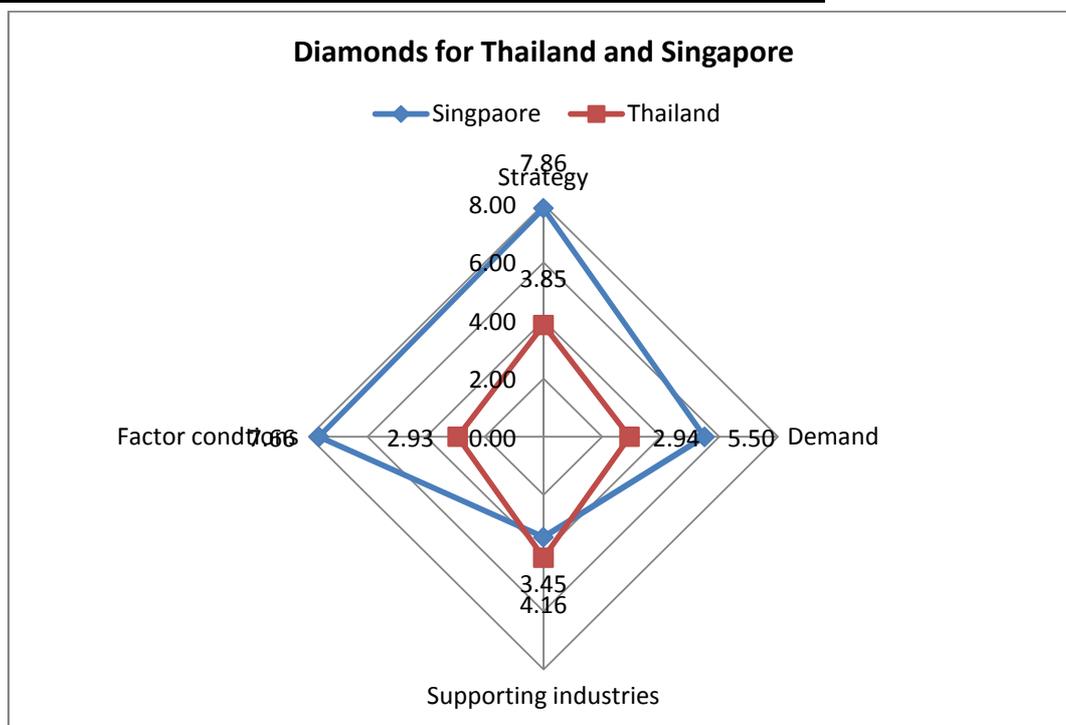
For demand conditions, the economic growth was scored the least among the six ASEAN nations. Hence, the policymakers have to find ways to stimulate economy. My suggestion would be on investment in advance factors. Two types of investment should be emphasized: ICT infrastructure (increase the availability, easiness, and affordable internet services and improve the ICT technology) and R&D infrastructure (increase expenditures on

R&D projects, and scholarship qualified students.) This will also improve the competitiveness' score in factor conditions. By stimulating the economic growth through the healthy investment (the investment that supports a nation's competitiveness) the national income and income per capita will rise which grant the buyers with the higher purchasing power on goods and services. Additionally, Thailand will have more sophisticated buyers from this growth stimulation.

Thailand or even Malaysia cannot defeat Singapore, at least not within these ten years. Singapore's competitiveness' score is 74.4 which is double from what Malaysia has (34.0) and almost triple of Thailand's current level (23.5). Hence, Thailand should not treat Singapore as a rival but instead, it should treat Singapore as a complementary. Thailand should aim to overtake Malaysia's competitive position as the first goal to improve itself and defend its competitive position from Vietnam, Indonesia and Philippines.

