The Link between Economic Growth and Port Development

A Study of The Southeast Asian Region from 2000 - 2006

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The Link between Economic Growth and Port Development: A Study of The Southeast Asian Region from 2000-2006

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Abstract:

The paper investigates the link that economic development has on port development in Southeast Asia in the period from 2000 - 2006. In order to analyze the link that ports have on national economies, a categorization of ports is needed, the study classifies into four main types, Global Pivot, Load Centers, Regional Ports and Minor Ports. From this classification we study the impact that these different port types have with their national economies. A quantitative analysis comparing the growth of national economies and their ports show that each port type has different relationships with their national economies. Our study shows that Global Pivots tend to grow at a faster rate than their national economies. Load Centers and Regional Ports tend to grow just as fast as their national economies just a difference in size and importance to global economy. Minor Ports tend to lag behind in their development compared to the growth of the national economy. A qualitative study of the port of Singapore, Tanjung Pelepas, Port Klang and Tanjung Priok, show these characteristics are aligned with their type. However, the case studies also unravel the causes of outliers and differences in the results. Some interesting findings show that Tanjung Pelepas is an upcoming Global Pivot but at its current throughput is too small to be considered one now. Tanjung Priok is also a phenomenon; we find the explanation as to why the largest port in the largest economy in Southeast Asia is only a Regional Port. It is because the cargo that flows in and out of Tanjung Priok are not all containerized and the port is a multipurpose port.

Preface

The bachelor thesis is a requirement in the Double Degree program between Erasmus School of Economics, Erasmus Universitiet Rotterdam and Fakultas Ekonomi dan Bisnis, Universitas Gadjah Mada. For this task we chose a topic in Port Economics, we chose Southeast Asia as a focus because we feel that that region will become one of the important regions in the global economy. Over the past 2 months we have strived to write the best possible bachelor thesis, and we feel that we have succeeded.

During the process of finishing our paper, we received much help from Mr. Nijdam, our supervisor, for that we would like to thank him for the effort he put in guiding us to finish our thesis. Because this thesis was a joint thesis, we would like to thank each other for putting all the effort in finishing this task. We would also like to appreciate each other's work and our abilities to resolve conflicts that came up during the process. Thank you Gregorio and thank you Mahatma.

We would also like to take the time to thank our friends who are in the same double degree program, Ahmad, Adit, Bowo, Fahmi, Oki, Putri and Surya for being there and helping us out. We would like to thank our fellow Indonesian students in Rotterdam, including Angga, Nadya, Mike, Aidil, Arman, Ria and the rest of our friends from the IHS program.

On a personal note, Mahatma, would like to thank all my friends in Indonesia, just to name some, Arantri, Adikara, Bemo, Goek, Lemot, Noni, Nova and Yanu for giving me the support I need to finish my part. I would also like to thank my sister Lety and her husband, Cedro and my niece Malia, for coming by and encouraging me in succeeding. And lastly, I would like to thank my beloved mother and father for supporting me not only financially but mentally and emotionally as well.

I, Gregorio, would like to thank Mom, Dad and Edo, as well as Ayolla for their sincere support and love. I would acknowledge my research partner, Mahatma, for his professionalism, patience, dedication and efforts exerted to finish this paper as a work of two.

To our readers, hopefully you find our thesis helpful and can provide a new perspective of the Southeast Asian region and its ports.

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I.   Introduction

Maritime economics is an essential aspect in the development of Southeast Asia (SEA), this region is especially rich in maritime resources. Thailand, Cambodia, Vietnam, The Philippines, Singapore, Malaysia, Indonesia, Brunei and East Timor all have coastlines and important ports. The only country in SEA that does not have coastlines or ports is Laos. This region's features encourage the development of maritime related industries such as fishery, maritime transport, cargo handling, off shore oiling, etc. This area offers a wide variety of resources, from labor to oil reserves. Slowly SEA is becoming an important region in global economics.

This region was originally known to be strong in the agriculture sector but is shifting to the manufacturing sector. An influx of foreign direct investments (FDI) has encouraged the SEA economy to move towards the manufacturing sector, especially because of the abundance of cheap labor in the region. This gradual shift from an agriculture-based economy to a manufacture based economy has increased the importance of major ports in this region. The pressure for ports to expand is increasing as more and more FDI flow into the manufacturing sector.   It is clear that these ports in developing countries have to keep up to cater to the needs of the manufacturing sector. The development of the ports in SEA is very important, it is important not only to attract potential FDI but also to develop the regional or individual national economies within the region.

The substantial growth that SEA is experiencing is linked to the maritime economy of the region. The geographical characteristics of SEA generate the need for maritime transportation. The region is full of islands, and coastlines. There are two main regions in SEA, the mainland region and the maritime region. The mainland region includes: Myanmar, Thailand, Vietnam, Malaysia and Laos. The maritime regions consist of: Brunei, Indonesia, Malaysia, The Philippines and Singapore. The natural borders of the sea and oceans create the obvious need for maritime transportation. Maritime transportation is the only way to get goods from one place to another for both intra-SEA trade and inter-SEA trade.   In maritime transportation the main bottlenecks are in ports. For this reason this study focuses on the ports in SEA.

Ports in SEA vary in type; the type of ports in SEA is greatly dependent on the development of a country and economy. The countries within SEA vary in development; some countries are well established while other countries are not. For example, Singapore and Cambodia, although located in the same region the economic development of both countries vary vastly. Because of this difference the ports in SEA also vary in size and type. This paper will categorize the types of port that are in SEA, we will take one example from each type of port and analyze the ports based on the impact they have on regional

economic development. We will also analyze whether these ports are able to keep up with the economic growth in the country and SEA.

Research Statement

What is the link between national economic growth and port development in countries in Southeast Asia?

To completely answer the research question we formulated two sub questions:
- According to a classification of ports, what types of ports are in operation in SEA?
- What type of link is there between national economic development and port development in SEA?

Scope of the Research

This study focuses on the major ports in SEA, in the following countries:

Vietnam	Malaysia	The Phillipines
Port of Saigon	Tanjung Pelepas	Port of Manilla
	Port Klang	
	Port of Penang	
Indonesia	**Singapore**	**Thailand**
Tanjung Priok	Port of Singapore	Port of Bangkok
Tanjung Perak		Laem Chabang

Methodology

This study will create a classification of the ports that are in SEA, the categorization of ports in SEA will be based upon a literature review. Once we have classified the ports we continue studying the economic development of SEA and derive the factors behind the economic growth.   Next, we create a theoretical background based on a literature review to prove that there is a link between port development and economic development. In this section we will also identify the variables that are used to show that this link exists such as imports, exports, etc. From this we can create preliminary assumptions on the link between port development and economic development. These assumptions will be tested quantitatively to

show correlation between port development and economic development of the region. The hinterland's economic development can be measured through GDP and exports and imports. The development of the ports is measured by throughput, this information is obtained through research and literature review. After this analysis we can determine which hypothesis can be proven. We also incorporate several case studies to describe the current situation in support of our results from the quantitative analysis. Finally a comparison will be made between the development of the national economies and port development to prove the type of link that SEA nations have with their ports.

List of Chapters

The first chapter introduces the background of Southeast Asian maritime economics and the growth SEA is experiences. The second chapter explains about the different types of ports that are in Southeast Asia, hub ports, regional ports etc, this chapter will also elaborate on the link that major ports have with the hinterland. The third chapter explains in more detail the growth that SEA is experiencing and the factors behind the growth. The next chapter describes the theoretical background we use to formulate the assumptions that will be tested and to determine which variables should be incorporated in our data. The fifth chapter shows our data gathering and our tests results to prove whether this correlation exists. In this chapter we also include an analysis of the data, which is further supported in the next chapter. To support out tests results, the sixth chapter uses examples of different types of ports based on the classification made in the second chapter and the hinterland they serve. In this chapter we will also point out and explain any anomalies that contradict or support our tests results which include a detailed description of the nation's economic development and the port's development. Finally we conclude with our conclusion as to whether or not SEA ports can sustain the economic growth in the region and the relationship they have with national economies.

1. Introduction
2. Port Typology in Southeast Asia
3. Hinterland's Economic Development.
4. Theoretical Background and Preliminary Assumptions.
5. Quantitative Analysis: Correlation between economic development and port development.
6. Case studies: The actual link between port type and the hinterland economy.
7. Conclusion

II.   Port Typology in Southeast Asia

Introduction

Southeast Asia is a region where there is a large variety of economic growth, there are some countries that are developing well and other countries are developing poorly. The gap between the large economies and the small economies in Southeast Asia is quite large. This can be seen if we compare Indonesia's economy to Laos's economy through GDP (millions of USD), in 2005 Indonesia's GDP 280,365 and Laos's GDP was a mere 2,872[1] (ASEAN, 2006). This difference in size between economies in SEA indicates that there must be a large gap in the quality and the capacity of maritime transportation infrastructure.

Cranes, ports and ship types in SEA must also differ greatly. The infrastructure needed to use a maritime network is very expensive. Not all nations in SEA can afford to invest in ports, ships and cranes. This means that there is a large variety of levels of development of ports which means that there are many types of ports. There are ports that very large ports that are vital to global networks and small regional ports that cater to a very small hinterland. There are several reasons as to why there is a wide variety of ports in Southeast Asia; one of the main factors is the development of local economy.

The development of ports is very much linked to the development of the economy. This relation can be explained in two ways. The first explanation is because a nation's economy is developing rapidly it will gain enough capital to invest in ports and develop its ports. The second explanation is because a nation views the maritime sector as a main economic driver it invests in ports, which will then induce economic development. Both explanations can be used to describe the development of ports and the development of regional economy. The main point is that ports vary in type because of differences in economic development.

The classification of ports is needed to create a basis of comparison. Through the classification of ports we can compare the development of ports to similar ports that are experiencing similar conditions. There have been many studies that have classified ports, but many of them use different criteria for classification. In this chapter we will describe the several ways ports can be classified and which classification we will use for this study. In the end a classification of Southeast Asian ports will be made and used as a basis of comparison and study.

Other Methods of Classification in Previous Studies

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[1] GDP at Current Market Prices in Millions of USD

Creating a classification of ports can based on many factors, these factors range from the way ports are managed to the role they play in a shipping network. The purpose of creating a classification is to identify which ports are similar and comparable. According to De Langen, "A port type in general 'constructed' on the basis of multiple dimensions (such as size, hinterland access, location, etc)" (De Langen, 2002). Determining these "multiple dimensions" in which these ports are classified into, depend on how the classification is used. As mentioned earlier, there is a wide variety of ports in Southeast Asia. To create a study that can compare and contrast ports, we must create a basis of comparison. To find the correct basis of comparison for this study we delved into previous researches that classify port or create a port typology.

UNESCAP has done several studies to classify ports; most of the factors they use in creating a port typology are based on trans-shipment. Their study focuses on trans-shipment because obtaining trans-shipment cargo throughput is the fastest way ports can develop (MPPM, 2006). Their main goal is to identify ports that have the potential as well the capabilities in grabbing a large share of trans-shipment cargo. Under their method of classification they have created two distinct scenarios, The Base Case scenario and The Big Ship scenario. The Base Case scenario describes a trans-shipment network based on ships ranging from 8,000 TEUs to 12,000 TEUs (MPPM, 2006). These ships operate under the traditional hub and spoke network with mainline services and feeder services. This scenario describes the existing situation in shipping networks today. The Big Ships scenario is developed in anticipation of the increasing size of ships. This is a hypothetical scenario in which ships on mainlines will increase to 10,000 TEUs to 12,000 TEUs. The only difference between The Base Case scenario and The Big Ship scenario is that the ships are larger and only stop in major trans-shipment ports. Under these scenarios the study by the UN creates port typology.

Using the scenario's described previously, the MPPM study created a classification of "The Major Trans-shipment Hubs" of ports in the Asia Pacific Region (MPPM, 2006). The study identified eight ports as Major Trans-shipment Hubs shown in the table below:

Figure 2.1 UNESCAP classification of Major Trans-shipment Hubs

Major Trans-shipment Hubs in the Asia Pacific Region
Colombo, Sri Langka
Port Klang, Malaysia
Tanjung Pelepas, Malaysia
Port of Singapore, Singapore
Hong Kong, China
Shanghai, China
Busan, Korea

Source: Data interpreted from UNESCAP study done by MPPM, 2006.

The ports are the ports in the Asia Pacific Region that can become trans-shipment hubs. MPPM study continued to create a classification based on throughput per berth shown in the graph below:

Figure 2.2 MPPM classification based on throughput per berth

Port Class	Description	Throughput per berth	Indicaive Cost per Berth
1	World class hub port	350,000 TEU	US$ 80 m
2	Major Port with many mainline services	300,000 TEU	US$ 60 m
3	Important secondary port	250,000 TEU	US$ 60 m
4	Feeder or regional port	200,000 TEU	US$ 40 m
5	Minor port using multipurpose facilities	100,000 TEU	US$ 40 m

Source: UNESCAP study MPPM, 2006

This classification created by the UNESCAP study was used to estimate the berth requirements that would be needed to accommodate the anticipated demand in 2011.

Parts of the study conducted by UNESCAP in the classification of trans-shipment hubs in the Asia Pacific can be used in our study of ports in Southeast Asia. From this study we can take the classification of the Major Trans-Shipment Hubs however, the study focuses on trans-shipment. Trans-shipment cargo has a weaker link to regional economics; it influences regional economics more than regional economics influences the port's development. In other words because these ports handle cargo from all over the world, the exports of these ports do not directly reflect the production of that nation. It is because they are a part of a shipping network that they are importing and exporting a lot. From this study we can use Figure 2.2 to classify the ports in Southeast Asia based on throughput per berth.

