
**UNIVERSITI PUTRA MALAYSIA**

***TRADE-BASED MEASURES OF INTERNATIONAL COMPETITIVENESS AND THE IDENTIFICATION OF EXPORT OPPORTUNITIES***

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# TRADE-BASED MEASURES OF INTERNATIONAL COMPETITIVENESS AND THE IDENTIFICATION OF EXPORT OPPORTUNITIES

**By**

**VIOLET TONG MING HWEE**

**Thesis Submitted to the Graduate School of Management, Universiti Putra Malaysia, in Fulfillment of the Requirement for the Degree of Doctor of Philosophy**

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September 2012

**Chairman : Associate Professor Mohd. Azhar Abdul Karim, PhD**
**Faculty : Graduate School of Management**

International competitiveness is very significant to nations or countries because it is a 'revealed' measure of how a particular country is performing in the market they are competing in. In addition, international competitiveness analysis provides crucial information about the market of interest. It can generally be divided into trade-based approach (the focus of this study) and non trade-based approach. At present, the number of factors (variables) as indicators of international competitiveness is voluminous in the international trade literature. The most widely employed measure of international competitiveness when it comes to international trade is the RCA pioneered by Balassa (1965). The search for appropriate indicators of international business competitiveness remains an integral part of business research. However, there is a strand in the literature of international business which utilizes the BRCA (Balassa RCA) index to measuring international competitiveness which are Traill and Da Silva (1996) and Ibeh and Wheeler (2005). In this study, we would like to contribute by proposing a generalizable measure to measure international competitiveness that is fitted to country, industry or firm level. This new measure

proposed is based on the geometrical methodology introduced by Azhar and Elliott (2008) which improves on the traditional RCA (Balassa, 1965) measure.

The general geometry measure applicability is then tested on one of an important Malaysia export industry; which is the non-renewable energy industry. Four RCA measurement tools, BRCA (Balassa, 1965), ARCA (Hoen and Oosterhaven, 2006), and generalized GRCA (Azhar and Elliott, 2008) were used to investigate international competitiveness. The empirical illustration will be tested on Malaysia vis-à-vis its top exporting countries (namely Japan, Singapore, Korea and Australia) from year 2005-2010 using data from UNCOMTRADE database. The outcomes of the analysis are then plotted for Malaysia's commodity export specialization. Results shows that in terms of international competitiveness ranking, the four measurement tools used do not differ much. Malaysia is most competitive in exporting HS271111 to Japan (2005 and 2010); HS271011 and HS271111 to Korea (2010); HS 270900 to Singapore (2010); and, HS270900 to Australia (2010). For products in which the country has no competitive edge at all, Malaysia should try avoiding exporting it or re-shuffle their strategy.

The identification of export opportunities is essential as it aids existing and new exporters in deciding which market to invest in. This ensures that exporters fully realize their money's worth when investing in the global market. The new measure is further extended to the identification of export opportunities. Similar to international competitiveness, identification of export opportunities has its own sets of measurement tools in the literature. They are shift-share model, decision support model, global screening model, trade-off model and ITC's multi criteria model just

to name a few. From the various tools in the literature, this study singles out the decision support model (DSM) by Cuyvers *et. al.* (1995). DSM uses a great deal of BRCA measure in its filters. In total 3 out of 4 filters uses the BRCA measure. Setting BRCA's advantage aside, the traditional measure has many flaws. Thus, the new measure is designed and constructed in a way it can be extended to the DSM filters to identify export opportunities. A brief empirical illustration using rubber products on existing and new DSM filters was done to test its applicability. The result indicates major difference between the existing and new filters. This difference can be seen in the calculations, difference in market and its scope.

**ABSTRAK**

Abstrak kertas project yang dikemukakan kepada Senate Universiti Putra Malaysia sebagai memenuhi sebahagian keperluan untuk ijazah Doktor Falsafah

**PENGUKURAN BARU UNTUK SAINGAN ANTARABANGSA DAN PENGENALPASTIAN PELUANG EKSPORT**

Oleh
**VIOLET TONG MING HWEE**

September 2012

**Penyelia : Associate Professor Mohd. Azhar Abdul Karim, PhD**
**Fakulti : Graduate School of Management**

Saingan antarabangsa memainkan peranan penting bagi negara-negara kerana ia adalah satu kaedah pengukuran prestasi pasaran yang negara itu bersaing dalam. Di samping itu, analisis saingan antarabangsa membekalkan maklumat penting tentang pasaran yang diminati. Ia boleh dibahagikan kepada kategori perdagangan (*trade-based approach)* (fokus tesis ini) dan kategori bukan perdangangan *(non trade-based approach)*. Pada masa ini, factor –faktor petunjuk saingan antarabangsa adalah banyak di kesusasteraan perdagangan antarabangsa. Pengukuran saing antarabangsa yang digunakan secara berleluasa adalah faedah berbanding terbitan (*revealed comparative advantage)* yang diperkenalkan oleh Balassa (1965). Pencarian penunjuk yang bersesuaian dengan perniagaan antarabangsa *(international business)* kekal sebagai sebahagian daripada penyelidikan perniagaan. Walau bagaimanapun, dalam kesusasteraan perniagaan antarabangsa, terdapat pengajian yang menggunakan BRCA index untuk mengukur saingan antarabangsa. Mereka terdiri daripada Traill dan Da Silva (1996) dan Ibeh dan Wheeler (2005). Sumbangan tesis ini adalah menawarkan kaedah ukur umum untuk mengukur saing antarabangsa yang sesuai digunakan pada peringkat negara, industri dan firma. Kaedah ukur baru ini

adalah berasaskan kaedah geometri yang diperkenalkan oleh Azhar dan Elliott (2008). Ia memberbaiki kaedah ukur traditional.