B. Thailand and Singapore

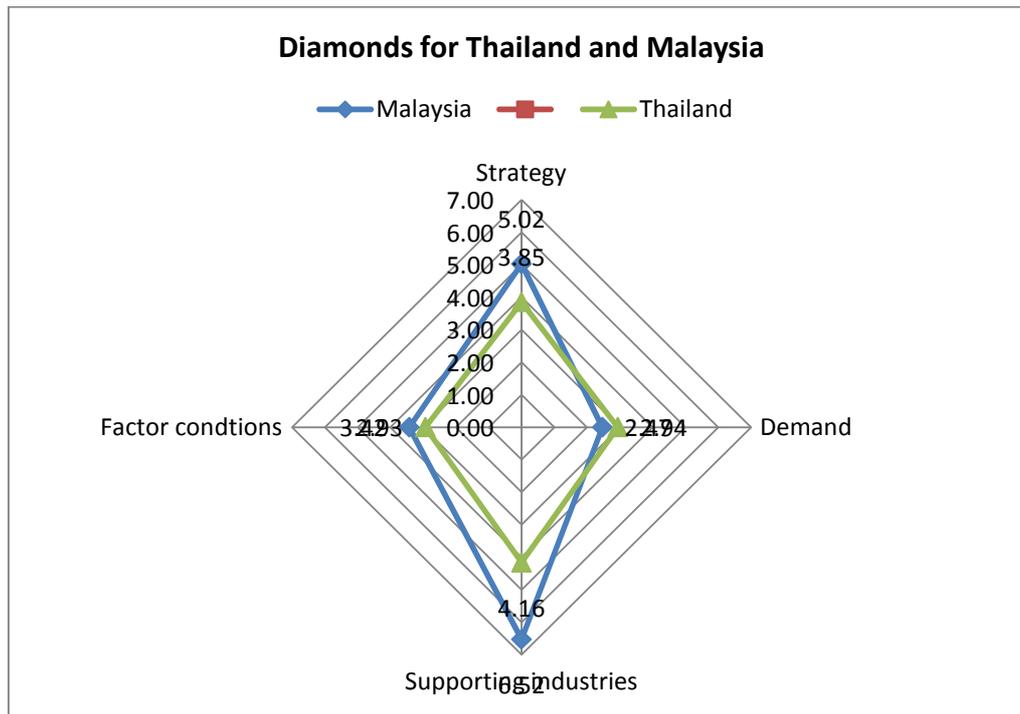
Figure 7: Diamonds of competitiveness for Thailand and Singapore



As I expected, Singapore would be the most competitive nation in the six ASEAN economies. It has the competitive advantage in three factors out of the four: firm strategy, structure, and rivalry, demand conditions, and factor conditions. However, its related and supporting industries are relatively weak and even weaker than Thailand. The result indicates that Singapore has fewer local suppliers and lower industrial growth rate than Thailand; still, it has higher labor productivity. What Thailand should do with Singapore is to incorporate. **Technology and knowledge collaborations should be encouraged; for example, Singapore's assistance in ICT and R&D projects.**

C. Thailand and Malaysia

Figure 8: Diamonds of competitiveness for Thailand and Malaysia



Malaysia has always been Thailand's most awful (neighbor) competitor. It was defined as the second-tier of the newly industrialized countries along with Thailand and Indonesia,⁶⁸ and it was expected to be the fifth tiger in competition with Thailand before the Asian crisis.

Malaysia is geographically located south of Thailand. The country's total area and population are 35.7 per cent (World Fact, 2011) and 59.5 per cent (World Bank, 2011), respectively less than Thailand. The country's Gross Domestic Product (GDP) is approximately two-thirds of what Thailand can produce. Yet, in terms of competitiveness, which not only consider how big the area, population or GDP are, Malaysia is doing a lot better than Thailand. Porter's diamond measures the competitiveness by utilizing four factors, which three out of the four, Malaysia can do better than Thailand: firm strategy, structure, and rivalry, related and supporting industries and factor conditions, but except in demand conditions. Particularly, related and supporting industries which are scored the highest among the six ASEAN nations which can be informed as the relative strength of Malaysia over his neighbors.

Basically, Thailand could perform better than Malaysia; for example, with the size of arable land, labor force, demand, and total income. However, when consider the productivity in terms of GDP growth, GDP per capita, specialized factors or other economic outcomes, Malaysia is much better than Thailand.