Another study that attempts to create a port typology is a study done by UNCTAD; however this study only classifies trans-shipment ports. The purpose of the UNCTAD study is to compare where the ports in developing countries stand in the trans-shipment networks. The port authorities of developing ports can position themselves in respect to other trans-shipment ports. According to the study there are four types of ports (UNCTAD, 1990):

- **Dedicated hub ports**
- **Hub and load center ports**
- **Direct call ports**
- **Feedered ports**

Dedicated hub ports are places of origin or destination of mainline services, where most of the trans-shipment cargo is collected and then transported. In most cases countries that have dedicated hub ports do not have any goods that they produce and export. Most ports of this type are used solely as trans-shipment ports, distribution points for the global shipping networks. These ports usually have geographical advantages that allow these ports to be dedicated hub ports (UNCTAD, 1990). For example, Singapore, its location provides easy access to other feeder ports and it is an origin and destination point in global shipping networks. These ports generate low levels of national cargo but instead serve as a trans-shipment point.

Hub and load center ports are very similar to dedicated hub ports; both types handle a large quantity of trans-shipment cargo. As in dedicated hub ports, strategic location is one of the main reasons why these ports handle so much trans-shipment cargo. They handle all types of trans-shipment cargo that include: "interlining, scattering for delivering in neighboring area, switching, catching-up, and by-passing" (UNCTAD, 1990). The main difference between dedicated hub ports and hub and load center ports is that hub and load center ports generate a substantial amount of cargo from and to their own hinterland. An example of this type of port is the port of Rotterdam. Rotterdam is known for creating high levels of liquid bulk cargo but also handle large amounts of containers; they are the "gateway of Europe."

Direct-call ports are ports that are on the mainline of global shipping, that generate their own cargo. Because they are on the mainlines of shipping networks then many ships call there and load and unload. Sometimes these ports hold trans-shipment cargo, but most of the time they generate cargo.

Feedered ports are ports in which they only receive feeder services. They are usually small ports with a small national economy that generate low levels of trade. These ports are typical of underdeveloped nations.

The UNCTAD study describes well the characteristics a certain port has to have to fall into each category. However there are some shortcomings to the study, it lacks statistical data such as container throughput to better classify the ports. Another shortcoming is that it only classifies ports based on the ability to be able to become trans-shipment points. From this study we can use the characteristics the each type of port has.

Another study that describes the term "load center" is a study done by Notteboom; his study classifies the European container port system based on their ability to reach the "load center" status. Notteboom uses Hayuth's definition of load center, he defines them as large ports that have large concentrations of cargo as the result of expanding intermodal transport networks and containerization (Hayuth Y. , 1982) (Notteboom, 1997). The study also uses Hayuth's model on the dynamics of port systems, it describes in five distinct phases in concentration patterns (Hayuth Y. , 1981) (Notteboom, 1997). Notteboom's study continues to classify the ports in Europe in to three main categories based on the hinterland networks that the ports serve: the Hamburg – Le Havre range, Atlantic, range and the Mediterranean range.

The most important aspect of Notteboom's study is that it introduces a matrix that distinguishes the market positions of ports in Europe. The matrix was developed by Boston Consulting group, which classifies four market positions: **'wild cats'** ports with an uncertain future, **'stars'** ports with high potential, **'cash cows'** ports that are mature and **'dogs'** ports that do not have a prospective future outlook for development (Notteboom, 1997). It determines the position of ports in this matrix based on average market share and annual growth. It is important in identifying the position certain ports are in and which ports need to downsize or need to develop.

Figure 2.3 BC Matrix Market Share of Ports
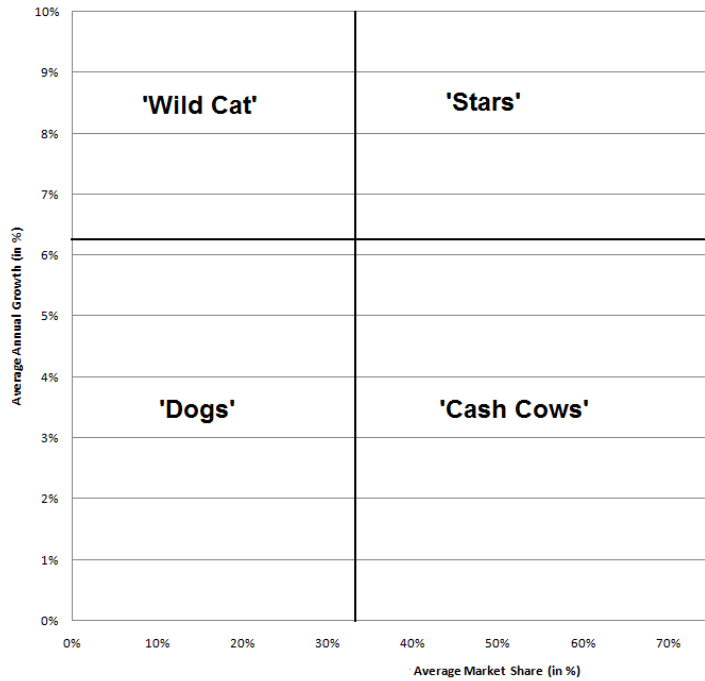
Source: Boston Consulting Group, Notteboom, 1997

There are many more studies that attempt to create a classification of ports, in these previous three studies conducted by UNESCAP, UNCTAD and Notteboom have attempted to do so based on different characteristics. The UNESCAP study attempted to create a classification of Major Trans-shipment Hubs in Asia. The main basis of classification was the portion of trans-shipment cargo a port handled. The UNCTAD study also based its classification of port on trans-shipment cargo, in the end they were able to derive four main categories: Dedicated Hub Ports, Hub and Load Centers, Direct Call Ports and Feedered Ports. Notteboom continues on the term Load Center and creates a classification based on market share and Hayuth's model on the dynamics on container port systems. However to classify ports in Southeast Asia this study needed a wider scope and a wider variety of factors of classification. For this study it is more appropriate that we introduce De Langen's attempt on port classification.

The Method of Classification Used in This Study

The previous section described several studies on the classification of ports, each study has a different base of classification. For this study, the previous methods of classification are less suitable,

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here we introduce De Langen's study. He classifies ports into four main categories, **Global Pivot, Load center, Regional Port, Minor Por**t. The classification is based on: **Logic of Location, Hinterland Role and Service Characteristics** (De Langen, 2002). In this section we discuss why these factors are used to categorize the ports and the characteristics of each categorization. We will use a derivative of his classification method that would be appropriate for our study.

Logic of Location that is used in De Langen's study analyzes the location of ports. It judges ports on how attractive are the ports location. Ports with strategic locations are more attractive and play a greater role in the global shipping network. They are also analyzed based on their role in the global shipping network and their importance to it. Another base for classification used in De Langen's study is the **Hinterland Services** of ports; this is used to identify the role of ports to their hinterland. It differentiates ports based on trans-shipment cargo, how much demand a hinterland creates for the ports and the level of intermodality of ports. The last base of classification is **Service Characteristics**, which is differentiating ports based on the size of ships they serve and the annual throughput volume in TEUs.

Based on these aspects, De Langen classifies ports into four main categories as mentioned above. The first, Global Pivot, are ports that are located in major shipping lines, they are responsible for handling a substantial amount of trans-shipment cargo. Most of the cargo that passes through, more than 60% is trans-shipment cargo. They also lack a natural hinterland and capitalize on their strategic location in the global shipping networks. These ports serve as intermodal connections, sea to sea or sea to land. The ships that they serve are large ships; at least 5000 TEU in size and their annual throughput is at least 600,000 TEUs a year.

Load centers, previously defined in Notteboom's study are described as ports that are a part of major global shipping networks. These ports also have a large hinterland that creates a large demand; at least 60% of cargo is to or from the hinterland. At least 10% of the cargo that flow through these type of ports have an origin or destination at least 300km away from the port (De Langen, 2002). These ports serve also as intermodal points as well in modal split. Modal split indicates that the cargo is transferred to other modes of transportation other than maritime transportation. The ships that are served are at least 4000 TEUs in size and the minimal annual throughput of these ports are greater than 1 million TEUs a year.

The next classification is Regional Ports, these ports are of less importance to global shipping networks and their location is also far from the main routes. The bulk of the cargos generated in these ports are from an industrial hinterland. They are either ports used for exporting or importing, there is not much trans-shipment cargo that flows through these ports. At least 90% of the cargos generated at these ports are from a hinterland area that covers no more than 500 km from the port. Because these ports do not handle a large portion of trans-shipment cargo, there is very little intermodality in the ports. The ships

that call at these ports range in size from 2000 TEUs to 4000 TEUs. These ports are usually used in shortsea shipping, feeder services and intercontinental services and a very small number of major services. The minimum annual throughput of these ports is 150,000 TEUs.

The last classification is Minor Ports, these ports are very small and local ports, and they have very little influence in the global shipping lines. Their cargo is generated from a very local hinterland, with at least 90% of their cargo generate from an area less than 100 km from the port. There is very little to none in intermodal activity in these ports. The largest vessels that they serve are 1000 TEU ships. These ports usually are involved in feeder services and shortsea shipping. The annual throughput of cargo ranges from 40,000 TEUs to 200,000 TEUs.

De Langen sums up his criteria for classification in the table below:

Figure 2.4 De Langen's Distinct Port Types and Their Characteristics

Aspect	variable	Global pivot	Load center	Regional port	Minor port
Logic of location	Maritime network	Located strategically nearby (intersection of) major shipping routes	Peripheral in maritime network	Unimportant position in maritime network.	Unimportant position in maritime network.
	Hinterland network	Limited natural hinterland	An extensive and voluminous hinterland	A substantial industrial/metropolitan hinterland	Local traffic base
Hinterland role	Transshipment	> 60% (sea/sea) transshipment	< 40% transshipment	Hardly transshipment	No transshipment
	Hinterland modes	Limited local hinterland	> 60% direct to hinterland substantial share (at least 10%) of origins/destinations > 300 km	At least 90% of the volumes with origin/ destination < 500 km	Direct local hinterland, at least 90% of the volumes with origin/ destination < 100 km
	Intermodal connections	Intermodal connections of limited importance	Intermodal connections important to modal split	A limited number of intermodal services	Hardly any intermodal facilities

Service characteristics	Vessel size	Largest vessels at least 5.000 TEU	Largest vessels at least 4.000 TEU	Largest vessels between 2.000 and 4.000 TEU	Largest vessels up to 1000 TEU
	Service calls	Frequent calls of major services, in some cases dominance of one shipping line	Frequent calls of major services of a number of shipping lines	Calls of secondary services (shortsea, feeder and secondary intercontinental services), a small number of calls of major services	Feeder and shortsea services
	Minimal annual volume	> 600.000 TEU	> 1 mln. TEU cargo	> 150.000 TEU	> 40.000 TEU and < 200.000 TEU

Source: De Langen, 2002

In our classification we made several modifications in the criteria used by De Langen. We disregarded the ship size criteria and modified the minimal annual throughput this is because the data used by De Langen was outdated; the data that was used was from 1983 to 1998. In order to make our classification valid and relevant we have updated the minimal annual volume criteria, the updated version is shown in the table below:

Figure 2.5 Modified Minimal Annual Throughput Criteria

	Global Pivot	Load Center	Regional Ports	Minor Ports
Minimum annual throughput	>10,000,000	4,500,000 – 10,000,000	2,000,000 – 4,500,000	0 – 2,000,000

Results and Conclusions

Using the updated criteria for classification we took 11 major ports in Southeast and classified them into one of the four categories with the data below:

Figure 2.6 Dataset for Classification of Ports

Port	Throughput		% Annual Increase	% Total Increase	Growth in TEU/Year
	2000	2006			
Tanjung Pelepas	418,218	4,770,000	148.65%	1040.55%	621,683
Port Klang	3,759,512	6,326,000	9.75%	68.27%	366,641
Port of Manilla	2,867,863	2,638,471	-1.14%	-8.00%	(32,770)
Tanjung Perak	949,029	1,943,000	14.96%	104.74%	141,996
Tanjunk Priok	2,222,496	3,347,000	7.23%	50.60%	160,643
Singapore	15,520,000	24,796,000	8.54%	59.77%	1,325,143
Port of Bangkok	1,073,517	1,486,328	5.49%	38.45%	58,973
Laem Chabang	2,195,024	4,215,817	13.15%	92.06%	288,685
Port of Saigon	763,342	2,532,000	33.10%	231.70%	252,665
Port of Penang	635,780	849,730	4.81%	33.65%	30,564

Source: Data Interpreted from (Yew & Kee, 2006) (Tongzon, 2006)

Figure 2.7 Classification of Major Ports in Southeast Asia

Global Pivot	Load Center	Regional Ports	Minor Ports
Singapore	Tanjung Pelepas	Port of Saigon	Port of Penang
	Port Klang	Laem Chabang	Port of Bangkok
		Tanjung Priok	Tanjung Perak
		Port of Manila	

From the results we can see that Southeast Asia is a very diverse region in port development, in a small sample of only 10 ports we can see the diversity. To summarize, there are 1 Global Pivot port, 2 Load Center ports, 4 Regional Ports, and 3 Minor Ports. This study's sample only consists of 10 major ports in Southeast Asia, there are many more minor ports but due to the limitations of out sample we only present three ports. Through this classification we can identify which ports can be compared to each other and which ports are not comparable to one another. The classification of ports creates a more reliable and relevant comparison.

III.   Southeast Asian Economic Background

Introduction

The economy in Southeast Asia is just as diverse as the types of ports. Not only is it diverse but it is also a rapidly growing economic region. The previous chapter establishes the diversity in the ports in Southeast Asia. There are many factors that lead to this diversity, and one of the main factors is the different levels of economic development.