Kaedah menggunakan geometri umum diuji pada industri Malaysia yang tidak boleh diperbaharui *(non renewable energy)*. Empat kaedah pengukuran yang digunakan adalah BRCA (Balassa, 1965), ARCA (Hoen and Oosterhaven, 2006), and generalized GRCA (Azhar and Elliott, 2008). Negara-negara yang diuji adalah Malaysia, Jepun, Singapura, Korea dan Australia untuk tahun 2005-2010 dengan menggunakan data daripada UNCOMTRADE. Hasil analisis emudiannya diplotkan untuk pengkhususan eksport produk Malaysia. Dari segi daya saing antarabangsa, hasil kedudukan saingan antarabangsa tidak banyak perubahan. Malaysia paling berdaya saing dalam eksport produk HS271111 kepada Japan (2005 dan 2010); HS271011 dan HS271111 kepada Korea (2010); HS 270900 kepada Singapore (2010); dan, HS270900 kepada Australia (2010). Untuk produk dimana negara tidak mempunyai daya saing, Malaysia harus cuba untuk mengelakkan mengeksport.

Pengenalpastian peluang eksport adalah penting untuk pengeksport sedia ada dan baru apabila hendak membuat keputusan untuk pelaburan pasaran. Ini memastikan para pengeksport dapat memaksimumkan pelaburan antarabangsa mereka. Kegunaan kaedah mengukur baru diperluaskan kepada pengenalpastian peluang eksport. Hampir serupa dengan saing antarabangsa, pengenalpastian peluang eksport mempunyai set pengukuran tersendiri dalam kesusasteraanya. Antaranya adalah *shift-share model, decision support model (DSM), global screening model, trade-off model* dan *ITC's multi criteria model*. Daripada kaedah ukur dalam kesusasteraan, tesis in fokus pada DSM yang diperkenalkan oleh Cuyvers *et. al.* (1995). DSM

banyak menggunakan kaedah ukur BRCA dalam penapisnya. 3 daripada 4 penapisnya menggunakan BRCA. Akan tetapi, BRCA mempunyai banyak kelemahan. Oleh kerana itu, kaedah ukur baru dibina dan direka yang ia boleh dilanjutkan ke penapis DSM untuk pengenalpastian peluang eksport. Aplikasi menggunakan produk getah atas penapis DSM sedia ada dan baru diadakan untuk mengenalpastikan kegunaannya. Keputusan yang diperolehi menunjukkan perbezaan antara penapis sedia ada dan baru. Perbezaan ini boleh dilihat pada pengiraan, perbezaan dalam pasaran dan skop.

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I certify that a Thesis Examation Commitee has met on 31 December 2012 to conduct the final examination of Violet Thong Ming Hwee on her thesis entitled **"Trade-Based Measures of Unternational Competitiveness and The Identification of Export Opportunities"** in accordance with the Universities and University Colleges Act 1971 and the Constitution of the Universiti Putra Malaysia [P.U.( A) 106] 15 March 1988. The Committee recommends that the student be awarded the Doctor of Philosophy degree.

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## DECLARATION

**Declaration by Graduate Student**

I hereby confirm that :

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## LIST OF ABBREVIATIONS/GLOSSARY OF TERMS

| | |
|---|---|
| ARCA | Additive Revealed Comparative Advantage |
| BRCA | Balassa's Revealed Comparative Advantage |
| CA | Comparative Advantage |
| CAGR | Compounded Annual Growth Rate |
| CDA | Comparative Disadvantage |
| DSM | Decision Support Model |
| GRCA | Geometric Revealed Comparative Advantage |
| HS | Harmonized Commodity Description and Coding System |
| IDI | Import Dependency Index |
| IEO | Identification of Export Opportunities |
| IMS | International Market Selection |
| NRCA | Normalized Revealed Comparative Advantage |
| RAB | Revealed Absence of Barriers |
| RBV | Resource-based View |
| RCA | Revealed Comparative Advantage |
| RCAB | Revealed Comparative Advantage Box |
| ROC | Rest of Commodities |
| SITC | Standard International Trade Classification |
| SRCA | Symmetric Revealed Comparative Advantage |
| WRCA | Weighted Revealed Comparative Advantage |

# CHAPTER 1

# INTRODUCTION

## 1.1 INTRODUCTION: BACKGROUND TO THE PROPOSAL

### 1.1.1 International Competitiveness

The emergence of interest in international competitiveness in the economics and international business literature was spurred by Adam Smith (1776) through his expounded theory of absolute advantage. His work which focused on the country as the unit of analysis has sparked the interest of many in efforts to measure the international competitiveness of countries. International competitiveness can be measured at three levels; they are country-, industry- and firm-level. However, a quest to find a generalizable measure which can be used across all there levels is challenge.

According to neo-classical economic theory, international trade explains the flow of goods between countries in terms of comparative advantage (opportunity costs of production difference). International competitiveness of a country arises because of productivity differences (Ricardian model) or combination of cross-industry differences in factor intensity and cross-country differences in factor abundance (Heckscher-Ohlin model). The common and widely done international competitiveness researches in the economics literature are usually at country and industry level.

Economists in the past have placed a large emphasis on comparative advantage when discussing about international trade. However, little emphasis has been paid to what actually drives trade flows; firms. In the 1950s, emphasis has then shifted to firms as the unit of analysis in international trade. Since mid-1990s, there were large numbers of empirical studies which provides useful insight regarding the increasing engagement of firms in export and import activities to the constantly changing dynamics of the global environment. Nowadays, exports and imports play a vital role in company strategies, and their importance is expected to grow further as markets become increasingly globalized. There are many empirical studies in the literature that provides evidence pertaining to the important role played by firms in mediating countries' imports and exports (Bernard, Jensen, Redding and Schott, 2007; Katsikeas, Deng, and Wortzel, 1997; Madhok, 1996).

More so there has been increased awareness amongst firms and governments regarding the growing importance of global competition as well as importance of positioning in the market they are competing in. The new century has brought new challenges for firms, industries and countries; and success in these times requires the ability to compete or be competitive. Hence rising interests emerge in the measurement of the international competitiveness responsible for the conduit of exporting from countries. A method of measuring international competitiveness is important if one wishes to excel relative to its competitors in the markets of interests. Associated with different paradigms or approaches of international competitiveness developed, there are various views, perspectives, concepts, measurement, methods of analysis, and its associated empirical constructs and applications studies. These

endeavors in general can be classified into two approaches: (1) the non trade based approach and; (2) the trade based approach.