Firm strategy, structure, and rivalry: Malaysia has **more** total reserves, gross saving (% of GDP), sustainable investment condition (saving is greater than investment), paid in worker's income (incentive to work), energy efficient, total factor productivity growth, flows

of export and import (ability to produce and learn), high-technological export, and growth in new business registered (prosperous business condition and higher degree of domestic rivalry). The successful strategies are important to sustain a nation's firms' competitive advantage; therefore, a nation's competitiveness. In overall, **Malaysia performs better than Thailand**: in generating more revenues, especially from foreign sources; healthier investment which rests on retained earnings or domestic saving rather than debt-financing; better awarding system for workers; better energy use relative to output; higher production efficiency; higher ability to produce sophisticated products; and more favorable competitive environment which then pressures the innovations and upgrading.

Related and supporting industries: Malaysia has more labor productivity and industrial estates while Thailand has more industrial growth and local suppliers. Yet, overall, Malaysia performs better Thailand; since Malaysian local suppliers are also as many as Thailand's.

Factor conditions: Malaysia has **more** air transport, contain port traffic, electric power consumption (per capita), ICT expenditure (% of GDP), fixed internet broadband subscribers (per 100 people), secure internet servers, R&D expenditure (% of GDP), and expenditure per tertiary student. Endowed factors and created factors are vital for a nation's firms' competitive advantage, especially, created factors, which Porter emphasized, that it supports a long-term competitive advantage for firms and a nation. In overall, Malaysia has more favorable factor conditions than Thailand. The firms that are located in Malaysia would absorb this benefit and could perform better than the firms in Thailand.

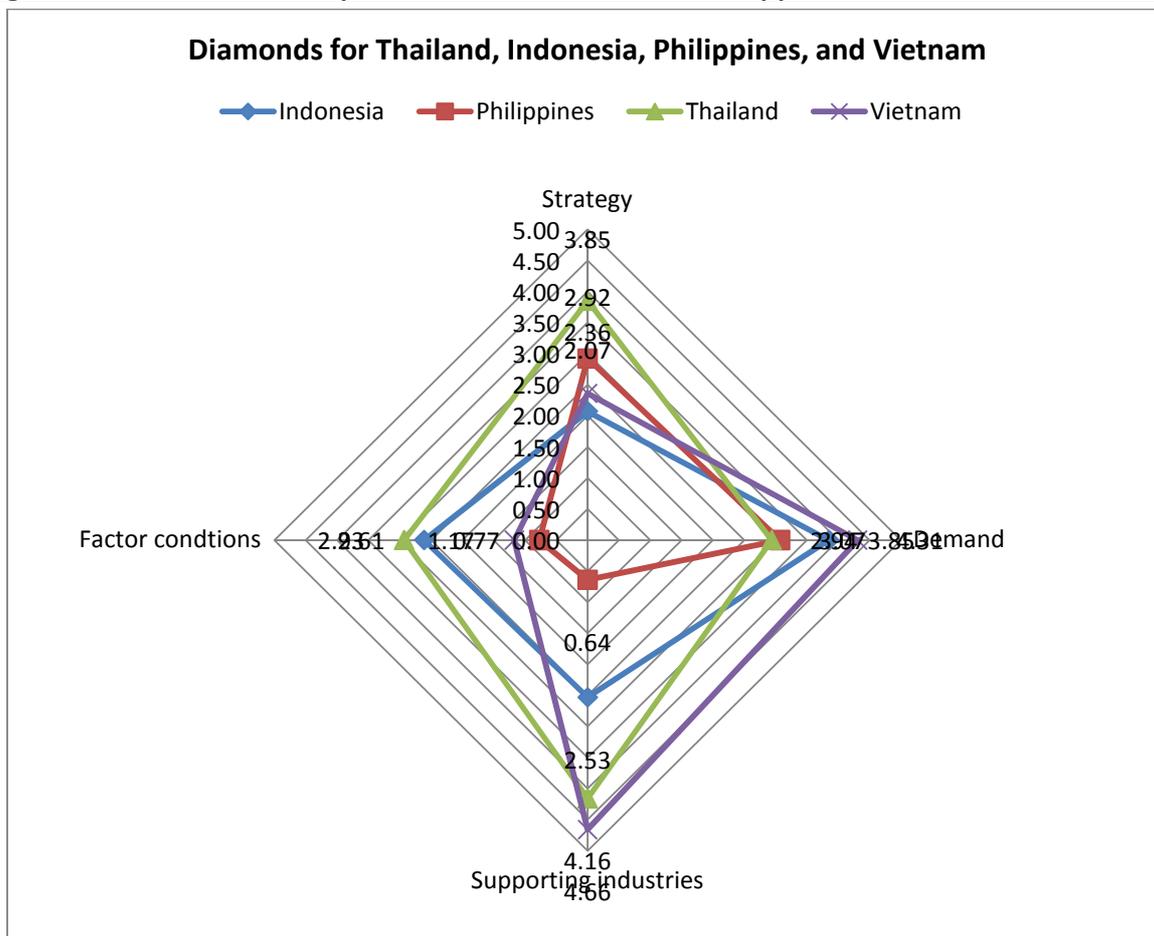
Demand conditions: Thailand has more population, GDP, labor force/GDP ratio, and literacy rate. This is Thailand's relative strength to Malaysia. Thailand has a higher quantity demand which it should make use of, which would help a nation's firms to easily gain economies of scale in selling goods and services. However, it lacks of quality demand, which Malaysia is scored higher. Malaysian firms could sell differentiated products in the wider (domestic) mass market than Thailand, and could upgrade their product quality more frequent (buyers push); and hence, could sell higher-value or more sophisticated in the international market successfully than Thailand can do.