In this chapter we will explore the economic diversity of the region. We examine the diversity in the region by comparing and contrasting important statistical indicators of economic development. We will also take a look into the factors behind this diversity; it is important to identify the factors behind the diversity to explain the differences in port development, this will be explained later in the study. We explain the historical path of economic development in Southeast Asia using by explaining Market Led Economies and State Led Economies. We introduce the concept of Export Oriented Industrialism, which plays a large role in the growth of the economy. By comparing the two different approaches we can understand the diversity and differences in economic development.

The development of ports would also be dependent on the economic state of a nation, by identifying the differences on the approaches in economic growth we can identify why there are very advanced ports and why other ports are lagging behind in development. This will be explained in more detail later in study. In this section we focus on the diversity of economic developments in Southeast Asia.

Economic Diversity in Southeast Asia

The countries in the Southeast Asia are members of ASEAN, The Association of Southeast Asian Nations. This organization oversees and sets economic goals of the region. However, the economic conditions are very diverse, ranging from agricultural based nations to extensive industrial and service-based nations. For example, the table bellow shows the diversity of Gross Domestic Product per capita or GDP per capita among ASEAN members. GDP per capita is a measurement that shows the value of any good and service produce in a nation divided by the population of the nation within the corresponding year. GDP per capita reflects an estimation of how much a person within a nation in a certain year can

earn. Based on the table, we can see that the there are huge differences of income between a person that lives in Singapore and a person that lives in Cambodia.

Figure 3.1 ASEAN GDP

GDP per Capita at Current market Prices in USD, 1996-2005

(US $)

Country	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Brunei Darussalam	-	-	-	-	18,471	16,829	17,134	18,706	21,856	25,751
Cambodia	296	283	251	283	288	295	310	326	362	404
Indonesia	-	-	-	-	807	793	970	1,113	1,183	1,279
Lao PDR	397	361	259	285	332	324	327	376	431	480
Malaysia	4,814	4,704	3,271	3,491	3,881	3,690	3,899	4,155	4,631	5,006
Myanmar	109	100	135	173	192	136	136	220	193	199
The Philippines	1,183	1,155	894	1,014	973	917	956	973	1,038	1,155
Singapore	25,218	25,283	21,017	20,918	23,066	20,735	21,218	22,161	25,366	26,864
Thailand	3,035	2,572	1,845	1,985	1,970	1,855	2,020	2,265	2,525	2,721
Viet Nam	337	361	361	374	403	415	440	489	555	635
ASEAN		-	-	-	1,156	1,098	1,211	1,332	1,449	1,582

Source: ASEAN Finance and Macroeconomic Surveillance Unit (FMSU) Database, computed based on Table IV. I

source: ASEAN Handbook 2006

Another evidence of ASEAN members' economic diversity is shown through the following table (UNDP, 2008):

Figure 3.2 ASEAN Human Development Index

	Year	Brunei	Cambodia	Indonesia	Laos	Malaysia	Myanmar	Philippines	Singapore	Thailand	Vietnam
HDI rank	2002	33	130	111	135	59	132	83	25	76	112
HPI rank	2002	..	74	35	66	..	45	28	6	78	41
GDI rank	2002	..	105	90	107	52	..	66	28	61	87
Goal 1. Eeradicating Extreme Poverty and Hunger											
Proportion of population living below $1 per day (%)	1990-2002	..	34.1	7.5	26.3	<2	..	14.6	..	<2	17.7
Proportion of population living below National poverty line (%)	1990-2001	..	36.1	27.1	38.6	15.5	..	36.8	..	13.1	50.9
Share of income or consumption - poorest 20% (%)		..	6.9 (data 1997)	8.4 (data 2002)	9.7 (data 1997)	4.4 (data 1997)	..	5.4 (data 2000)	5 (data 1998)	6.1 (data 2000)	8 (data 1998)
Children underweight for age (% under age 5)	1995-2002	..	45	26	40	12	35	28	14	19	33

source: UNDP,2008

The top side of the table shows Human Development Index or HDI ranking, which rank nations in terms of achievements in terms of life expectancy, educational attainment and adjusted real income (Chu, 1997). The ranking shows how diversified ASEAN members are. Singapore and Brunei Darussalam are ranked at 25 and 33 respectively; whereas other members are barely make it to top 50 in

the ranking. The second section of the table tells about the proportion of population that lives below $1 per day. From this section, the diversity is apparent, since some nations such as Cambodia, The Philippines and Vietnam have a considerable amount of population, which more than 10% of that lives on income below $1 a day, whereas some other nations have less than 2%.

There are many theories that may explain the phenomena of such diverse economic condition among ASEAN members, this section seeks to find the most distinguishing feature that contributes in building the phenomenon. A closer look at the differences between these nations shows that there are two type of development path that distinguish their economies, which is: market led economies and state led economies.

Market Led Economies

The practice market led economies in Southeast Asian nations can be traced back to post World War II. During the time, the world's geopolitical condition was divided into two polar, namely the United States (US) and the Union of Soviet Socialist Republics (USSR). This worldwide geopolitical power division also affected Southeast Asia, which forced the nations to choose between capitalist based markets and communist based markets or alternatively decide not to join any major side. During that time, what it is now known as ASEAN- 5, Indonesia, Malaysia, The Philippines, Singapore and Thailand, plus Brunei Darussalam, decided to join the be allies of the US side.

In joining with the US, these nations received aid that helped them to develop their economies. The aid given seemed to be a correct source of funding; it was intended to establish capitalism-supporting market, a market that had little or none government intervention. The aim of capitalism-supporting market was similar with the aim of colonialism, which sought to develop the infrastructure, agricultural and financial sector only to be able to exploited more from these nations. As a result, these countries exported cheap raw materials to mainly US and Europe, and buy the expensive end products back. Therefore, although the person in charge was different, there was no fundamental economic change compare to the colonialist era.

The development that stemmed from the aid that U.S. provided, led these nations to be involve in an exploitative relation between the core and the periphery countries as explained in the dependency theory. The dependency theory suggests that there is an exploitative relationship between developed countries, or in this theory also known as the core countries, and the less developed countries, or the periphery countries. The relationship is exploitative in a sense that the core countries not only buy raw material and sell the end product back to the periphery countries, but by doing so, the core countries are

allowed to enjoy a higher income, which suppresses the periphery countries from developing its economies. Another character of this relation is the dependency of periphery countries to core countries for end products, in the sense that the less developed periphery countries do not have the technology and knowledge to produce the end product.

After being lead by the system into an exploitative relation that was less beneficial for these nations, their leader decided to act in a different manner that can actually lead their nations to a better economic state. The solution was based on Neo- Marxist theory, which states that to be able to prosper, a nation must be more active and involved in the economies, and thus the Import Substitution Industrialism or ISI was born. ISI was a protectionism-based policy intended to protect local industry in order to be able to compete with foreign products (McGregor, 2008). This policy requires government intervention to create a condition that in the words of Andrew McGregor "stimulates local industry to manufacture the goods for domestic markets rather than imports them" (McGregor, 2008). The conditioning of the nations can be achieved through import tariffs and quotas, which basically decrease the competitiveness of imported products. ISI was the right decision to stimulate the industrialism growth of a nation and to cut the exploitative relation between the core countries and the periphery countries.

Although it seemed to perform well in cutting off the exploitative relation, ISI had a major disadvantage, which is its limitedness to a nation's jurisdiction area. It is limited to a nation's jurisdiction area because ISI heavily depending on government intervention to boost local industry competitiveness. Because of this limitedness, the area that ISI supported industries served was a small market, a market that easily saturated. To be able to continue their business effectively, these industries must find another market, which means that they have to compete with well established industries that has was more efficient and produce higher quality product. When these industries could not improve themselves, then it was just the matter of time before the well-established international competitor rushed in to their market.

The Emergence of Export Oriented Industrialism

When ISI failed, the situation called for another policy that was able to not only to sustain the temporary independence of these nations relative to the previous dependency condition, but also to make the local industry able to compete internationally. The answer for the quest came from Singapore; it was called Export Oriented Industrialization or EOI. The aim of this policy is to attract foreign direct investment or FDI to local industries to boost their development through investment in related fields. In other word, EOI attract FDI to create an internationally competitive local industry (McGregor, 2008).

By implementing EOI, a nation prepares itself to improve facilities that support industrialism, because by doing so, a nation is making itself more appealing for investor, especially those who wishes to

invest in industrial field. In relation with the topic of this paper, from all other aspects that could improve a nation's attractiveness to FDI, investment in port is considered crucial. Because of the EOI, local industries would likely experience a boom, thus creating the need for easy access to raw material market and to an end product market, which would likely to be achieved via shipping. It was for this reason that Singapore decided to invest heavily in its port, because it believed that by investing in such infrastructure, it would attract more FDI that later will develop its local industry, thus will increase the need for greater port service. Although Singapore also invested in other fields such as road infrastructure and in knowledge, but the investment in port to anticipate surging demand was considered as a vital decision in attracting FDI.

EOI policy itself causes a snowball effect, which begins by a nation trying to attract more FDI. To attract more FDI, this nation improve itself by investing in may supporting factors, such as infrastructure, knowledge or a better international trade policy. When a nation finally successful in attracting FDI, its local industry will likely to grow, this will increase the need for a better supporting infrastructure. Then when a nation has improved the supporting factors, FDI will once again flow in, because investors see the growing potential. The effect will again continues to create and ever growing need for a better supporting factors until a nation reach a certain point where a further development is not possible, which is usually due to lack of land space.

The practice of EOI by Singapore was fruitful and sustainable; it was not long before the other nations started to adopt similar policy. However, in implementing the policy, many of these nations faced with the remaining of ISI supported industries, which was still vulnerable to international well-established industries. Although the process was not relatively fast, these nations slowly built their economies.

State Led Economies

The government that represents the people controls the state led economies. The practice of this policy in Southeast Asia can also be traced back to post World War II era. Whereas other nations opted for market led economies, Burma, Cambodia, Lao PDR and Vietnam opted for socialism approach, partially because of the fear of neo- colonial exploitation (McGregor, 2008). Essentially, the nations under state led economies aimed to create a condition in which people own and control economic condition for the greater good of the greatest amount of people.

The practice of state led economies began in the agricultural sector. In Southeast Asia, it involved claiming of farmlands by government and pooling of labor resources. This policy was intended to

overcome the land ownership disparity, which mostly inherited from the colonial era. In the words of Andrew McGregor (2008):

Peasants were organized into collectives who would pool land, labor, equipment and resources in order to overcome the problematic economies of scale associated with small land parcels. Agricultural collectives would produce food for themselves and for the state with the proceeds of state sales divided among households within the collective according to the number of work hours the had committed. The state used the agricultural produce to feed urban populations but would also support health and educational services within collectives, providing much greater rural access to these essential services than that which occurred within the market led economies.

Although state led economies provided a great rural access to essential health and educational service, the system was not fault free. Since the state bought the agricultural product to be later distributed for the population, the state makes sure that the population can afford the product at the lowest possible price, in order to maximize utility. By doing so, the state was basically creating negative incentives for the peasants to work on state owned farmlands, and indirectly, forced them to work on their own fields and sell the product to black market for a higher price (McGregor, 2008). In the case of Burma, the government not only enforced such problematic system, but they also intended to stamp out private trade from the nations, which prohibited the import of rice and in the end, resulted in a decade long widespread hunger and staple food scarcity.

In the industrial sector, socialism was manifested in the form of nationalization of private firms, especially foreign owned firms. When the government took control of these firms, party officials and worker- committee replaced owners. By taking control of these companies, the government aimed to empower workers in managing their own working place under the supervision of the local authority. State led economies government also invested in new enterprises that produce goods for domestic market (McGregor, 2008).

Under the socialism approach, the industrial sector suffered similar inefficiencies like the agricultural sector. Although workers are being encouraged to manage their own workplace, the nationalized firms and newly found enterprises were actually under government authority, which meant that the decision making was centralized and fundamental changes can only be executed by party officials. Because of this system, the industrial sector development was inhibited.

Another drawback of state led economies was the bad reputation associated with human rights violation and the association of socialism to communism, which at that time was despised by West, or

West supporting nations, that overshadowed these nations. The bad reputations lead these nations to have fewer networks of nations in their trade portfolio that inhibits these nations from accessing the source of technology and knowledge needed to boost their economics. By having less networks, these countries relied on other socialism countries such as China and USSR for technological and knowledge aid. Not only the industrial sector growth was inhibited, the system did not allowed the market expansion of the industrial sector due to the small trade networks.

In the light for a better economic and nation development, these nations slowly change their policy to be more open to trade. Nations such as Vietnam has opted for a change by adopting EOI in their system, partially and under government observation.