The two approaches to the measurement of Comparative Advantage and international competitiveness in the literature:

- *Non Trade-based approach.* (Porter, 1990; Barney, 1991, Hoopes *et al*, 2003; Fahy, 2002; Cho, Moon and Brush, 2008; and many more).
- *Trade-based approach.* (Balassa, 1965; Laursen, 1998; Proudman and Redding, 2000; Hoen and Oosterhaven, 2006; Yu *et al*, 2008; Azhar and Elliott, 2008; and others).

### 1.1.2 A Brief Review of the Malaysian Economy

The Malaysian economy has witnessed an economic boom in the 1970s and has been Southeast Asia trade hub for centuries. The country's rich natural resources ensure sound developments in agriculture, forestry and minerals. Malaysia exports natural and agricultural resources, and petroleum is the most valuable resource exported. Significant mining resources to Malaysia economy are tin and petroleum. Tin mining played a dominant role in the 19$^{th}$ and 20$^{th}$ century. Petroleum and natural gas discoveries in oil fields were in 1972. Apart from these main resources, there are others such as clay, kaolin, silica, limestone, barite, phosphates and dimension stones (granite, marble blocks and slabs) which can be found in Malaysia.

However, with global giants such as China making record strides in the market, it has become relatively harder to secure or maintain an economic position. The rapid

economic growth and uncertainty in the economic environment has caused major concerns among investors, governments and operating firms. Therefore, to visualize how the performance of Malaysia compares with its competitors; a comparative study of international competitiveness between industries goods in the same industry is conducted to gain insight into its competitiveness, growth and patterns. This will be done in Chapter 4 of my thesis by using a new geometry measure of international competitiveness.

### 1.1.3 SITC and HS Code

#### 1.1.3.1 Standard International Trade Classification (SITC)

SITC is the Standard International Trade Classification which is a statistical classification of the commodities entering external trade. It is designed to provide the commodity aggregates requited for purposes of economic analysis and to facilitate the international comparison of trade-by-commodity data. The hierarchical structure of the classification comprises:

- Sections – one-digit code
- Divisions – two-digit code
- Groups – three-digit code
- Subgroups – four-digit code
- Items - five-digit code

Generally there are nine broad categories of SITC sectors[1]. The SITC at the 1-digit level or components are food and live animals; beverages and tobacco; crude materials, inedible, except fuels; mineral fuels, lubricants and related materials; animal and vegetable oils, fats and waxes; chemical and related products, n.e.s.; manufactured goods classified chiefly by material; machinery and transport equipment; miscellaneous manufactured articles; and commodities and transactions, not classified elsewhere in SITC.

#### 1.1.3.2 Harmonized Commodity Description and Coding System (HS)

All existing products can be classified under the HS system. The Harmonized Commodity Description and Coding System (HS)[2] is an internationally standardized list of names and numbers which classify trade products. Their classifications of products are based upon the Customs Cooperation Council Nomenclature (CCCN) and the Standard International Trade Classification (SITC). This system is developed and maintained by World Customs Organization (WCO). It is classified into 21 sections and 96 chapters (along with interpretation rules and explanatory notes). Its list of headings are assembled in a systematic order (such as degree of processing) and, where appropriate, subdivided into subheadings.

HS system is significant as it effects uniformity in the classification of goods and standardizes commercial documents which ultimately enhance custom administration. It provides a vast range of uses: 1) as a tariff nomenclature; 2) as a statistical nomenclature; 3) as a base for the harmonization of economic

[1] Refer to Appendix 1 for SITC categories at 1-digit level.
[2] Refer to Appendix 2 for HS categories at general level.

classification (e.g., market surveys and data collection); 4) as a multipurpose nomenclature by international unions of shopping and transport organizations; 5) as an international language and code for customs purposes; 6) as a base for determining of the Rules of Origin (ROO) for non-preferential trade purposes such as the MFN treatment, anti-dumping and countervailing duties, safeguard measures and origin marking. This study will conduct an application study on Malaysia's non renewable energy industry at HS 6-digit level[3].

### 1.1.4 Malaysia Non-renewable Energy Industry and Natural Rubber Industry: A Brief Review

#### 1.1.4.1 Malaysia Non-renewable Energy Industry

One of the empirical analyses in this thesis is on non renewable resource energy industry (Chapter 4). A non renewable resource is a natural resource that could not be produced; grown; generated; or used on a scale which can sustain its consumption rate, once depleted; they are no longer available for future consumptions. Resources that are consumed much faster than nature can re-create falls under nonrenewable as well.

Population and income growth are the two most powerful driving forces behind the demand for energy. Since 1900 world population has more than quadrupled, real income has grown by a factor of 25, and primary energy consumption by a factor of

[3] Non-renewable energy industry HS commodity code and description are listed in Appendix 3 (Products used in this thesis's commodity code and description are provided only).

22.5 (see Figure 1.1). In addition, the energy usage globally has been increasing and is expected to continue rising (see Figure 1.2).