To improve Thailand's ability to compete with Malaysia, Thailand should be more focused on 'higher-value or sophisticated products'. Thailand should upgrade its ability to produce sophisticated and high-value products. By this, Thailand could generate more revenues from the foreign source (increase high-technology exports and total reserves) and increase its efficiency in using energy in the production. That is, Thailand has to increase and upgrade its advanced and specialized factors; such as technology infrastructure and skilled/specialized workers. The private and public investment in Information and Communication Technology and research and development should be emphasized. ICT types of investment may focus on ICT applications (hardware/software) on plants, equipments and other facilities that support the advanced and specialized productions. For research and development, Thailand should establish more R&D institutions or R&D projects that support and upgrade the development of sophisticated products and production

technology. The investment in ICT and R&D would, in the first hand, stimulate the growth of economy, and in the longer-term, raise total factor productivity, labor productivity (thus, income), and quality demand (sophisticated buyers). This does not only solve the relative weaknesses to Malaysia but also the weaknesses to the rest of ASEAN.

D. Thailand and Vietnam, Indonesia and Philippines

Figure 9: Diamonds of competitiveness for Indonesia, Philippines, Thailand and Vietnam



Without any strength, Thailand is in the vulnerable position. Thailand should also be careful with these three ASEAN nations, especially Vietnam. Although Vietnam is ranked in the fourth competitive nation, it has several strengths which score the highest among the six nations. Vietnam has the highest gross domestic investment, growth in ICT capital service, GDP growth, labor force to GDP ratio, and industry growth. These illustrates that Vietnam has tried to develop its economy a lot during the past decade. The way for Thailand to keep outperforming Vietnam is to always keep developing and improving itself, especially, the field that it is scored weakness.

For Indonesia, it has the relative strength (the highest score) in quantity demand: the highest population and national income, but lacks of quality demand. A product that targets the mass would be able to sell well in Indonesia; such as, standardized products. In terms of agriculture and labor-intensive sectors (such as services), it also has the relative strengths in

arable land and labor force, which it has the highest among the six ASEAN nations. To keep outcompeting Indonesia, Thailand has to increase the use of capital in the productions and keep upgrading technology infrastructure.

Philippines are relatively the least awful ASEAN competitor for Thailand. Its factor conditions and related and supporting industries are scored the lowest among the six ASEAN nations. It performs relatively 'OK', which ranks fourth in demand conditions and firm strategy, structure and rivalry. However, its demand condition is stronger than Thailand's. Philippines have more population, GDP growth, labor force to GDP ratio and adult literacy rate than Thailand's. Yet, Thailand has more GDP and GDP per capita than Philippines. Thailand needs to stimulate its economic growth (in the way that improves its competitiveness) in order for GDP to keep growing and also improve its education system in order to beat Philippines in this factor.