Figure 3.3Nations under Two Development Paths

	Market Led Economies	State Led Economies
Nations	• Brunei Darussalam • Indonesia • Malaysia • The Philippines • Singapore • Thailand	• Cambodia • Vietnam

ASEAN Development

Figure 3.4 The Result of The Two Development Paths

	Market Led Economies	State Led Economies
Advantages	• Access to knowledge and technology • Access to international market • Access to aids, in terms of monetary and assistance • Access to FDI • A growing industrial sector	• Ability to control the economic activity as desired by the government • Protection from exploitative relationship • Ability to maximizing economic activity for the greatest good of the greatest number of people • Protection of local firms

	Drawbacks	• Exposure to the exploitative relationship as explained in dependency theory • Market determined economic do not always bring the greater good for the greatest number of people • No protection for local firms	• Do not have the access to knowledge and technology for developing national economic • Often seen as having bad reputation that leads to, • Do not have the access to international market, which closes the expansion chance

Figure 3.5 GDP growth of Southeast Asia
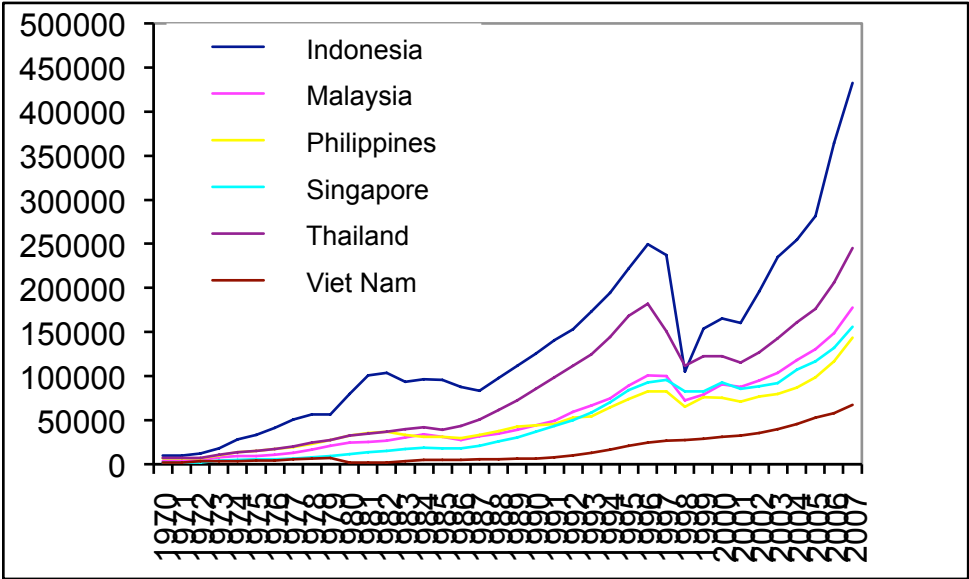
Source: UNCTAD, 2008

The graph above shows that the market led economies nations has a significantly higher GDP compared to state led economies nations. This could be the result of the different development paths that the respective nation took. The development path that a nation took has proven to shape the economic mechanism of a nation. For example, Vietnam under state led economies wound up as a nation that did not have access to knowledge and technology, nor they have the opportunities for market expansion. In

contrast, Singapore under market led economies had successfully attracted not only knowledge and technology but also capital and valuable human resources. It is now clear that the path a nation took shaped the nation from at least:

- Its relationship with other nations, which grants
- The access to knowledge and technology
- The access to valuable human resources and natural resources movement in the sense of immigration and trade, and also
- The access to international market that enables local firms to expand.

Another observable impact of market led economies and EOI was the tendency to build ports ahead of demand. It became a common amongst Southeast Asian countries. This tendency arises from the fact that by having a better and more capacity before it is actually needed contributes in attracting FDI, which in turn will contribute in developing their economies.

The extensive development that stemmed out from the region's effort to loosen the exploitative grip of core countries to their resources, this region has developed a policy that is not only able to develop themselves, but also in a certain way, enhance their competitiveness significantly. It is observable that the market led economies, which gave birth to EOI, has shaped the region into adopting the free market principle and the neo- liberal development philosophies as the World Bank's East Asian Miracle report stated.

The Southeast Asian nations struggle to develop their own economies was not to be taken for granted. Starting from an effort to develop them and to be free from colonialism economic, this region has become one of the most attractive markets for FDI. Based from this chapter and previous chapter, the following chapters are dedicated to study the relation between GDP growth and port growth in Southeast Asian nations.

Conclusion

Therefore, the development path that a nation follows, once again, shaped and determines a nation's economic system, directly or indirectly. The Southeast Asian nations struggle to develop their own economies was not to be taken for granted. Starting from an effort to develop them and to be free

from colonialism economic, this region has become one of the most attractive markets for FDI. As a result a wide range of levels of economic developments emerged.

The diversity in economies within Southeast Asia has direct implications on how each nation approaches infrastructure developments especially in port developments. It is clear that Southeast Asia is a region that is greatly dependent on maritime transportation. To monitor and understand the differences, the historical path of economic development must be made clear. It is important to clarify this difference to explain the link between economic developments and port developments.

The information presented in this chapter and previous chapter will be used in the following chapters to study the relation between GDP growth and port growth in Southeast Asian nations. The theories introduced in this chapter will be used to analyze the case studies later in the paper. Our study begins by establishing the different port types and different economies to explain the diversity. By understanding that in Southeast Asia one nation's economy and port developments can be very different from another nation we can compare and contrast similar cases. This creates a relevant base to compare and analyze port developments and economic developments.

IV.   Theoretical Background and Preliminary Assumptions

Introduction

The previous chapters explain the diversity of economic developments and port developments in Southeast Asia. It also explains the theories behind the differences, why the region so diverse. Why can neighboring countries have very different economicconditions and why can neighboring ports have different development stages. These theories are a basis to evaluate the relation between economic growth and port growth in Southeast Asia.

In order to study the relation we must determine which variables are appropriate to be used as indicators of economic growth. This chapter will clarify the use of GDP as a economic growth indicator as well as an indicator for port demand. We explain why it is used to explain the relation between nation economic development and port development. The chapter continues to formulate research assumptions which can explain the relation between a nation's economic development and port development. These assumptions are used to analyze the test results from our next chapter. The theories behind these assumptions are explained more in depth.

Indicators of Economic Development

The first variable we use as an indicator of economic development is GDP. GDP can be defined as the total value of all goods and service produced within the boundaries of a nation within a year. The distinct characteristic is that GDP includes any goods and services produced within the boundaries, regardless who produce them. The second distinct characteristic is the limitation of GDP to a nation's geographical borders. In other words, GDP only takes into account the value of goods and services that are produced within a nation, the income that the citizens of the nation generate outside the national jurisdiction are excluded. Although there are several types of GDP measurements, such as current GDP, nominal GDP and real GDP, for the sake of validity, this paper uses real GDP.

The reason why this paper uses GDP in measuring the economic growth of nations are because of the distinct characteristic of GDP. When GDP measures the total value of all goods and services produced within the boundries of a nation. Since this paper aims to study the relation, it needs to incorporate resource endowment theory. This theory, which is also known as the Heckshcer- Ohlin theory, states that resources are endowed differently in different area that makes international trade based on resource

difference possible(Stopford, 2007). In conjunction with this theory, the sense of space or area confinement relative to resource endowment, GDP match the theory.

Another reason why GDP is a proper development milestone for this study is because GDP incorporates trade. GDP includes household consumption, investment, government spending and international trade indicated by the deduction of gross export value with gross import value. In mathematical equation GDP can be written:

$$GDP = C + I + G + (X - M)$$

GDP   = Gross Domestic Product.

C   = Household consumption that includes any expenditure in goods and service that a household spend in order to sustain itself, except housing.

I   = Investment includes every investment made by household or business in goods and services, including building, insurance and equipment.

G   = Government Expenditure that includes every expenditure made by government on goods or services.

X   = Gross Export, which includes every goods and services produced for other nation's consumption.

M   = Gross Import that includes every goods and services imported from abroad. This variable is deductive because it represents the outflow of capital from a nation to another and to avoid being considered as a domestic production.

GDP has a direct relation with port because it incorporates international trade in its calculation. In international trade, denoted by X and M, goods are most likely to be transported via seaborne transportation, which will use ports. This is especially true in Southeast Asia where almost all international trade is transported by maritime transportation. The relation between GDP and port is clear in the sense that if there is a change in international trade, there will be a change in GDP and also for the demand for port services. This phenomenon of port services demand that is partially if not entirely dependent on international trade (Rees, 1971) denoted by X and M is called derived demand. The next section of this chapter will explain more about the relationship between GDP, export and the derived demand for port services.

GDP and International Trade Linkages

As the milestone of nation economic development, GDP plays an important role in this paper. The reason why GDP is utilized instead of GNP has been described in the previous section of this chapter. This section aims to explain how GDP and International trade, which is represented by exports and imports, are related and what relation do they have. As the formula suggest, it is clear that international trade has a significant importance to GDP. To state led economies nations such as Cambodia and post colonialism Vietnam, the formula do not necessarily reflect the GDP mix, since these nations are rarely involved if not isolated from international trade. In particular, market led economies nations such as Indonesia, Malaysia and Singapore, which are involved actively in international trade; this formula is able to reflect their GDP mix.

Furthermore, in nations which have a market led development path, EOI has made international trade as inevitably an important and major part of their GDP mix through industrialism, as shown in the graphs below:

Figure 4.1 GDP Mix, Agriculture, Industry, Services
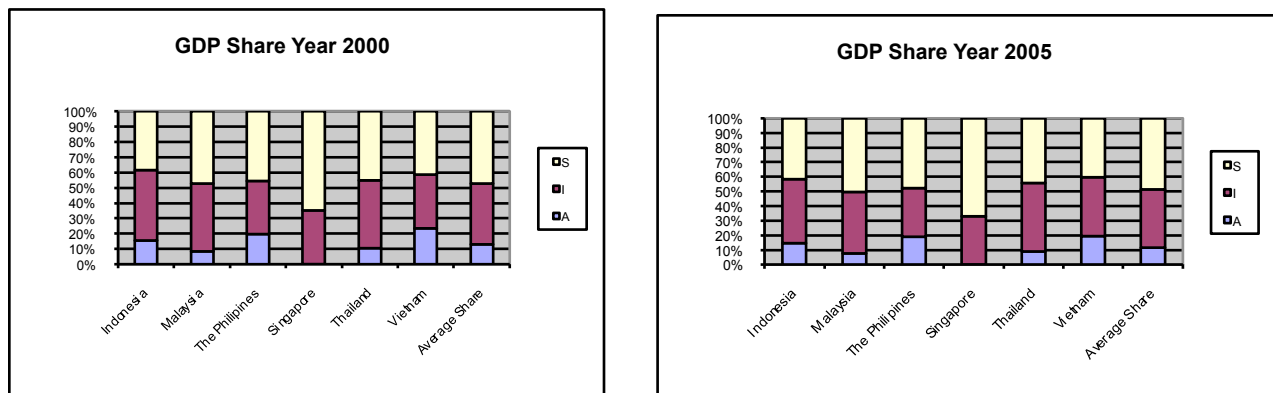
Source: ASEAN Secretariat handbook of statistic

The graphs show that the share of GDP generating sectors. The three colors, each represents the agriculture sector, industry sector and service sector, denoted by A, S and I respectively. From the graphs above, it is evident that the market led economies shaped the economy of SEA to be more reliant toward industrial sector. Take Vietnam for example, this nation adopted EOI much later than other nations, trough time, the graph shows that Vietnam slowly converting its agriculture sector to industrial sector.

As the local industry grows, the need for port service will also grow. More industry means more raw materials to be imported, and to certain extent, more manufactured goods to be exported, which likely to be done by shipping(Rees, 1971). From here we formulate our first assumption:

"GDP and international trade of SEA nations, represented by exports and imports, have a positive, linear relationship and also are highly correlated."

This assumption will be the first assumption of this paper. Next, to better understand the bigger picture of the paper, the following section will explain more about how GDP growth and port are related. This relation will also be tested quantitatively in chapter five.

GDP and Derived Demand for Port Services

Previously the process has shown why GDP is the most suitable indicator for a nation's economic development; this section is dedicated to explain the relation between GDP and derived demand for port service. First, market demand port service is a means to an end, which means that people do not demand port service for the sake of getting the service. It is a means to an end that in most cases, to deliver goods from one place to another for a higher economic value. Therefore, the demand for port service is derived from the demand of the actual goods that is being delivered. This type of demand, which is derived from demand for other product or service, is called derived demand (Stopford, 2007).

The demand for port services is derived from the demand for the commodity from one area that needs to be delivered to other areas for a greater economic value. Without any demand for commodity from an area, no one would demand port service. The demand for a commodity from one place to be shipped to another is supported by the factor endowment theory, which basically states that resources are different from one place to another (Stopford, 2007). This theory also explains international trade, because one nation needs resources from another nation to create goods. In relation with EOI, the more a nation produces, the larger the need for raw material and the more products it has to be exported. When more raw materials and products are demanded by international market through international trade, the more port services are demanded. In conjunction with the result of previous section, it can be said that the derived demand for port services increases as GDP of a nation rises.

Borrowing Martin Stopford's insight from his book *The Economic Principles of Maritime Trade*, the relation between GDP growth and derived demand for port services growth can be explained through three reasons:

1. Larger economies have a greater need for raw materials and goods, which is shipped by sea.

2. Along the path of economic development, local resources are likely to be depleted.

3. A nation with high GNP can afford to purchase import and has more to export in return.

Although these reasoning are associated with GNP instead of GDP, but to certain extent, both milestones have similar qualities that make these reasoning applicable for GDP. Another aspect that needs to be clarified is the use of term larger economy or large economy and how they are related to GDP growth. What Stopford tried to show in his book is that a higher GNP leads to higher demand for port services. This argument is expandable to developing nations, such as nations that this paper studies, in the sense that a nation with growing GDP tends to:

1. Deplete its own resources along the path of development, that leads to

2. Increasing needs for raw material and goods to be shipped in, which implies

3. The possibility of having more export, which also implies

4. The growing GDP allows a country to have more import

From four reasons above, the first reason is self- explanatory. The second reason is related to the fact that developing nations such as in Southeast Asia will need raw materials to support their industries and needs. By having more imports to support their industries, a nation tends to have more exports, which is stated in reason number three. And in the end, a higher export will lead to higher GDP that in the end allows a nation to have more import to support their growing industries and needs.

Up until this point, one might argue that although the relation is theoretically possible, but it is not necessary true that the relation exists because of the nature of the economies itself. For example, this relation is only true when a national economy is based on industrialism, which has direct impact on export and import of a country. If a country happens to have a service based economy or agricultural economy, the assumption will not hold.

Furthermore, on the extreme, even if the GDP of a nation is apparently based solely on industrialism, there are chances that a nation might have all the resource needed and the nation produces for itself, thus eliminates the need for port services: a case of isolationist nation. On the less extreme case, it is rare, if not impossible, that a nation has all the resources it needs to produce goods for itself. This contra-argument is based on the law of average, which in this case states that not all resources are available within the nation's jurisdiction (Stopford, 2007). On the extreme case, if it is the case of isolationist nation, the market are shaped and curbed by the government into somehow only demanding goods that able to be produced with locally available resources.