**Figure 1. 1: Population, energy and GDP growth**

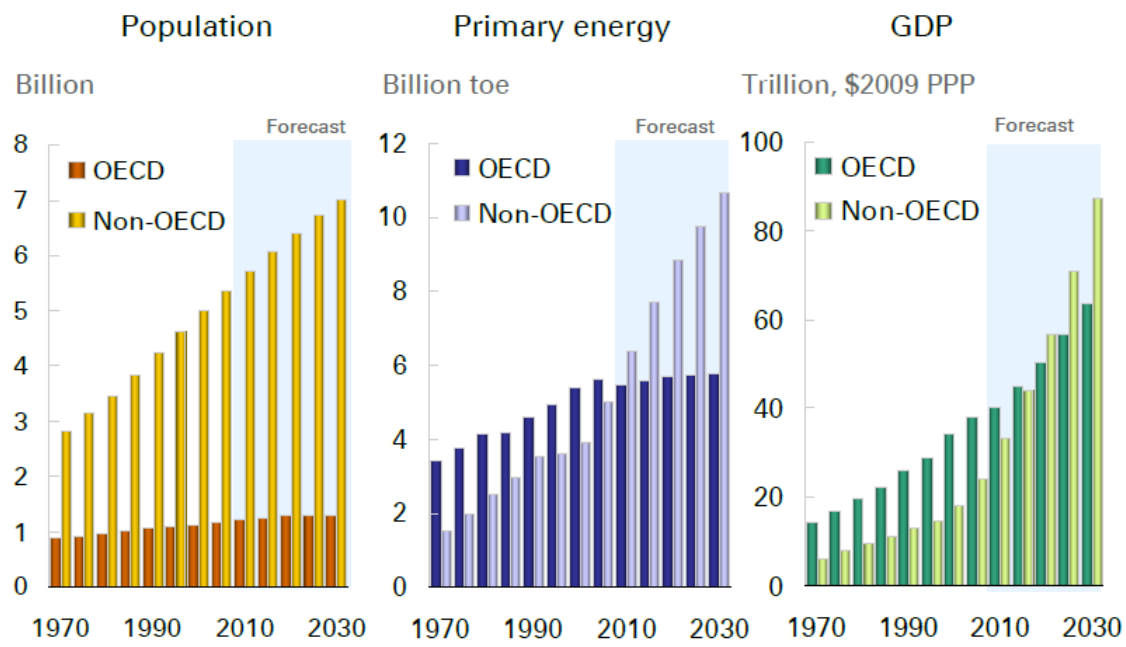
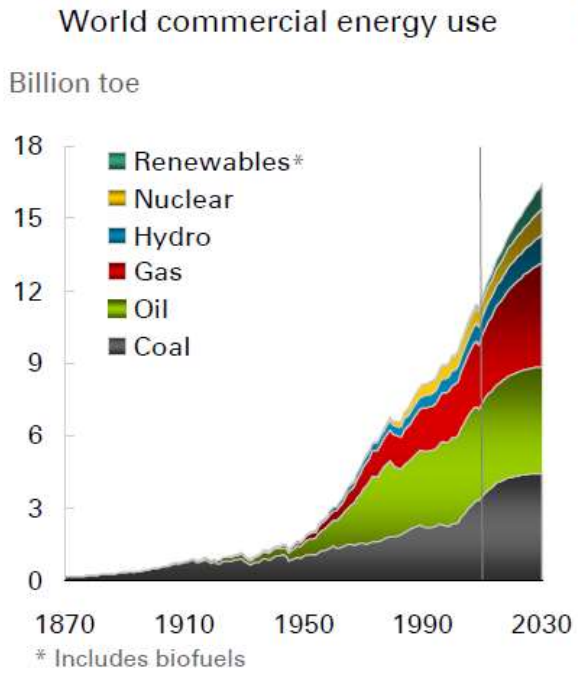



**Figure 1. 2: World commercial energy use**



As for Malaysia, Malaysia's economy has been growing steadily in the last several decades. With an annual average growth projected at4.8%, the demand for energy consumption will inevitably increase (Ninth Malaysia Plan). Presently, Malaysia is blessed with both conventional and non-conventional energy sources to fuel its economy with more than 80% of its primary energy supply comes from oil and gas (www.epu.gov.my). Malaysia is endowed with conventional energy resources such as oil and gas and other renewable sources and it is currently contributing about 11% of export earnings in 2004. Unfortunately, the country's proven oil and natural gas reserves are projected to be depleted in 19 and 33 years respectively if no alternatives measures are found to sustain the reserves (Malaysia Report 2008). Hence, it is no doubt that energy infrastructure growth has been regarded as indispensable to economic development, and is now the driver and stimulus for greater growth and industrialisation in Malaysia. Malaysia's power sector is characterized by strong growth, stable prices and abundance of natural gas resources (Malaysia Report, 2008). The Malaysian economy is expected to grow by 7.5% in the period of 2001-2010, though the GDP actually grew at a steady rate of 4.2% in 2003 (Malaysia Report, 2008).

As a developing Asian Nation, Malaysia has a very interesting energy profile, both in the past and for the future. Malaysia is one of the few net exporters of energy in the Asia Pacific region. In the late 1990s, the country exported as much oil and gas as it consumed, and in recent years, oil and gas exports amounted to roughly three-fourths of domestic consumption. Availability of energy resources places Malaysia in a uniquely secure energy position relative to other countries in the region. The government has leveraged these assets to provide stability to domestic electricity

markets. The gas sector was developed in tandem with the country's gas generation capacities under a "four fuel" strategy aimed at reducing the country's dependence on oil. Although the four fuel strategy required the development of gas, coal as well as hydro capacity, the clear preference was gas. TNB, which owns 62% of Malaysia's capacity, generates more output with gas (56% of total) than with coal, hydro and fuel oil combined. The country's remaining capacity comprises mainly gas-fired facilities operated by licensed IPPs.