VII. Policy implications

The research result illustrates that Thailand has to improve all four factors; yet, the first priority should be given to 'factor conditions.' In order for Thailand to defeat Malaysia, its most awful competitor, and keep outperforming Vietnam, Indonesia and Philippines, it has to improve the quality of its products; that is to be more sophisticated and superior value. The Thai policymakers should propose the policies that stimulate the investment and upgrading in the advanced and specialized factors, particularly in the fields of Information and Communication Technology (ICT) and research and development (R&D), as their first priority for developing a nation's competitiveness. It means that the government should *increase* their budget/attention on investing and upgrading ICT infrastructure and R&D *more than before*. **The investments target two goals: firms and buyers, that is to increase the level and number of sophisticated products and to improve the quality demand (sophisticated buyers.)** Moreover, my suggestion is also aligned with what WEF, IMD and Michael Porter currently conclude for Thailand's competitiveness that is Thailand needs to improve its technology infrastructure.

In the past eleven years after the Asian crisis, this research affirms that the public and the private sectors did not emphasize on the role of developing advanced and specialized factors sufficiently and relatively lower than Singapore and Malaysia.

In 2003-2009, Singapore's and Malaysia's annual average ICT expenditures were 8.3 and 11.8 per cent of GDP, respectively while Thailand had only 6.2 per cent of GDP (Index Mundi). Hence, Thailand needs to increase its ICT expenditure to be at least equal or more than Malaysia. ICT expenditure includes both public and private sectors, either or both sectors have to increase their expenditure. In order to be equal with Malaysia, ICT expenditure needs to be approximately 11.8 per cent of GDP; that is US\$21,010.9 million a year. Thus, Thailand needs to increase its ICT expenditure around US\$ 9, 971.3 million or 348, 995.5 million Baht (at 35 Baht/Dollar), doubled from its current level. Ministry of Information and Communication Technology of Thailand receives only 0.2 per cent of the national budget each year, which it is only 4,080 million Baht (2003-2009) or US\$117

million.⁶⁹ That is the ministry alone will not be able to cover this increased expense. When considering the annual average ICT expenditure for Thailand during 2003-2009, it was US\$11,039.6 million. That is most of the ICT expenditure was from the private sector's spending and the sum of other ministries' spending. Therefore, the most effective policy here would be firstly the Ministry of ICT needs to increase its budget in ICT approximately US\$105.7 million or 3,698.7 million Baht each year (the law of renal appendage.) Secondly, since this is also the way to develop and stimulate the economy, ICT Ministry may incorporate some projects with Ministry of Finance which has the budget share of 12.7 per cent each year. Thirdly, the government could also stimulate the investment on ICT infrastructure through stimulating the private sector; for example, by organizing campaigns on ICT collaboration among firms with lessened regulations and taxes, especially attracting FDI to this activity. Fourthly, the government may collaborate with the private sector on some projects. Not only the specific needs of the private sector will be satisfied, the investment expenditure will also be shared. Stimulating the private sector, attracting foreign direct investment and collaborating with the private firms are the best choice. Therefore, besides ICT Ministry itself and the ministry-inter-collaborations, the policymakers should develop policies that stimulate and attract the private and foreign direct investment to this activity.