It is now clear that when the GDP of a nation grows, the demand for port service will likely to grow because of the existence of international trade. Our second assumption relates to the EOI policy, which discussed in chapter 3:

"A nation as it grows, particularly SEA nations, will likely enhance the capacity of port to meet the rising demand for port services."

Conclusion

Taking into account all the links, it can be said that GDP is linked positively to derived demand for port services through international trade. This depends greatly on the economic condition of the host nation of the port. Nations that are intensively involved in industrial activities and manufacturing tend to have higher demands of maritime transportation. As a result we come up with our first research assumption, that GDP and international trade, represented by exports and imports have a positive, linear relationship and also are highly correlated.

To anticipate a higher demand for maritime transportations, as discussed in chapter 2, ports are built ahead of demand as a part of EOI policy to attract FDI and sustain growth. This is where our research assumptions are formulated. It is justified to hypothesize that Southeast Asian ports are able to support the development of Southeast Asian nation's economic growth. The next two chapters are dedicated to study whether the hypothesis stand when faced with the real world condition of the region.

V.   Quantitative Analysis

Introduction

This chapter is dedicated to test the assumptions stated at chapter four. There are mainly two assumptions that will be tested, namely:

1. *"GDP and international trade of SEA nations, represented by exports and imports, have a positive, linear relationship and also are highly correlated."*
2. *"A nation as it grows, particularly SEA nations, will likely enhance the capacity of port to meet the rising demand for port services. "*

The First Assumption Test: GDP and International Trade Relatedness

The first assumption that will be tested using regression and correlation tests to find out the type of relation and how related these variables are. The regression test will utilize scatter plot to indentify the type of the relation, whereas the correlation test will uses Pearson correlation test due to the nature of the data. Both tests will be run in SPSS. The data for these tests can be found in appendix 1.1. Hereby we present the test result:

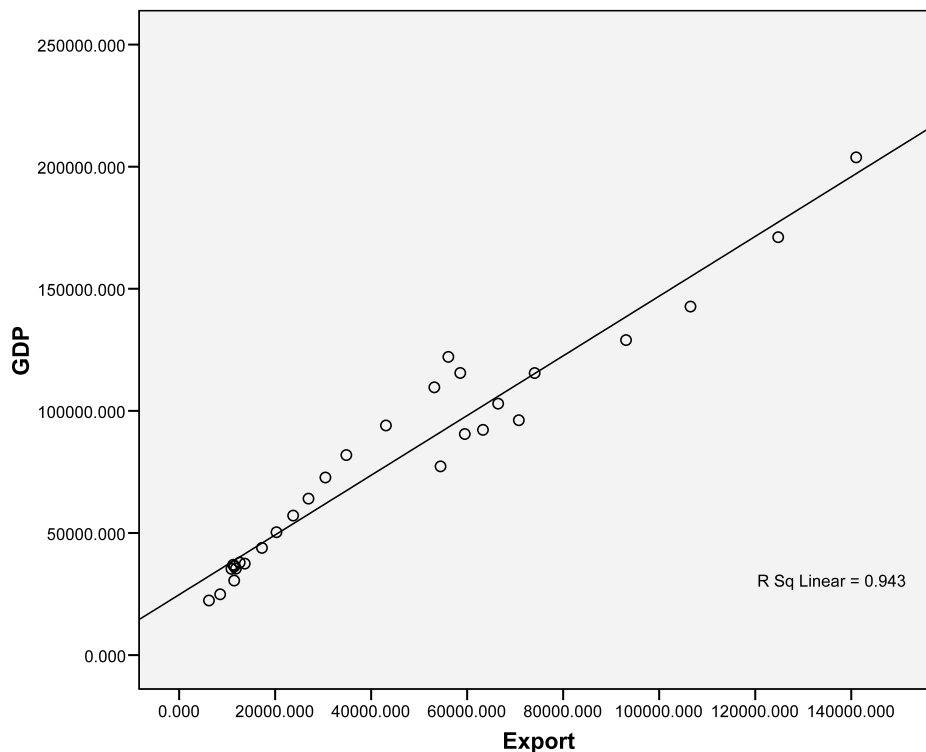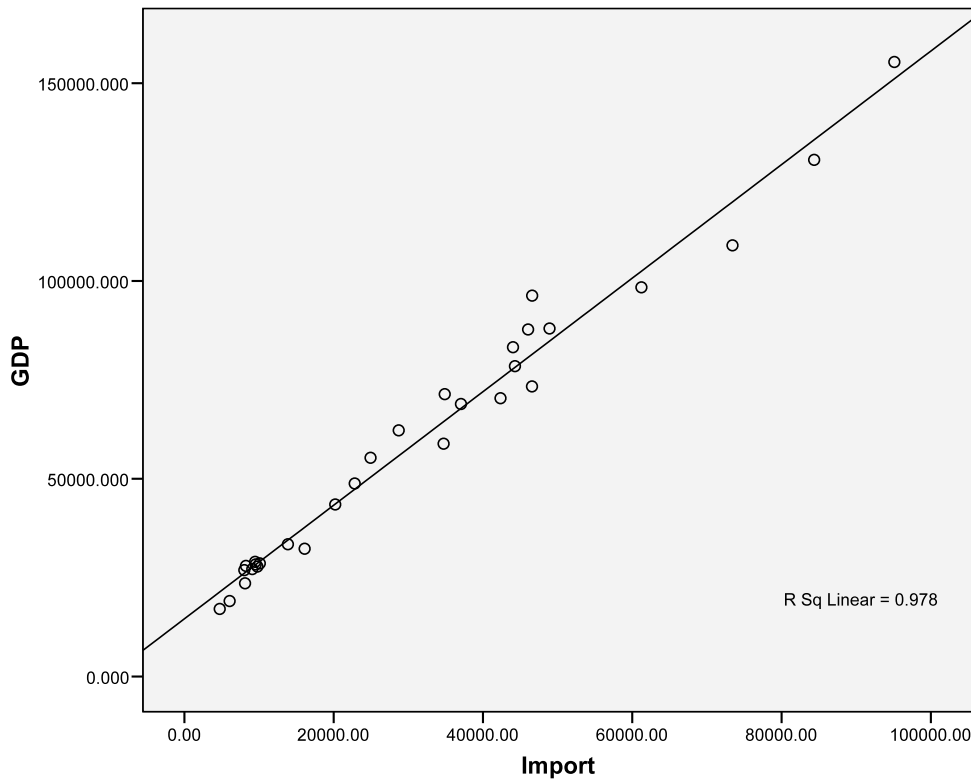**Figure 5.1 Scatter plot test on GDP and Export**

Figure 5.2 Scatter plot test on GDP and Import

The first two tests on GDP and international trade variable shows positive relation. The trend line that stretches from lower left to upper right shows the positive relation. By having a positive relation, it means that these variables changes in the same direction. For example, when import reaches 20.000, the GDP will be increased to somewhere near 50.000, whereas when import reaches 60.000, the GDP will grow to a level close to 100.000. The tests proves that international trade has a positive impact in GDP, which means that it will for every change occurred to international trade, GDP would be affected in the same manner.

One aspect that needs to be underlined is that in the formula, import is in minus, which logically, when put in a test, the result should show a negative relation. Although it might seem contradictive with the formula, but actually imports are being put into subtractive role in the formula to differentiate foreign supply from local supply. The differentiation is needed, because imports are going to be distributed in the other component of GDP, such as C, G and I. When imports are not differentiated, the distributed supply might be mistakenly be considered as local supplies, thus creating an over valuation of local supply and under valuation of foreign supply. Furthermore, GDP is intended to measure local production, not merely the consumption, although the goal is achieved trough measuring local spending and consumption. It also

expected that the test show positive relation, because only a country with growing GDP can afford to have growing import.

The second test is Pearson correlation test. This test is carried out to study the relatedness of international trade variables to GDP. Hereby are the test results:

Figure 5.3 Pearson Correlation Test on GDP and Export

		GDP	Export
GDP	Pearson Correlation	1	.971(**)
	Sig. (2-tailed)		.000
	N	30	30

** Correlation is significant at the 0.01 level (2-tailed).

Figure 5.4 Pearson Correlation Test on GDP and Import

		GDP	Import
GDP	Pearson Correlation	1	.990(**)
	Sig. (2-tailed)		.000
	N	30	30

** Correlation is significant at the 0.01 level (2-tailed).

The first Pearson correlation test shows that 0.971 correlates export and GDP and that the result is significant. Correlated by 0.971 means that the two variables have high likelihood of being treated the same way. In relation with the scatter plot result, it is legitimate to interpret that for every change in export, there is a likelihood of 0.971 that GDP will change as well. The similar interpretation goes to import and GDP. Taking into account the scatter plot result, it is also legitimate to say that for every change in import, there is a likelihood of 0.990 that GDP will change. The second Pearson correlation test is significant due to significance value, which is lower than 1% confidence level.

These tests prove that the relations between international trade and GDP are positive, linear and highly correlated. It is also evident that the first assumption of this paper stands, recall from previous chapter, it this chapter shows that SEA nation GDP and international trade, represented by exports and imports have a positive, linear relationship and also are highly correlated. At this point, it can be said that the more a nation is involved in international trade, the more its GDP will grow. This statement is supported not only by the test result, but also historically as the market led economies development path passage tells us about. In the next section the second assumption will be tested.

The Second Assumption Test: GDP Growth and Port Development Relatedness

This section will test the relation between GDP growth and port development. The relation test will be done trough three tests, namely scatter plot, Pearson correlation coefficient test and elasticity test. The scatter plot test aimed to uncover the type of relation between the two variables. Pearson coefficient correlation test aims to find how much correlation the two variables have. The last test, elasticity test seeks to find the sensitivity of port development for every changes of GDP. First two tests resemble the tests on previous section, whereas the third test is the essential test that will test the hypothesis.

Series of graph: 5.3- 11 Scatter plot test on Nation GDP Growth and Port Development
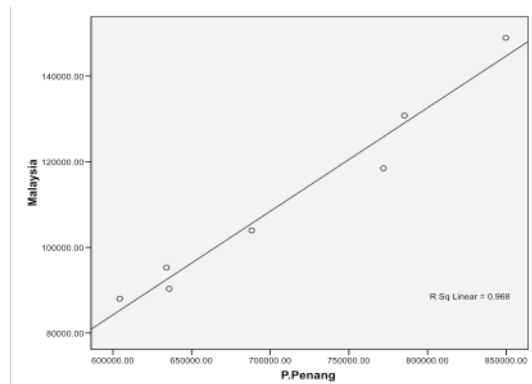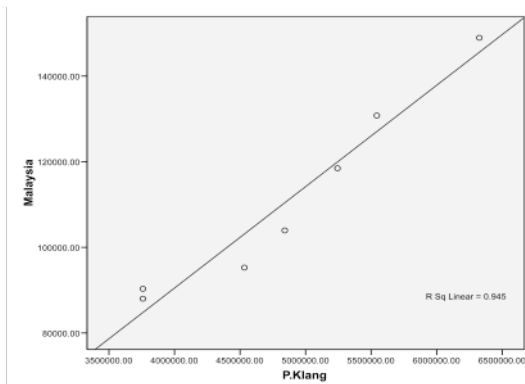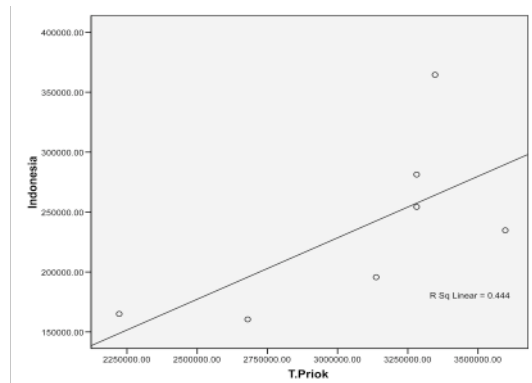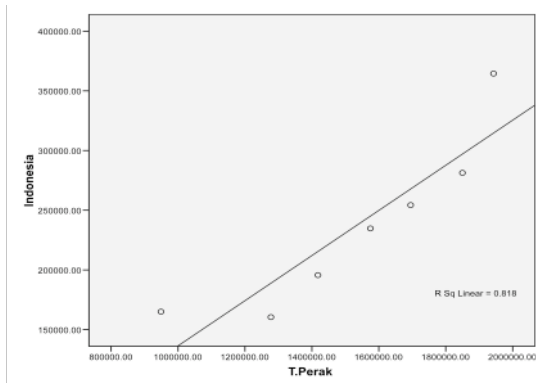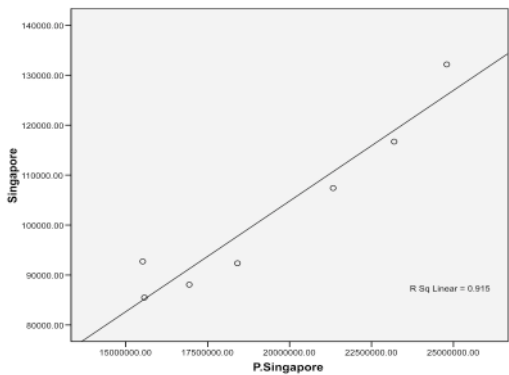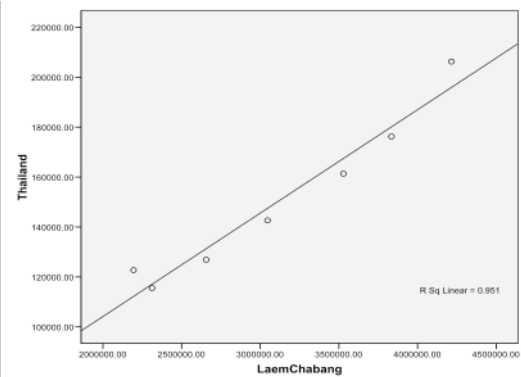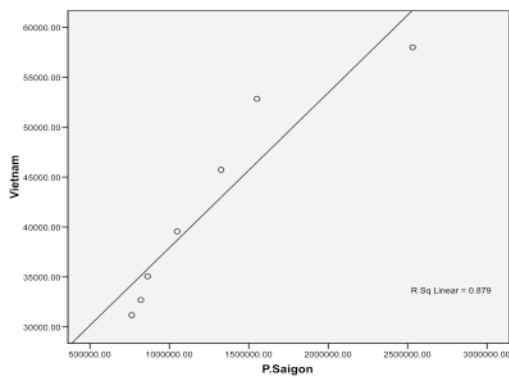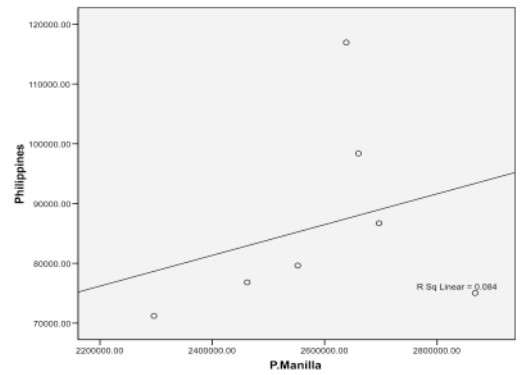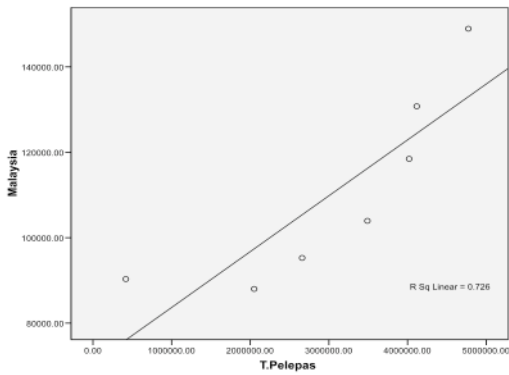
The tests were run on a data gathered from UNCTAD, which can be found in the appendix. The data ranges from 2000 to 2006. The results of these scatter plots were as expected, all of the ports shows a positive relations. These positive relations are showed by the upward trend lines that stretch from lower right to upper left of the graph. The results of these tests match the assumption set up in the previous chapter. Next, to be able to find the how related these variables are, we present the results of the correlation test.