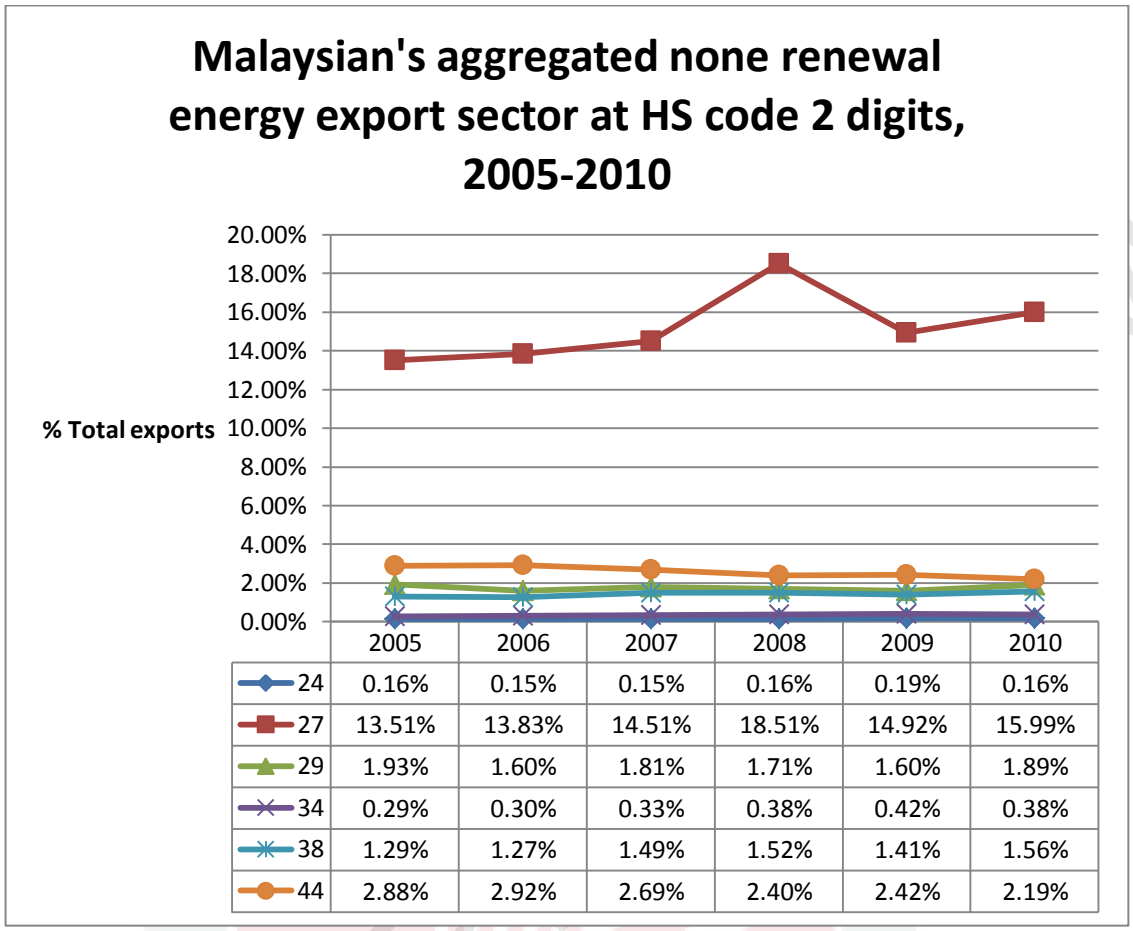
Malaysia's energy consumption per unit of Gross Domestic Product (GDP) is high in comparison to most developed and several advanced developing countries. The industry sector contributes about a third of the overall GDP, with a registered growth rate of 13% in 1970 to 27% in 1990. In 1995, the industrial sector accounted for 33.1% of the GDP and it was expected to grow to 37.5% by 2000 (www.epu.gov.my). Industrialization over the last two decades has reduced the share of agriculture in GDP to only 8%, leaving the service and industrial sectors to account for 44% and48% of GDP respectively. The substantial size of Malaysia's industrial base, plus higher energy intensities of industrial activities has made the industrial sector the traditional engine of growth behind the power sector (Malaysia Report, 2008).As a developing Asian Nation, Malaysia has a very interesting energy profile, both in the past and for the future. Malaysia is one of the few net exporters of energy in the Asia Pacific region. In the late 1990s, the country exported as much oil and gas as it consumed, and in recent years, oil and gas exports amounted to roughly three-fourths of domestic consumption (Malaysia Report, 2008). Availability of energy resources places Malaysia in a uniquely secure energy position relative to other countries in the region. In 2000, the total primary energy supply was 49.47

mtoe (million tons of oil equivalents). The fuel mix consisted of 71.4% petroleum, 11.6% hydroelectric power, 8.8% natural gas, 7.6% coal and 0.5% biomass (Malaysia Energy Balance, 2005). The greatest fuel mix is petroleum products. Energy is consumed mainly in the transportation and industrial sector, at 41.8% and 37.7% respectively, followed by commercial and residential sectors combined at 13.4% and the agriculture sector, which consumes 0.39% of the energy (Malaysia Energy Balance, 2005).

Crude oil and natural gas are the primary non renewal energy export industry for Malaysia. The industry contributes 15 to 20% of Malaysian's total export[4]. The key export destinations are Japan, Singapore, Korea, and Australia (Figure 1.4 and Figure 1.5).

[4]As at Jan 2010, Malaysian's crude oil reserves are estimated at 5.86 billion barrels with expected life span of 25 years while natural gas reserves stood at 88.9 trillion standard cu ft, sufficient to last for 29 years.

**Figure 1. 3: An aggregate of non renewal energy export for Malaysia from 2005 to 2010**




| | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 |
|---|---|---|---|---|---|---|
| 24 | 0.16% | 0.15% | 0.15% | 0.16% | 0.19% | 0.16% |
| 27 | 13.51% | 13.83% | 14.51% | 18.51% | 14.92% | 15.99% |
| 29 | 1.93% | 1.60% | 1.81% | 1.71% | 1.60% | 1.89% |
| 34 | 0.29% | 0.30% | 0.33% | 0.38% | 0.42% | 0.38% |
| 38 | 1.29% | 1.27% | 1.49% | 1.52% | 1.41% | 1.56% |
| 44 | 2.88% | 2.92% | 2.69% | 2.40% | 2.42% | 2.19% |