In the Master's plan 2012-2015 of ICT Ministry of Thailand, there are four main strategies: (1) Development of ICT infrastructure to efficiently thoroughly, timely technology and security; (2) Promoting and supporting ICT implementation in the management and service in all sectors with governance; (3) Promotion and development of ICT resources, including supporting for research and development, to enhance competitive capabilities in the industry for ICT regionally and globally; and (4) ICT use in the management and integration of meteorological data and disaster warning system to be effective and timely.⁷⁰ The Master's plan sounds good. The budget is allocated mostly towards the first strategy 70.07 per cent, and for the second, third and fourth strategies, 11.88, 7.1, and 10.95 per cent, respectively.⁷¹ That is, the Ministry emphasizes on the first strategy, which is to develop ICT infrastructure to efficiently thoroughly, timely technology and security; this is more about economic development and stand-living upgrading, which would have the effect on the quality demand or sophisticated buyers which will be improved through this plan. The second strategy is more on firms/organizations and this is very important for the effectiveness of firm strategy, structure, and rivalry as well as how firms relate and support each other. This strategy would help firms to improve its competitive capability on developing and producing sophisticated products. The role of ICT applications on production and operational activities; for instance, developing or buying the (new) hardware and software help firms to produce higher-sophisticated products, enhance their ability to add more value to its products (such as designs) as well as help firms to operate effectively. The third strategy is about R&D in ICT which is essential for the long-term development of ICT industry and any related-ICT industries. Each nation has the competitive advantage in

different industries; thereby, adapting and developing the ICT applications to extend or remain the competitiveness is the task for that particular nation to carry out; that is why the third strategy is important for a nation's competitiveness in the long-term; however, it is the least emphasized. The fourth strategy is developed for only the meteorology industry, which they have realized that it needs upgrading and improvement; however, this ultimately affects a nation's competitiveness; for example, a correct forecast on the weather or the natural disasters would help firms to timely manage their businesses. The first, second and third strategies should be emphasized for developing a nation's long-term competitive advantage.

The four strategies look promising. It will improve the level and number of sophisticated products and sophisticated demand, but to what extent? In the past eleven years, it was proven that the Information and Communication Technology were not given the attention enough from the public and the private sectors, compared to Malaysia and Singapore. To attain Malaysia's level, 11.8 per cent of GDP, from its current level 6.2 per cent requires the double of its current economic activity on ICT; that is doing double from what it is currently planned in the four strategies. This would as I mentioned above, require the collaboration between public and private sectors, and certainly lots of effort. The realization of the importance of developing ICT specialized and advanced infrastructure must be largely pronounced by the government. It should include the plan for improvement and upgrading ICT infrastructure as a nation's first priority for the competitive advantage and call for the help from the public and private sectors.

Research and development (R&D) is an important source for the competitive advantage for firms and a nation, it is where new knowledge, ideas, inventions and innovations can be investigated and carried out. Policymakers should also give their first priority on R&D for developing a nation's competitiveness. Thailand's R&D expenditure both public and private was relatively low compared to Malaysia and especially Singapore. In 2006, Thailand's R&D expenditure was 0.25 per cent of GDP while Malaysia's was 0.64 per cent of GDP and Singapore was 2.27 per cent of GDP (World Bank). To establish the long-term competitive advantage for Thailand, of total output (value) produced, R&D should take part 0.64 per cent or more. Thailand should beat its close competitor first, Malaysia. I simply suggest them to triple its current activity on R&D. However, R&D activity is usually counted as the sunk cost that would not be included in the cost of production for goods and services. That is generally, many firms do not want to invest in this activity. The government needs to lead the role. Firstly, the government may increase its budget in R&D in the ministries that directly involve with the role of promoting sophisticated products; such as, Ministry of Science and Technology and other public R&D centers. Secondly, the government should promote and facilitate the collaboration among firms in R&D activities in order to share R&D costs; for instance, the government may announce that a group of firms can ask for the R&D fund from the government in a particular project (indeed, the government has to be careful in selecting process and monitoring after granting the fund.) Thirdly, other benefits; such as, income tax deduction for firms that have R&D activity more than 1 per cent of its total

output could also be an incentive (certainly, tax incentive should be given differently according to the size of the firm.) Ministry of Science and Technology and Ministry of Finance should be responsible for this plan; while Ministry of Science and Technology leads the role.