The Pearson correlation coefficient, the data set used in these test are the same set of data used in the scatter plot test. Although the result of these test are again as expected by the assumption stated in chapter four, there are some outliers in among these ports. Whereas almost all of these ports show positive and highly correlated results, Tanjung Priok and Port of Manila show different results. Hereby are the test results:

Figure 5.5Pearson Coefficient Correlation Test on Nation's GDP Growth and Port Development

		T.Perak	T.Priok	
Indonesia	Pearson Correlation	.905(**)	0.666	
	Sig. (2-tailed)	0.005	0.102	

		T.Pelepas	P.Klang	P.Penang
Malaysia	Pearson Correlation	.852(*)	.972(**)	.984(**)
	Sig. (2-tailed)	0.015	0	0

		P.Manilla		
Philippines	Pearson Correlation	0.29		
	Sig. (2-tailed)	0.528		

		LaemChabang		
Thailand	Pearson Correlation	.975(**)		
	Sig. (2-tailed)	0		

		P.Singapore		
Singapore	Pearson Correlation	.957(**)		
	Sig. (2-tailed)	0.001		

		P.Saigon		
Vietnam	Pearson Correlation	.937(**)		
	Sig. (2-tailed)	0.002		

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

In the case of Tanjung Priok, the test is not reliable because the significance exceeds the confidence level. This phenomenon shows that the port development to certain extent does not have any relation with the GDP growth of Indonesia. The other case, Port of Manila test results shows that the significance level exceed the confidence level by almost five fold. The similar reasoning from Tanjung Priok case might be applied on this case. A more detailed explanation will be given after the third test.

The two previous tests on the second assumption have showed that most ports development is correlated positively to national GDP growth. Because the relation is now known and established, it is natural that a question on how sensitive is ports to change of the national GDP arises. The last test, the elasticity tests is to answer the question. By answering this question this chapter will be able to test whether the hypothesized outcome will be applicable in SEA nations. The elasticity test utilized data set taken from various sources, which can be found in appendix. This data set shows the development of national GDP and the development of port in terms of TEU throughput. The methodology used is comparison of the percentage growth of port for every growth of GDP. This methodology will make GDP growth as the denominator. In other words, the test wants to set up the elasticity of port development for every change of GDP growth. The test will compare the average percentage change of both variables within the period of 2000- 2006. By doing so, the test avoids the cyclicality of the data and still able to assess the sensitivity of the relation as hypothesized. The relation between the GDP change and port development has been set in the previous chapters, Furthermore, as the tests in previous section show, the base of the assumption, that is to say, the GDP growth and port development, shows a positive relation and highly correlated. Bellow is the result of the test:

Figure 5.6Elasticity Result Test on GDP Growth and Port Development

Port Type	Country	Port	Elasticity
Global Pivot	Singapore	Singapore	1.333
Load Center	Malaysia	Port Klang	1
	Malaysia	TanjungPelepas	9
	Indonesia	TanjungPriok	0.533
Regional Ports	Philippines	Port of Manilla	-0.125
	Thailand	LaemChabang	1.333
	Vietnam	Port of Saigon	2.091
Minor Ports	Indonesia	Tanjung Perak	0.867
	Malaysia	Port of Penang	0.556

The result shows that most ports are sensitive to change of GDP. Some ports, like port of Singapore, Laem Chabang and Tanjung Pelepas show very high elasticity that seems to be breaking the elasticity boundary of -1 to 1. This phenomenon is not a result of data error, although it might be the case, in this study, a result of more than one or minus one is expected. First, the developments of ports are not merely explained by nation development. Second, unlike the development of nation, the development of port requires a smaller amount of resources in a significantly smaller range and in which in shorter time, thus a port can change significantly compared to nation in a given amount of time. Take Tanjung Pelepas for example with the elasticity of 9, which can be explained by the port's massive investment in the early years of its operation, namely in 2000- 2001.

A very large elasticity, denoted by elasticity result of more than one or minus one, shows that the port is developing faster than the nation's economy given the same amount of time. It also shows that the port growth is not only dependent on nation economic growth, but as the function of port suggest, it also dependent on the demand for the port service as transhipment point. As in the case of the Philippines, the elasticity shows a minus sign, this means that port development is not sensitive to the GDP growth of the Philippines. There are two possible reasons for this, first, that the port is actually degrading in terms of throughput due to decreasing international trade in the Philippines. The second possibility is the port suffers unfortunate events such as a earthquake or a tsunami that damage the facility, thus decrease the throughput.

Analysis of Results

In relation with the port typology discussed in chapter two, ports falls into certain category with certain characteristics. Furthermore, based on this typology ports are expected to develop relative to nation economics in a certain way. The first typology, Global Pivot, suggests that a Global Pivot port is expected to have a limited natural hinterland and serve as a major transhipment point. In other words this type of port is expected to have positive correlation between GDP growth and port development. On the other hand, a global pivot is expected to have a positive elasticity with the nation economic growth, apart from its role as a major transhipment point, it also serves its limited natural hinterland. In this case, the limited natural hinterland's need of port service is indicated by its GDP growth, and due to the limited size, a Global Pivot can easily fulfil the demand and still providing a transhipment service. Therefore, a Global Pivot serves its limited natural hinterland, and also international transhipment. This makes a Global Pivot centre to have an elasticity equal to one or more, since its development is driven not only by its national economy but also the international trade.

A similar analysis can be done to other types of ports. A load centre, which mainly serves voluminous natural hinterland, is expected to have a positive correlation with its hinterland economic growth with an elasticity equal to 0.5 or more. The elasticity shows that a load centre reflects the need of the natural hinterland, which in most case the whole nation itself, indicated by its GDP growth, since its development is mainly driven by the hinterlands need.

A regional port is expected to perform at a level in which it has positive correlation and positive elasticity with its natural hinterland economic growth. The elasticity of this type relative to the economic growth of its hinterland is expected to range from the first positive nominal to one, but not more than one, because its developments are majorly driven by the economic development of industrial region it serves. In turn, the industrial region that the ports serve reflects the economic growth of the nation, a reason why the port is expected to have positive but not more than one elasticity value. The last one, the minor port type is expected to perform at a level where it may have small or no correlation with the nation GDP growth. Furthermore, this typology is expected to have elasticity ranging from negative value to positive but not more than one. This due to the fact that this type serves minor regions that does not have any major impact with the economic growth of a nation, which can also indicate that any government capital may not go into the port, but instead be utilized to build the region itself.

This analysis is based on the condition where ports are operating in a normal day to day operating condition where there is no major investment going in to the port, which explains why some of the analysis does not match with elasticity results in the table above. In other words, the numbers that strays from the analysis shows that ports are built ahead of demand, particularly in SEA nations, as they shows elasticity values that is significantly higher. From these three tests, it is clear that the assumption two stands. Recall from the previous chapter, it has been proven that nation as it grows, particularly SEA nations, will likely enhance the capacity of port to meet the rising demand for port services.

Conclusion

In this chapter, the assumptions are being put to test. The early section of this paper shows that SEA nations GDP growth and international trade are aligned. This finding acts as a base for the second assumption. At the later part of the chapter the second assumption was tested. It has been proved that SEA nations built their port ahead of demand. In other word, this chapter shows that the type of relationship between SEA nation growth and port development is that port develops faster than economical development of a nation. The following chapter will explain more in detail about some port development-nation economic growth relation through case studies of some of the SEA nations and the respective ports.

VI.   Case Studies: The actual link between port type and hinterland economy

Introduction

Southeast Asian ports are very diverse stemming from different economic development paths. This difference stems from the different port development paths. This can be seen clearly in the previous chapter. There are several theories that state that ports should develop ahead of demand but not all ports are capable of doing so. There are some ports that are successful in building ahead of demand and there are some ports that remain congested because port development is lagging behind. This section will show some successful and unsuccessful ports that are faced with a rapid increase in demand.

From the Port Typology chapter we will take one port out of each category except for Minor Ports. There are many minor ports in Southeast Asia and due to limitations in this study we only covered three ports. The examples we will use are as follows: from the Global Pivot category we will use Singapore, from the Load Center category we will use Tanjung Pelepas and Port Klang and from the Regional Ports category we will use Tanjung Priok (Jakarta).

There are several reasons as to why we have chosen those ports for our study. Based on the size of the economies, Indonesia, Malaysia and Singapore are amongst the top five largest economies in Southeast Asia. We wanted to find out how the largest economies approach port growth and how strong is the link between the two. Singapore is the ideal example of a Trans-shipment Hub; we want to find out how important the port is to Singapore's economy. Tanjung Pelepas and Port Klang, showed some stunning results from the previous chapter, although similar in size, Tanjung Pelepas is growing at a much faster rate, we wanted to find the reasons behind this rapid growth. We chose Tanjung Priok as well, because it seemed out of the ordinary, considering that Indonesia's economy is the largest in Southeast Asia but it's port development seemed slow. These examples can give us a better look into the characteristics of each port category and how it relates to their host nations economies.

For each port we will describe the history and the development, port role and typology and the hinterland's economic development. We will cover more information on the hinterland's economic development, identifying more specific factors that cause an increase in demand in shipping from FDI to social and political conditions of the nation. We will also point out any anomalies or factors that provide more insight to our quantitative findings and analysis form the previous chapter.

Tanjung Pelepas

This Malaysian port has a very unique history, in less than a decade it transformed from a mangrove swamp to a world-class trans-shipment hub. As of 2005, Port Tanjung Pelepas (PTP), has 8 berths, and 6 million TEU capacities. By the end of 2006 it is expected to add two more berths totaling to 10 berths with a 10 million TEU capacity. Its terminals operate 24 super-post panama cranes which can serve the largest ships in the world (Osman, 2006). It has a very strategic location, very close to major shipping routes, 45 minutes diversion time from major routes to the port. It has a turning basin of 600m, and a terminal draft of 15-19 so the largest ships can enter the port (PTP, 2009).

In the typology chapter, we have classified this port as a Load Center port. In the quantitative analysis chapter we classified it as a Global Pivot. This inconsistency is due to the fact that the initial classification may not fit due to its characteristics; there are several aspects in which Tanjung Pelepas can be considered both as a Global Pivot or a Load Center. The main purpose of Tanjung Pelepas was to become a Trans-shipment Hub, or in our categorization to be a Global Pivot. The target market segment is trans-shipment cargo. To achieve PTP works together with Maersk and Evergreen shipping companies (Osman, 2006). In 2000, Maersk acquired a 30% share in PTP; Maersk has a dedicated terminal for its ships in PTP. Maersk has 25 mainline services and Evergreen has 17 mainline services that use PTP as a Trans-shipment Hub (PTP, 2009). However, its current annual throughput does not allow it to be categorized as a Global Pivot. Because of its throughput levels, we have categorized PTP as a Load Center.

Port Klang

Port Klang is Malaysia's "gateway to the world", the Port Klang Authority have claimed that this port is the nation's load center. Their claims are strongly supported by their performance and their characteristics. The ports are connected to over 500 ports in over 120 countries around the world (PKA, 2009). There are two main container terminals in Port Klang, Northport and Westport. In total, it has 21 berths and a quay length of 5,313 m and drafts of up to 15m. The port is equipped with the latest superstructures with Post-Panamax cranes. Per year, Port Klang serves an approximate of 8000 ships at the Northport alone.