**Figure 1. 4: Malaysia's non renewal energy product top exporters from 2005 to 2010**

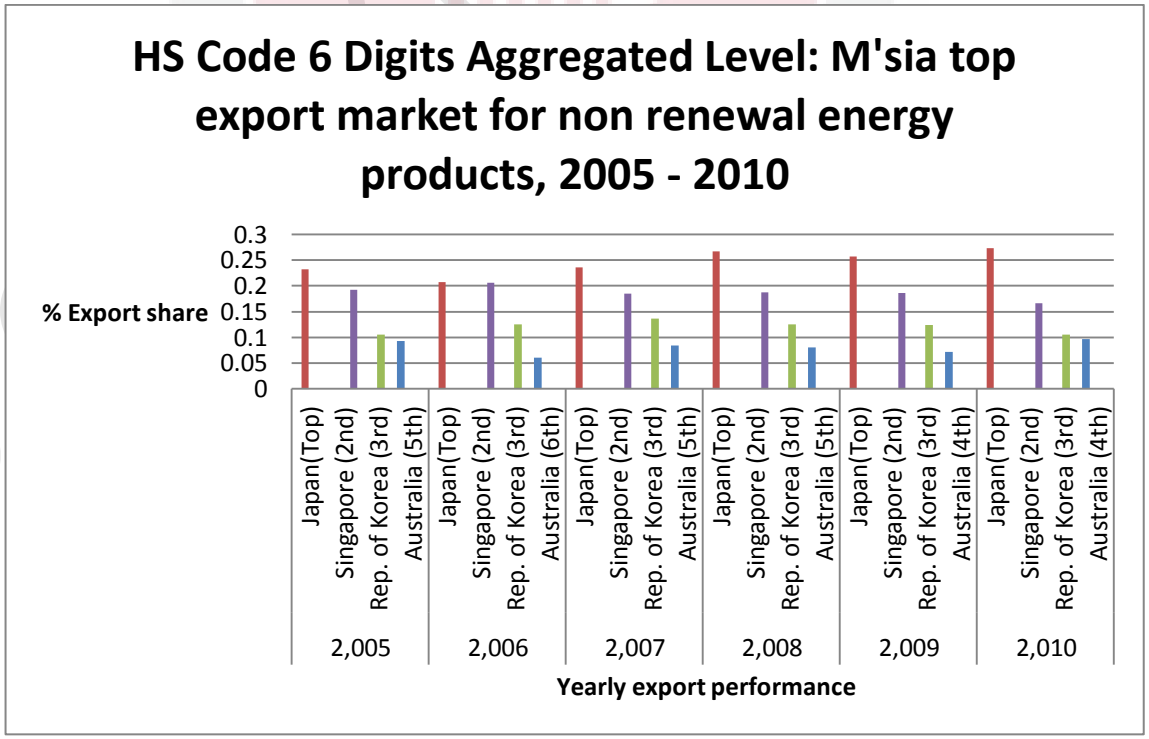
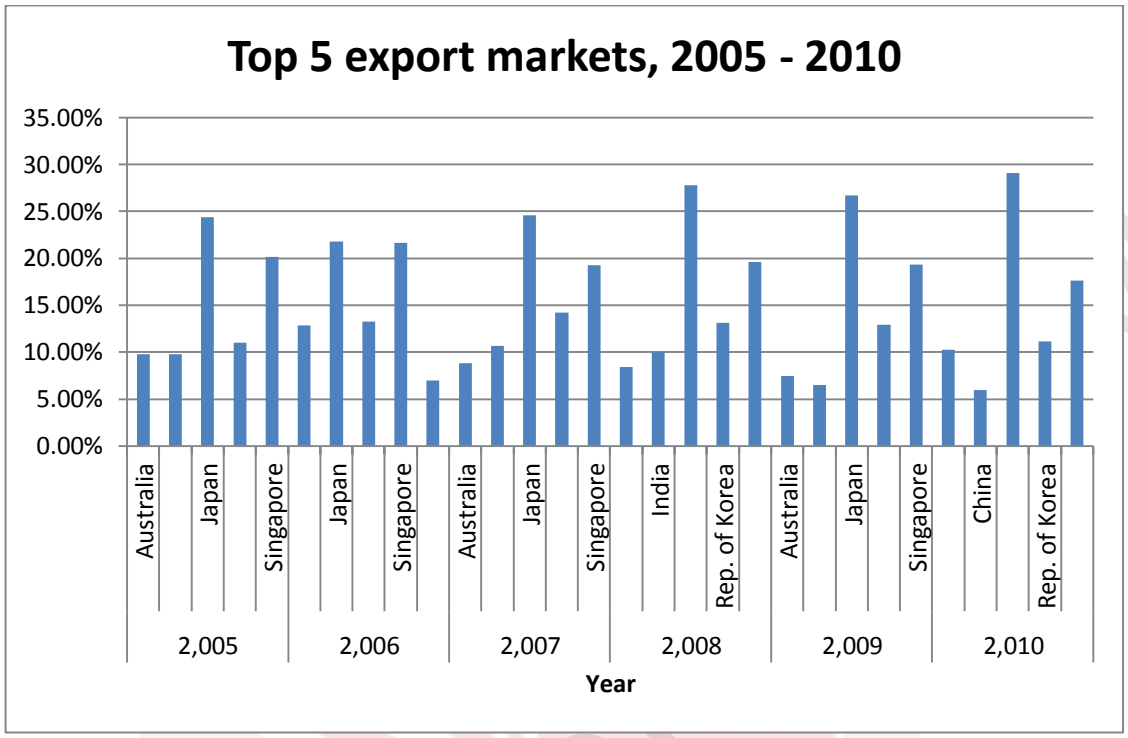


**Figure 1. 5: Top 5 export markets from 2005 to 2010**




In an effort to determine the export position for Malaysian's non-renewable energy industry, the export trade data is collected from UNCOMTRADE on crude oil, natural gas and charcoal energy exports from year 2005 to 2010. It is my key interest to study the comparative advantage for Malaysia in the individual key markets against the top rivalries as a whole and understand the change in trend over time in order to examine and predict the opportunity in the respective market. Additionally, it is also drill down to understand the product level specialization over time to gain insight to the concentration level of the market towards or against the Malaysian's energy export opportunities.

### 1.1.4.2 Malaysia Natural Rubber Industry

Natural rubber was introduced in Malaysia in 1877. The natural rubber industry in the word has undergone very tremendous and fundamental changes in the last decade. This is due to the growth of many players in this industry: (1) existing (traditional suppliers); and (2) emergence of new players. These major changes as well as consequent challenges (internal and external) have impacted Malaysia's comparative and competitive advantage in the cultivation of the industry. Since then, the Malaysian rubber industry has evolved through the years and transformed itself into a more integrated industry where the rapid developments of the mid- and downstream industries have made the industry a multi-billion ringgit industry. This was possible due to the R&D of rubber cultivation, harvesting and rubber processing. Currently Malaysia's natural rubber industry values around 25 billion Ringgit Malaysia. In addition, Malaysia is now one of the biggest importer and consumer of rubber; and a major exporter of rubber products.

*Global Economic Outlook and its Implication*

The demand for natural rubber is not expected to decrease. This is because there are many sectors which will be the driver of the natural rubber industry growth. For example, the automotive industry. Table 1.1 shows the world rubber consumption from year 2000 to 2011; and the consumption level increases every passing year. The consumption pattern of the industry is predicted to increase gradually along with its price due to limited supply.