In the Master's plan 2011-2013 of Ministry of Science and Technology, there are five main strategies: (1) Promote and expedite manpower development in science and technology as a powerful source for a country's development; (2) Create awareness, development and learning in science and technology to a knowledge-based society; (3) Enhance the ability of R&D and innovation as the knowledge base and to improve the productivity of the country; (4) Promote technology transfer and applications of research findings, development and innovation to use in commercial productivity in all levels; and (5) Develop the basic infrastructure and support systems for research and development and innovation sufficiently as well as develop the policy and management of science and technology to be effective and modern.⁷² The Master's plan sounds good. The budget is allocated mostly toward the fifth strategy 38.94 per cent, and for the first, second, third and fourth strategies, 15.22, 10.1, 27.17 and 8.57 per cent, respectively.⁷³ That is the ministry emphasizes on the fifth and third strategies, respectively; to develop the R&D infrastructures and to enhance the ability of R&D in the role of knowledge base and productivity. The first strategy is to develop the human resource in R&D; such as researchers and scientists. The second strategy is to create the learning society. The fourth strategy is to develop the ability of R&D product in commercialization. The implementation of the five strategies will have the positive effect on Thailand's competitiveness. However, the impact is not enough compared to Malaysia. In order to attain Malaysia's level, Thailand needs to increase its R&D expenditure from its current level 0.25 per cent of GDP or 18,132.4 million Baht to 0.64 per cent of GDP or to increase 0.39 per cent or 28,286.6 million Baht a year. Ministry of Science and Technology receives the budget in 2011, 10, 283 million Baht.⁷⁴ That is the government needs 28, 286.6 million Baht a year or more in order to outperform Malaysia. The government may choose to increase this budget to the Ministry of Science and Technology or as I mentioned above stimulate the collaboration among firms, the collaboration between the public and the private sectors and the tax incentives. The triple of its current R&D expenditure would require lots of effort, but it will certainly improve the country's competitiveness.

The increased investments/expenditure both in ICT and R&D will improve Thailand's competitiveness not only in the advanced and specialized factors; that is the factor conditions but also the other three. Especially, demand conditions that are scored the lowest will be directly positively influenced.

Firm strategy, structure and rivalry: The export income from selling higher-value and sophisticated products will increase; therefore, the total reserves, which increases the stability of Thai financial sector. The individual income will be improved by the higher productivity of labor, which is enhanced by advanced and specialized factors. The total

factor productivity will be improved with more technology and efficiency into the production process. The energy efficiency will be increased by higher-value of output. Finally, it will attract the new businesses and firms into the industry, where it sees profitability and long-term prosperity.

Demand conditions: The slowest GDP growth rate among the six ASEAN economies will be improved by the increased investments/expenditure in advanced and specialized factors which are considered to be the healthy investment which enhances more productivity to a nation's firms; hence, not only economy grows but sustainably grows. Individual income will rise when they can produce more output or value of output; this is along with labor productivity, which is also benefited from the increase in advanced and specialized factors. Quality demand will be improved, in the first hand, by the availability of ICT services that are accessible and affordable. Hence, buyers will be able to access and learn more information; and thus, improve their preferences on goods and services, which eventually, pressure the firms to innovate and upgrade their products.

Related and supporting industries: It is most likely that the increased investment should not be concentrated only a few firms or in isolated areas; the advanced and specialized factors should be conveniently accessible and be exploited by as many firms as possible. Either the strategic area or the mobility of the advanced and specialized factors should be required. The collaborations in ICT and R&D projects would enhance the ability for firms to relate and support each other. This will improve the industrial growth rate, labor productivity and the regional/national innovation system.

Factor conditions: This is a direct positive result. The domestic factor conditions will not only be upgraded, but also improved in the way that increases the competitiveness of Thailand. The improvement in advanced and specialized factors means more (quantity and quality) advanced and specialized physical resources as well as advanced and specialized human resources, which is important for a sustainable competitive advantage of a nation.

The policymakers would think how this could be possible. The main problem would be the immense increase in expenditure for both ICT and R&D, which means the government has to earn more revenue in order to cover the increased expense. If the government cannot earn more, it needs to delegate this burden to the private sector; however, this is not also easy. To improve Thailand's competitive advantage would take time and a lot of effort from the public and the private sectors. The government should not make it rush. The reformation always takes time to really succeed; the quantity has to come along with the quality. Now, Thailand knows what its relative weaknesses to other ASEAN nations and how to solve them. The increases of the public spending and the government promotion in ICT and R&D *more than before* are necessary for improving its competitiveness. The collaborations between the public and private sectors as well as among firms on ICT and R&D should also be stimulated *more than before*. Thailand needs to see the improvement in ICT and R&D every year. The policymakers may set the target according to their capability for each year in order to evaluate the progress.