In order to keep up with Malaysia's economic growth, there are many plans for development to anticipate for the rise in maritime transportation. The ongoing development that Port Klang is going through is known as the five-year Ninth Malaysian plan, which is meant to increase capacity and efficiency in the port. The government allocated RM 1.29 billion into the expansion of the ports, the

project will allows Northport alone to handle 18 million TEUs a year. These port developments are conducted in anticipation of the increase in demand as Malaysia's economy grows. How Malaysia's economy is developing will be discussed in the next section.

Malaysia's Economic Development

Malaysia's economic growth spurt began in the 1970's when the government made an attempt to attract FDI into the nation. Most of the FDI that entered the Malaysian economy originated from East Asian economies. Many factors caused this inflow of capital, these factors include: appreciating East Asian currencies and rising labor and capital costs in these countries (Siew-Yean, 2004). As the result a massive exodus of capital came from East Asian nations, one of the beneficiaries would be Malaysia. This was also due to Malaysia's attractiveness, by 1993 Malaysia became one of the top ten economies to receive FDI and stock (UNCTAD, World Invesment Report, 1995, 1995).

During the Asian Economic Crisis starting in 1997, the massive outflows of capital crippled Malaysia's economy. The inflows of corporate investments also decreased substantially during this time period, as the result Malaysia's GDP from the manufacturing sector contracted; in 1998 the contraction reached 13.4 (WTO, 2000). To reduce the damage done by the economic crisis, Malaysia allowed foreign investors to hold 100% ownership in the manufacturing sector. After being hit hard by the crisis, Malaysia began its economic recovery.

On the road to recovery, Malaysia took large steps, by 2000, GDP contribution from the manufacturing sector reached 32%. From that point and onwards, Malaysia's economy especially in the manufacturing sector excelled. By 2003, employment from the manufacturing sector reached 27.2%. During this time Malaysia heavily promoted it exports by being more open towards FDI. From 1970 to 1999 total exports increased from 11.9 % to 83.7% (Siew-Yean, 2004). Exporting became a major base for Malaysia's economy.

From the third chapter we can see that in fact Malaysia's economy moves to Export Oriented Industrialization. This process has been encouraged by the government by allowing FDI to flow into Malaysia more freely. Through this influx of FDI, Malaysia's manufacturing sector continued to grow and become exporters of goods. By 2007, FDI that entered into Malaysia manufacturing sector totaled to RM 133.6 billion. Over 50% of all FDI that flowed into Malaysia's economy went into the manufacturing sector (Masud et.al, 2008). This continued influx into the manufacturing sector set the stage for rapid developments at the ports.

Analysis of the Link between Malaysia and its Ports

Malaysia's two ports, Port Klang and Tanjung Pelepas are very different in type. In our categorization we have classified them into the same category, Load Centers. However, as explained earlier the classification of Tanjung Pelepas into the Load Center category is up to debate. After taking a closer look at the two ports we can see that the two are very different in nature. Through our literature survey we found that actually Tanjung Pelepas is more of a Trans-shipment Hub or a Global Pivot rather than a Load Center. On the other hand, Port Klang remains as a Load Center. The characteristics of Port Klang fit the category of Load Center. This difference must be established to better understand the link between port development and the development of the economy and the hinterland economy.

Port Klang compared to Tanjung Pelepas is more correlated to Malaysia's economic growth. This is explained by the different roles that the two ports serve. Because Port Klang is a Load Center its growth and development is obviously more related to economic growth. In the past few decades we can that Port Klang has been growing as fast as Malaysia's economy. As you can see from the previous chapter, the growth of Port Klang's capacity and the growth of Malaysia's GDP is highly correlated with an elasticity, 1. On the other hand, Tanjung Pelepas's growth does not have a link to the growth in Malaysia economy. It outgrows Malaysia's economy at a very fast rate.

This finding clearly shows that the two ports, although similar in size, serve a completely different role for the Malaysian economy. Because the growth of Port Klang is highly correlated to the growth of Malaysia's economy it is safe to say that it is a Load Center, serving as "Malaysia's Gateway". When we look at the economic growth of Malaysia, it is currently in a phase of receiving large amounts of FDI in the manufacturing sector. The derive demand theory states that as demand for Malaysia's exports grows so should the demand in maritime transportation.

In anticipation for the continual growth of Malaysia's economy, the ports should also develop at least at a similar rate to the economy. Using Malaysia and Port Klang, we can confirm our hypothesis that a nation will enhance the capacity of ports to meet the rising demand in port services. We can see that Port Klang has done a great job in developing as fast as the economy. In the previous chapter we can see that compared to Malaysia GDP growth and Port Klang's capacity is well aligned. This indicates that there is no lag in meeting the demand for port services.

This is not the case when we take a look at Malaysia's Tanjung Pelepas, which is expanding at a much faster rate than Malaysia's economy. The growth in capacity of the port absolutely does not have any correlation to Malaysia's economy. At a glance, it may seem ridiculous, especially when it is categorized as a Load Center. However, when we take a closer look into the phenomena, we find an

explanation for this. As mentioned before, Tanjung Pelepas is designed to be a Trans-shipment Hub not a Load Center.

Trans-shipment Hubs generally do not have any correlation to a host nation's economy. This is so because the majority of the cargo that is handled is trans-shipment cargo. Which means it does not produce any goods and it is not a gateway, rather it is just a place where cargo stops by temporarily. Unlike Load Centers whose demand is especially sensitive towards national economy, Trans-shipment Hubs are more sensitive to Global Trade and the Global Economy rather than the national economy. If we take a look into the characteristics of Tanjung Pelepas, we can clearly see that it is not in fact a Load Center. Therefore, Tanjung Pelepas, despite its relatively low annual throughput levels, must be considered as a Global Pivot rather than a Load Center.

Tanjung Priok

The Port of Tanjung Priok serves the largest economy in Southeast Asia; it is the busiest port in Indonesia. It has a long history, dating back to 1960; the port authority of Indonesia operates the ports as well as 11 other ports in Indonesia. Tanjung Priok has a total 14 terminals, ranging from container terminals to car terminals; the total berth length is 12,958 m with drafts ranging from 5 – 14 m deep (Port of Tanjung Priok, 2009). It can cater to large ships but not Super-Post Panama ships. Tanjung Priok is a multipurpose port; there are 9 types of terminal, shown in the table below:

Figure 6.1 Types of Terminals in Tanjung Priok

Type of Terminal	Quantity	Length (m)	Draft
General Cargo Terminal	42	6597.5	5m – 11m
Multipupose Terminal	5	914	8m – 11m
Container Terimnal	13	2800	9m – 14m
Passenger Terminal	3	450	9m
Dry Bulk Terminal	8	1242	4m – 10m
Liquid Bulk Terminal Oil	4	377	12m
Liquid Bulk Terminal Chemical	1	204	8m
Beaching Point	1	66	6m
Car Terminal	2	308	10m

Source: (Port of Tanjung Priok, 2009)

Tanjung Priok has three main terminal operators: Jakarta International Container Terminal (JICT), Koja Container Terminal (KOJA), Olah Jasa Andal (OJA) (Yew & Kee, 2006). JICT and KOJA

operate Tanjung Priok's largest container terminal, in 2005 alone the throughput was 2.29 million TEUs, it is a port of call for over 20 shipping lines with routes serving more than 25 countries (HPH, 2008). KOJA handles a berth length of 650 m and land area of 29.3 HA.

From the typology chapter we have categorized Tanjung Priok as a Regional Port, however this categorization is up to debate. Based on the information obtained from the container terminal it should be considered as a Regional Port. However, Tanjung Priok is a multipurpose port, with many types of terminals. Indonesia has over 18,000 islands and 33 container ports many islands still use general cargo ports. General cargo terminals are still very popular in Indonesia; this explains the large quantity of general cargo terminals. It also serves as a large bulk port, mostly exporting raw materials and liquid bulk oils and chemicals. It indicates that using container throughput data is not sufficient in explain the growth of port capacity and its ability to meet the demand for port services.

Indonesia's Economic Developments

Like Malaysia's economy, Indonesia's economy was also developing at a fast rate. Indonesia's economy began to open up to FDI in 1967, in which they passed the Investment Law No.1 (Osada, 2004). In order to be more attractive to FDI, the Bank Indonesia adopted a free-floating exchange system in 1970. To further attract FDI, beginning in the 1980's Indonesia took a liberal approach in the financial sector. As the result, from a period between 1970 and 1996 the rate of growth of the Indonesia economy reached 7.3%.

Indonesia's economy has experienced a drastic change from the 1970's; it was known as Asia's Tiger, performing extraordinarily in the agricultural sector. However, from a period of 1986-2005 a very basic change occurred as the economy slowly began to shift away from agriculture to manufacturing and services. Comparing the contribution of the agriculture sector during the period between 1986 and 1990 and the period between 2000 and 2005, we can see that the average contribution dropped from 20.03% to 14.08%. On the other hand, during the same period we can see an increase from 19.96% to 17.82%, indicating a shift in economic base from agriculture to manufactures (Khaliq & Noy, 2007).

This positive trend ended abruptly as Indonesia was hit by the Asian Crisis, like its fellow Southeast Asian neighbors, they were hit hard. During the period between 1998 until 2002, Bank Indonesia recorded negative FDI of US$ 3 billion per year. This instantly stunted the growth of the economy. Many industries were hit hard, among the hardest hit were: construction, transportation, services and finance. There were also several industries that were not hit as hard such as: agriculture, fishery, oil and mining, electricity and telecommunication sectors.

After the crisis, Bank Indonesia took several measures to insure that Indonesia's economy can remain attractive to potential investors. The first measure was establishing the BKPM (*Badan Koordinasi Penanam Modal)* a government body responsible in overseeing investments coming into the economy. BKPM provided assurance that foreign companies to freely transfer profits provide a tax holiday for foreign investors, allow investors to be free of import duties and sales tax on machinery and equipment and provided licenses for foreign companies to operate for 30 years in Indonesia (Khaliq & Noy, 2007). Bank Indonesia also signed an Investment Guarantee Agreement with 61 countries and a bilateral Investment Promotion and Protection Agreements with 55 countries. Through these agreements investor confidence remain high, to show for this, from a period between 167 until 2006 a total of US$ 315.22 trillion in FDI flowed into Indonesia's economy (Khaliq & Noy, 2007).

Analysis of the Link between Indonesia and Tanjung Priok

Maritime transportation for Indonesia is very important, it is estimated that 90% of external trade is transported via maritime transportation. It is also the largest archipelago nation in the world, with 33 container terminals in the nation, maritime transportation is essential to trade. Without it, it assured that Indonesia's economy will suffer greatly. In eleven of the major ports in Indonesia, the growth in traffic increased by 25% in just two years from 2005 to 2007 (Ray, 2008). Tanjung Priok handles over 50% of the container throughput in the country.

Tanjung Priok is clearly essential to the region's economy; however it is also the gateway for Indonesia to global shipping routes. It can also be considered as a Load Center because of its hinterland access, it is also a trans-shipment point for short sea shipping and feeder services. The intermodality of Tanjung Priok can be clearly seen, sea-to-sea and sea to land intermodality. The port also serves large ships with Panamax cranes. From its characteristics it can be considered as a Load Center, but from a container cargo perspective it is a Regional Port.

From the previous chapter we can see that Tanjung Priok is not well correlated to the growth in Indonesia's economy. The pattern in growth of Tanjung Priok seems random and does not align with the pattern in growth of Indonesia's economy. There are several explanations for this, after careful study our reasoning is that Tanjung Priok is a multipurpose port rather than just a pure container terminal. From the description of Tanjung Priok we can see that there are 9 different types of terminals within the port. Therefore the concentration of cargo is spread across 9 different terminal types. Using container throughput as an indicator of port capacity would not be the best way to compare port development and economic growth.

Another explanation for this phenomenon is that, Jakarta is the main port for the highest populated island in Indonesia, Java. Jakarta's hinterland is limited to one island and cannot account for the whole economy of Indonesia. Therefore comparing, the growth of Indonesia's economy to the growth in throughput does not indicate whether the port is developing along with the nation's economy. Because of that reason, any developments in the manufacturing sector will be correlated to the nearest port rather than Tanjung Priok.

Indonesia's economic growth, in terms of the shift from an agricultural based economy to an industry-based economy has an effect on the demand for maritime trade. However, Indonesia is a special case because it is an archipelago nation. FDI that enters the manufacture sector must also be specific to what region or island that the investments are being used in. It is difficult to come to conclusions by looking at the data above and the case study. We can only say that Indonesia is a special case because of its unique archipelago characteristics.

Singapore

Singapore's economy is highly dependent on the port's activities; it is one of the main contributors to Singapore's GDP. The port built its first container terminal in 1966 and in 1972 it received its first call from a container ship at Tanjong Pagar (Yew & Kee, 2006). There are four terminals in the port of Singapore, Tanjong Pagar, Keppel, Brani and Pasir Pajang. In total it offers connections to more than 120 countries and 600 ports. The port is not a dedicated port for containers; it is also a multipurpose port, with other terminals as well. In total the quay length of 16,000m, a draft of up to 16m and can handle up to 35 million TEUs (PSA, 2009).

It is currently the largest Trans-shipment Hub in the world; it is under the Port Singapore Authority (PSA). More than 80% of the cargo that flows in to the port is trans-shipment cargo. There are many development projects in Singapore to continue to hold the title of the world's largest trans-shipment hub. Not only that, PSA is expanding its operations and is establishing operations in 16 countries with in 28 ports. The infrastructure of the port is capable of serving the newest vessels, with new gantry cranes and Post-Panamax quay cranes. There have been many developments in the logistics chain as well; the PSA has invested over SGD 10 million in trucks to better serve customers (PSA, 2009).