**Table 1. 1: World rubber consumption (2000 to 2011)**

| Year | NR Consumption ('000 tonnes) | | |
|---|---|---|---|
| | Natural Rubber | Synthetic Rubber | Total Rubber |
| 2000 | 7,340 | 10,830 | 18,170 |
| 2001 | 7,333 | 10,253 | 17,586 |
| 2002 | 7,556 | 10,874 | 18,430 |
| 2003 | 7,937 | 11,350 | 19,287 |
| 2004 | 8,716 | 11,877 | 20,593 |
| 2005 | 9,205 | 11,889 | 21,094 |
| 2006 | 9,690 | 12,675 | 22,365 |
| 2007 | 10,178 | 13,296 | 23,474 |
| 2008 | 10,175 | 12,748 | 22,923 |
| 2009 | 9,330 | 12,248 | 21,578 |
| 2010 | 10,778 | 14,086 | 24,864 |
| 2011 | 10,924 | 14,926 | 25,850 |

Source: International Rubber Study Group (IRSG)

*Malaysia Rubber Products Industry Competitiveness*

The introduction of the Industrial Master Plans (IMPs) gave Malaysia rubber industry a greater impetus. The rubber products manufacturing industry has achieved remarkable progress in terms of consumption and export earnings through the IMPs. In the last eleven years (2000-2011) total rubber consumed by the industry increased by 110% (refer Table 1.2), of which natural rubber was the main material used. Malaysia is now the fifth largest consumer of NR in the world after China, the USA, India and Japan and also the biggest consumer of NR latex. Malaysia is also the world's largest producer of latex gloves, catheters and latex thread.

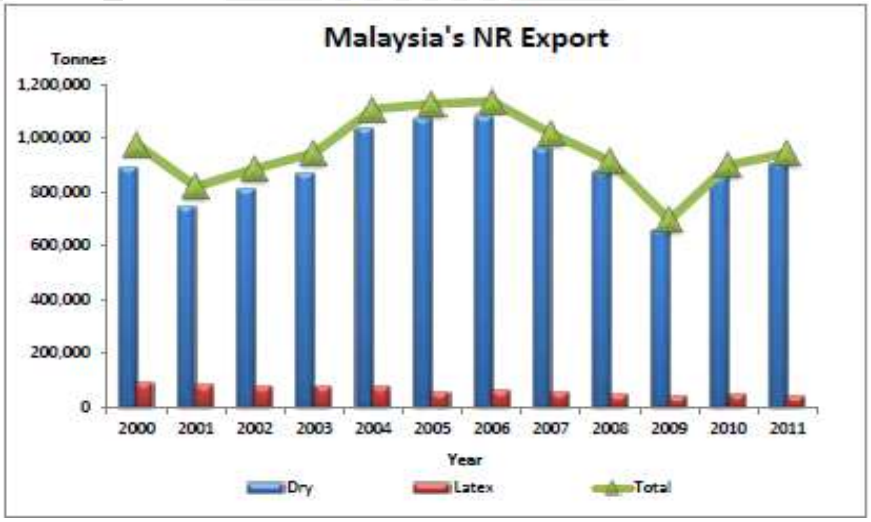
**Table 1. 2: Malaysia natural rubber consumption**

| Year | Consumption | | |
|---|---|---|---|
| | Dry | Latex | Total |
| 2000 | 85,357 | 278,358 | 363,715 |
| 2001 | 76,763 | 324,125 | 400,888 |
| 2002 | 77,415 | 330,469 | 407,884 |
| 2003 | 73,890 | 347,891 | 421,781 |
| 2004 | 90,739 | 312,030 | 402,769 |
| 2005 | 80,884 | 305,588 | 386,472 |
| 2006 | 74,555 | 308,769 | 383,324 |
| 2007 | 82,642 | 367,604 | 450,246 |
| 2008 | 80,592 | 388,302 | 468,894 |
| 2009 | 66,053 | 402,616 | 468,669 |
| 2010 | 64,558 | 393,361 | 457,919 |
| 2011 | 56,906 | 345,017 | 401,923 |

Source: International Rubber Study Group (IRSG)

In tandem with the increase in rubber consumption, the corresponding increase in the volume and value of exported rubber products has also grown. The export of Malaysia's natural rubber from year 2000 to 2011 was bell shape (see Figure 1.6). From 2001 to 2006 the natural rubber export increases; however, 2007 to 2010, the natural rubber export decreases slowly. The export market starts to pick up again in 2011.

**Figure 1. 6: Malaysia natural rubber export**




Source: International Rubber Study Group (IRSG)

It is my key interest to study the comparative advantage for Malaysia in the natural rubber markets to examine and predict the opportunity in the market. Natural rubber industry was selected amongst the various industries because in the past, Malaysia used to be the leading exporter of the industry. Where the country's export earnings expanded by 438.1 % from RM1.87 billion in 1990 to RM 10.09 billion in 2007. Based on Figure 1.6, we can see that the over the 11 years, the natural rubbers being exported has a bell curve eventhough the industry is mostly controlled by the government. Eventhough the export fluctuation is minor; however, it might affect the existing and new firms operating in the industry. This industry will be analysed using the new DSM (Chapter 5). This analysis is significant to both existing and new firm as the outcome from the analysis will affect the business related decisions which will be made by the respective firms.

## 1.2 PROBLEM STATEMENT

Measuring international competitiveness is significant to the literature of international business as well as economics (evidence of its importance can be found based on Figure 2.1). When operating in a competitive environment, it is crucial to be able to select the best measure of international competitiveness as it will bring significant impact to operating firms and/or governments as there are many measures of international competitiveness in the literature. Generally international competitiveness measures can be systematically arranged into non trade-based (firm level international competitiveness) and trade-based (country or industry level international competitiveness) approaches.

The focus of my study would be on trade-based measures of international competitiveness. The various trade-based approaches to measuring international competitiveness will be reviewed, and to investigate the properties of the measures proposed in the literature, in particular the recent ones. In the trade-based approach of measuring international competitiveness, the most-widely employed method would be the Balassa Revealed Comparative Advantage (BRCA). The BRCA measure by Balassa (1965) will be used as a base to investigate the nature of international competitiveness. The BRCA limitations are no secret to all. Following BRCA, there are other Revealed Comparative Advantage (RCA) developments (Laursen, 1998; Proudman and Redding, 2000; Hoen and Oosterhaven, 2006; Yu *et al*, 2008; Azhar and Elliott, 2008) to address its shortcomings. However, the ideal measure with appropriate properties was yet to be found. In 2008, Azhar and Elliott developed the GRCA measure that encompasses symmetrical, proportional and

scalability properties which are crucial to any empirical study. Analysis of the BRCA and other RCA attempts was given a geometric impetus.