VIII. Conclusion

Thailand had missed his privilege on being the fifth Asian Tiger of the newly industrialized economies after it was hard hit by Asian Crisis in 1997. Reconsidering its competitive potential after the crisis would be an interesting topic for Thai policymakers. The six ASEAN countries were chosen to make a comparative competitiveness: Indonesia, Malaysia, Philippines, Singapore, Thailand, and Vietnam. Porter's Diamond Model of Competitive Advantage has been chosen as the framework to analyzing Thailand's competitiveness. The main four determinants from the diamond model with the thirty-seven self-selected sub-determinants are as the tool for assessing Thailand's competitiveness during 1999-2009. The results are Singapore is the most competitive nation among the six ASEAN nations. Malaysia, Thailand, Vietnam, Indonesia and Philippines are ranked respectively.

Thailand, during the past decade has performed 'OK' in all four factors. It has no definite strengths and weaknesses in any areas. Thailand has the relative advantage in firm strategy, structure and rivalry over Philippines, Vietnam and Indonesia but the relative disadvantage to Singapore and Malaysia. For demand conditions, Thailand has the relative advantage over Malaysia while relative disadvantage to Singapore, Vietnam, Indonesia and Philippines. Related and supporting industries where it has the relative advantage over Singapore, Indonesia and Philippines whilst relatively disadvantage to Malaysia and Vietnam. Last but not least, factor conditions while it has the relative advantage over Indonesia, Vietnam and Philippines, it is relatively weak compared to Singapore and Malaysia. Without any core competency, Thailand is in the vulnerable position. It has to improve in every factor.

My suggestion is in the area of factor conditions, which is to increase the investment and upgrading in advanced and specialized factors, particularly, in the field of Information and Communication Technology (ICT) as well as research and development (R&D). This is to improve a nation's firms' capability in producing sophisticated products (high-value and high-technology product) and upgrade the home demand's quality to be more sophisticated in order to attain the sustainable competitive advantage. By increasing the private and public investments in ICT and R&D infrastructures, the economy will be improved, in terms of the economic growth (investment stimulates the growth of GDP) and upgrading economic structure of the country. That is, this will directly improve the two factors in diamond that are factor conditions and demand conditions and indirectly improve the other two; related and supporting industries (the availability of advanced and specialized factors and higher communication technology) and firm strategy, structure and rivalry (the ability to produce higher-value products and more efficient production process with the use of advanced and specialized factors.)

IX. Further research

It will give this research model more fruitful if we could try on more nations and especially with more sub-variables, and see the research result. This research methodology

gives another researcher who could try on finding the competitive advantage for a particular country with a flexible and self-argument method. The model was framed with the Porter's Diamond Model of Competitive Advantage that is only a requirement the next research needs to follow. They can freely use any sub-variables that they want to see its effect on the nation's overall competitiveness; however, the variables have to be only defined better in terms of explaining competitiveness, not just include any irrelevant variables. For my sub-variables, most of them are from my interpretation on what Michael Porter means for a nation's competitiveness in his book, *The Competitive Advantage of Nations* (1990); then, support and argue on his ideas. Additionally, my model has reflected a nation's competitiveness by using quantitative analysis instead of a usual qualitative one, which is easier and least subjective for any researchers who want to analyze a nation's competitive advantage using Porter's diamond model.

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- ⁶*Ibid.*, 10.
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Data sources for sub-variables

Index Mundi: www.indexmundi.com (20 per cent)

Maddison: www.conference-board.org/data/economydatabase (5.71 per cent)

World Bank: www.data.worldbank.org (68.57 per cent)

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Data source for number of Industrial estates (2.86 per cent)

Indonesia: Indonesia Matters: www.indonesiamatters.com/967/industrial-parks

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