Singapore's Economic Developments

Singapore compared to its Southeast Asian nations experienced rapid growth under a stable environment. Other nations experienced economic under development, social unrest and political instability. Its strategy in economic development is far different from its neighbors; they took a path into liberalization and became open to international trade. They opted for a capitalistic growth strategy; other Southeast Asian nations took an approach to a more closed economy stance. As the result, many foreign investors chose to invest in Singapore compared to other nations. Today there are over 3000 multinational companies and lucrative and open financial markets.

The strategic location of Singapore made it a very important player in the Southeast Asian economy. After gaining its independence from Malaysia in 1965, many felt that Singapore would not be able to develop and would have to deal with a declining economy. However, after its independence Singapore opted to promote an export oriented industry based economy, to support that, they invested heavily in infrastructure. As the result of such policy Singapore became a large economy in Southeast Asia by the end of the 1970s (Menon, 2007).

In the 1980s, Singapore set to push for further developments in their economy, they moved from an economy based on a large cheap labor pool to a high skilled labor pool and capital intensive economy. Singapore specialized in the electronic and oil refining industries that needed high level of technology. As the result, Singapore became a hot spot for multinational companies because of its well-established infrastructure and financial markets. The financial sector contributed up to 25% to GDP during the 1980s In Asia it ranked it was amongst the top three destinations for FDI, along with Hong Kong and Tokyo (Menon, 2007). However, Singapore's economy relied heavily on the global economy, not only its financial sector but also its port. Any shock to the global economy will directly affect Singapore's economy.

The growth and shift in economic base in Singapore continued into the 1990's, the manufacturing sector contributed roughly 30% into GDP. The electronic sector contributed the most; it came from the production of computer component and oil refining. Despite the growth in the manufacturing sector, Singapore's economy is not only based on Export Orientated Industrialization. As mentioned before its financial markets are attractive as well as their port services. However, the growth in industries also showed a need for port services in Singapore and contributes to the demand.

The Asian Crisis also hit Singapore hard but its path to recovery was considered to be faster comparing to its Southeast Asian counterparts. By 2003, Singapore was able to recover because of the Economic Review Committee (ERC). The ERC suggested several policy changes to help the economy recovery. Their recovery was also especially fast because of the growth of the Global Economy during that time.

Analysis of the Link between Singapore and its Port

Singapore is a very special case, it is a very small nation but its economy can rival those of large countries such as Malaysia and Thailand. Not to mention the ports this is almost three times larger than its next competitor in annual throughput in Southeast Asia. After looking into Singapore economy we can see that the main contributors to its GDP are the service and manufacturing industry. The agriculture sector hardly contributes anything to GDP. From the characteristics of the economy we can come to several conclusions on the link between the economy and the port.

The first conclusion is that, Singapore's port is highly dependent on the global economy, since the portion of trans-shipment cargo that flows in and out of the port reaches 80%. The rest is generated from Singapore's economy. This would mean that the link between Singapore's economy and its port is strong, but the port's activities contribute a lot into GDP. The contribution of GDP from the services sector reached 67% in 2005, which is from financial services, legal services and port services. The manufacturing sector also contributes to GDP, but because the goods are for export it adds to more demand in port services.

Another interesting point is that the elasticity of economic development and port growth in Singapore was 1.33. This means that port development is very sensitive to economic development, meaning that the port expands faster than the economy. This is reasonable because Singapore is a Trans-shipment Hub or a Global Pivot, as the previous chapter shows, Global Pivots tend to expand faster than the nation's economy, because they are anticipating in demand for port services from the global economy.

Conclusion

After taking a closer look into the economies of Malaysia, Indonesia and Singapore we can see the difference between the three. Malaysia and Indonesia took a similar development path in shifting from an agricultural based economy to an industrial based economy. On the other hand Singapore's economy shifted from an industrial based economy to a service based industry. These differences have different implications on the ports of these countries. Singapore continued its path in being a service-

orientated economy by developing its port. While Malaysia and Indonesia continued to develop it ports in accordance with the demand for port services.

There are many interesting findings from this chapter; the first is the different roles of Tanjung Pelepas and Port Klang to Malaysia's economy. Although these ports are similar in size they are completely different from one another. Port Klang serves Malaysia solely for export and imports, while Tanjung Pelepas serves the global economy and provides service mainly for trans-shipment cargo. This is clearly seen by Port Klang's elasticity to Malaysia growth in GDP. Tanjung Pelepas's growth rate compared to the economy's growth rate is not linked in any way, growth at a much faster rate than Malaysia economy.

Singapore, typical of a Trans-shipment hub also grows at a faster rate than Singapore's economy; again this is reasonable because it is in anticipation of an increase in global demand. Therefore the port develops and serves a global economy and the link with the national economy is somewhat weak. Port services of Global Pivots usually contribute to GDP rather than depending on GDP to boost demand in the ports.

By taking a closer look into the conditions surrounding the development of the economy and ports we get a clear understanding of the link. In some cases the link is strong such as Port Klang and Malaysia's economy. In Tanjung Priok it is difference because of geographical features as well as the cargo that flows in and out of Tanjung Priok. Not all of the cargos passing through Tanjung Priok are containerized. The relation would possibly strong if throughput was not the only factor in measuring port capacity and growth.

VII.   Conclusion

This study was conducted to find the relationship between the growth of national economies and port development in countries in Southeast Asia. To establish a base for comparison a classification of ports was done, this was done to show the diversity in ports in the region. Here we find that the port types are of a wide variety, with 1 Global Pivot, 2 Load Centers, 4 Regional Ports and 3 Minor Ports. Each type has a distinct character and role in the global shipping network, the size of the ports are also different.

To better understand the economic developments of the national economies, we had to find the background behind the economic spurt of the region. Here we found that the development path of nations shape the outline of the economy. This also clarifies and explains why the region is so diverse in economic size. This information is used as a basis for our explanation of the relation between national economies and port development.

We also found out how international trade affects port growth of a nation. This relation explains the importance of ports as a major supporting infrastructure for a nation's economic growth. Furthermore it explains why ports are built ahead of demand. The link is further underlined by the derived demand theory, explaining that the demand for a nation's product will have an impact on the demand for port services.In the quantitative analysis, we explained how different types of ports have different relationships with national economies. This phenomenon is explained by the functions and role of the ports in relation with the hinterland it serves and the national economy. Essentially, Southeast Asian nations are developing at a faster rate than the national economy. However, the levels of growth depend once again on the role of the ports.

There are several anomalies from our quantitative study, to find out the causes of these anomalies we looked into the largest economies and the relation it has with its ports. Here we found out that although Tanjung Pelepas and Port Klang are similar in size they play a completely different role in the global shipping network, thus their relationship with the national economy is different. Tanjung Priok also ended up with peculiar results in the quantitative study, the explanation is that Tanjung Priok is actually a multipurpose port. This indicates that container throughput is not sufficient in analyzing port growth. Singapore also show that Global Pivots seem to grow apart from the national economy, it is a major contributor rather than relying on the national economy for demand in port services.

Our final conclusion is that Ports in Southeast Asia are developing and growing at a much faster rate than national economies. This is due to the fact that ports are built ahead of demand to anticipate rising demands in the future. Another reason is that ports are closely linked with the global economy and

international trade therefore, they must accommodate for demand not only from their national economy but also from the rest of the world.

Appendix

A.1. Southeast Asian Throughput Data 1992-2006

Port	1992	1993	1994	1995	1996	1997	1998	1999
Tanjung Pelepas	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Port Klang	677,588	771,901	943,844	1,133,811	1,409,491	1,684,508	1,820,018	2,550,41
Port of Manila	1,157,912	1,251,257	1,501,965	1,668,091	1,971,524	2,121,074	2,690,000	2,147,42
Tanjung Perak	n/a	n/a	n/a	n/a	n/a	n/a	n/a	891,42
Tanjunk Priok	907,509	1,000,126	1,252,153	1,300,126	1421 693	2,091,402	2,130,979	2,273,30
Singapore	n/a	9,050,000	10,400,000	11,850,000	12,950,000	14,140,000	15,140,000	15,940,00
Port of Bangkok	1,303,308	1,273,797	1,394,769	1,432,843	1,232,610	1,100,000	1,079,794	1,063,75
Laem Chabang	33,705	218,528	349,448	529,073	819,886	1,023,671	1,559,112	1,828,46
Port of Saigon	n/a	n/a	n/a	389,397	484,111	540,581	607,519	687,47
Port of Penang	303,367	330,922	386,182	433,474	454,765	506,863	509,169	566,40

Port	1999	2000	2001	2002	2003	2004	2005	2006
Tanjung Pelepas	n/a	418,218	2,050,000	2,660,000	3,490,000	4,020,421	4,117,121	4,772,98
Port Klang	2,550,419	3,758,512	3,758,512	4,533,212	4,841,235	5,243,593	5,543,527	6,326,00
Port of Manila	2,147,422	2,867,863	2,296,151	2,462,169	2,552,187	2,696,878	2,660,137	2,636,47
Tanjung Perak	891,429	949,029	1,277,609	1,418,146	1,574,998	1,695,266	1,850,000	1,943,00
Tanjunk Priok	2,273,303	2,222,496	2,680,000	3,137,299	3,597,299	3,281,580	3,281,580	3,347,00
Singapore	15,940,000	15,520,000	15,570,000	16,940,000	18,410,000	21,329,100	23,192,200	24,796,00
Port of Bangkok	1,063,756	1,073,517	1,069,179	1,136,293	1,174,000	1,318,000	1,550,967	1,486,32
Laem Chabang	1,828,460	2,195,024	2,312,438	2,658,651	3,046,520	3,529,000	3,834,406	4,215,81
Port of Saigon	887,474	763,342	820,492	983,632	1,048,666	1,328,257	1,552,137	2,532,00
Port of Penang	566,409	635,780	604,254	634,042	689,171	771,024	785,289	849,73

A.2. Southeast Asian GDP Data 1978-2007

YEAR / Economies	1978	1979	1980	1981	1982	1983
Indonesia	56535.0766	56473.1804	79636.492	101089.935	103780.377	93795.0395
Malaysia	16358.0822	21213.2682	24468.2209	25004.2858	26804.4975	30130.7485
Philippines	22706.5355	27501.9485	32450.3978	35646.6426	37140.1639	33212.1309
Singapore	7840.89885	9437.77856	11718.0097	13887.2134	15266.1301	17383.7818
Thailand	24152.6922	27534.8716	32353.5148	34846.038	36389.7719	40042.798
Vietnam	6531.70539	7140.0776	2395.49976	1884.5432	2190.29745	3288.74972
Total	134125.011	149301.125	183042.135	212358.658	221771.238	217853.248
Average	16765.6263	18662.6406	22880.2669	26544.8323	27721.4047	27231.656

YEAR Economies	1984	1985	1986	1987	1988	1989
Indonesia	96259.3791	95959.5706	87963.1351	83424.1588	97550.6884	111469.194
Malaysia	33942.9023	31199.6375	27734.115	31601.7577	34695.8829	38847.9701
Philippines	31408.4772	30734.2666	29868.3635	33195.9738	37885.4853	42575.2166
Singapore	18774.6533	17691.2938	18032.3319	20688.3404	25661.4781	30428.533
Thailand	41797.6465	38900.5632	43096.7739	50535.4464	61667.255	72251.0564
Vietnam	5068.65741	4785.0165	5055.9064	5327.93061	5791.73091	6293.31094
Total	227251.716	219270.348	211750.626	224773.608	263252.521	301865.281
Average	28406.4645	27408.7935	26468.8282	28096.701	32906.5651	37733.1602

YEAR Economies	1990	1991	1992	1993	1994	1995
Indonesia	125720.198	140819.376	152846.749	173602.04	194352.05	222081.512
Malaysia	44024.5852	49134.8069	59151.6785	66894.5785	74482.4249	88832.7064
Philippines	44311.5938	45417.5062	52976.3622	54368.2009	64084.541	74119.7951
Singapore	36901.3903	43190.0669	49862.2849	58354.7066	70608.8002	83931.9164
Thailand	85360.9743	98249.0144	111452.745	125010.688	144306.069	168018.562
Vietnam	6471.7449	7642.39651	9866.99775	13180.9537	16281.1807	20736.258
Total	342790.486	384453.169	436156.817	491411.17	564117.066	657720.75
Average	42848.8108	48056.6461	54519.6022	61426.3963	70514.6333	82215.0937

YEAR Economies	1996	1997	1998	1999	2000	2001
Indonesia	249811.406	237043.506	104866.012	153819.513	165021.02	160446.942
Malaysia	100849.682	100169.144	72175.3145	79148.4211	90319.7368	88001.0526
Philippines	82846.8765	82344.377	65171.4656	76157.1099	75030.7124	71215.636
Singapore	92551.9296	95865.2618	82398.5795	82610.7845	92716.8211	85484.6105
Thailand	181947.627	150891.453	111859.659	122629.746	122725.248	115536.405
Vietnam	24657.5069	26843.6234	27209.6021	28683.728	31172.628	32685.1988
Total	732665.027	693157.365	463680.633	543049.302	576986.166	553369.845
Average	91583.1284	86644.6706	57960.0791	67881.1628	72123.2708	69171.2306

YEAR Economies	2002	2003	2004	2005	2006	2007
Indonesia	195660.606	234772.449	234299.099	281275.72	364459.034	432607.493
Malaysia	95266.3158	103951.842	118461.053	130770.27	148941.288	177890.508
Philippines	76813.9153	79633.5158	86703.1089	98371.4375	116931.405	143356.205
Singapore	88068.484	92349.8675	107405.489	116703.912	132154.665	156140.189
Thailand	126876.919	142640.055	161349.014	176221.707	206247.122	245384.366
Vietnam	35064.1055	39552.5132	45723.5604	52831.982	57982.976	67348.1106
Total	617750.345	692900.243	773941.324	856175.029	1026716.49	1222726.87
Average	77218.7931	86612.5304	96742.6655	107021.879	128339.561	152840.859

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