The RCA measures are established in the economic literature; as for international business literature, it has been the subject of extensive research enquiry and yet there appears to be no universally accepted model of international business (Bilkey, 1978; Toyne, 1989; Leonidou and Katsikeas, 1996; Chandra and Newbury, 1997) The good news is there is a strand in the international business literature which utilizes the RCA (mainly BRCA) to measure international competitiveness. The key papers of international business are Traill and Da Silva (1996)[5] and Ibeh and Wheeler (2005)[6].

This study would like to introduce a new geometry measure (will use interchangeability with GRCA and generalizable measure) of international competitiveness which can contribute to the international business literature. It is a generalizable measure of international competitiveness that is fitted to country-, industry-, and firm-level. Firstly we will employ the GRCA to introduce a new geometry measure of international competitiveness and test it on an important Malaysian energy industry. Malaysia being a small open economy is a trade dependent economy. Therefore, in order to survive, there is a need to continue generating growth through international competitiveness. Thus, export plays a crucial role in Malaysia's growth process. By utilizing the generalizable measure, the results will portray Malaysia's commodity export to which top exporting countries are most

[5] According to Traill and Da Silva (1996), international competitiveness is a dynamic concept and should not be limited to international trade point of view only. It should include foreign production by multinational firms. Adaptations were made to incorporate business firms into the BRCA measure; and the outcome was a satisfying in terms of level and trends of competitiveness measure.

[6] Ibeh and Wheeler (2005) proposed the use of resource-based perspective as a platform for integrating and explaining recent export performance research findings, involving mainly small and medium sized enterprises (SMEs).

competitive. Thus, Malaysia firms or policy makers are able to maximize their resources by focusing on areas where they are most competitive.

International competitiveness is only the first part of this thesis, the second part comprise of export performance. Apart from international competitiveness, export performance is an important factor as well to countries and competing firms. Thus, Identification of Export Opportunities (IEO) presents attractive competitive situations, life cycle stages of product(s), market growth rates and opportunities at hand. The generalized measure is further extended to the construction and design of Decision Support Model (DSM) filters in identifying potential export opportunities. DSM (Cuyvers *et. al.*, 1995) was selected amongst the various IEO methods because the model uses the BRCA measure heavily in its filters. By extending the generalized measure, a new DSM is introduced. Through the new DSM, reliable exporting opportunities can be identified, considered and capitalized upon/exploited compared to existing DSM.

## 1.3 KEY QUESTIONS

- Why is a study on international competitiveness significant?
- What are the trade-based and non trade-based approaches of international competitiveness measures in the literature?
- Given the voluminous literature on the measurement of international competitiveness, why and how can a new geometry method be gainfully employed to measure international competitiveness?
- How does the new geometry method compare with previous methods in measuring international competitiveness?
- Why and how can the new geometry method be extended to the construction and design of decision support model in the IEO?
- How can the new geometry method be used in selecting markets for exporting firms in Malaysia in an international market selection study?
- How does the new geometry method compare with previous methods in IEO?

## 1.4 RESEARCH OBJECTIVES

- To systematically review the various approaches to the measurement of international competitiveness in the literature
- To design and propose the use of new geometry approach to the construction of international competitiveness.
- To illustrate the usefulness and applicability of this new geometry approach to an empirical study of measuring international competitiveness of Malaysian non renewable energy industry.
- To further illustrate the applicability of new geometry approach to the construction and design of DSM in the IEO.

## 1.5 SIGNIFICANCE OF STUDY

The extent of international competitiveness is significant to nations or countries because it is a 'revealed' measure of how a particular country is performing in the market they are competing in. In the economics literature, measures of international competitiveness are voluminous. However, there is only a strand in the international business literature in relation to this area.

This study intends to make a contribution to the international business literature by introducing a new geometry approach to the measurement of international competitiveness. Specifically the use of a new 'revealed' measure of international competitiveness is proposed adapting the framework of Balassa (1965) revealed comparative advantage. The new geometry measure is a generalizable measure

which can be used to measure international competitiveness at country-, industry-, and firm-level. Firms' international competitiveness are drawn from international competitiveness of an industry or commodity. It is also evident that the extent of a country's international competitiveness is represented by the success or competitiveness of its industry's business firms. International competitiveness measure analyses are crucial information in the global competition for markets. At present, the numbers of factors (variables) as indicators of international competitiveness are voluminous. Its applicability is conducted on a study of an important Malaysian export industry. The generalized measure can help the government, policy makers and firms' in many aspects.

The contribution of this new approach is extended in its use as decision support filters in the construction and design of new DSM. The new DSM constructed and designed will be able to help governments and firms in identification of potential opportunities that are available in the market they compete in. This enables them to avoid losses from making wrong market investments and select good prospective markets. The analysis using the new DSM in this thesis is just an empirical illustration using rubber products to see how it compares with the existing DSM.

The empirical illustrations done in this study utilizes product-level data as there was no access to firm level data. Future researchers can take on the challenge of conducting empirical studies using the generalized measure as well as the new DSM with firm level data. With firm level data analysis, it is able to display growth, trends, positioning, policy implications and competitiveness of a particular firm's industry of

a country. Based on these findings, governments and firms are able to decide whether to invest, withdraw, expand or penetrate a market.

## 1.6 ORGANIZATION OF THE CHAPTERS

The remaining chapters to the thesis will be organized as follows: A review of the literature on the international competitiveness measures are provided in Chapter 2. In Chapter 3 construction of new geometry measure is proposed. Chapter 4 provides an application study adopting the use of the generalizable measure proposed to assess Malaysia's non renewable energy industry. Applicability of the proposed measure is then extended to its use as new decision support filters in the IEO literature along with brief empirical illustration in Chapter 5. Finally, Chapter 6 provides the policy perspectives, summaries and conclusions.

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