The Study on Human Resource Demand Forecasting of Shipping and Port Logistics Industry in Malaysia

In Focus of Comparing with Korean Case

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By

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A thesis submitted in partial fulfillment of the requirements for the degree of Master of Shipping Management

The Graduate School of Korea Maritime and Ocean University

Department of Shipping Management

August 2017

Approval Page

This thesis, which is an original work undertaken by Ooi Chew Yong in partial fulfillment of the requirements for the degree of Master of Shipping Management, is in accordance with the regulations governing the preparation of thesis at the Graduate School in the Korea Maritime and Ocean University, Republic of Korea.

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JUNE 2017

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Abstract

This study predicts the short – term manpower demand of the shipping and port logistics industry in Malaysia by applying trend analysis and regression analysis on the relevant industrial indicators. Forecasted results are then compared to the outcomes of the forecasted result for human resource demand in Korea.

Coping with Malaysia's new port development at Straits of Malacca, the over dependency on foreign labour force is highlighted across the mass media. Hence, this study would like to draw focal attention on the urge to gather data from all relevant sub – sectors of shipping and port logistics

industry in Malaysia; and then forecast in detail the total manpower demand for the abovementioned industry. On top of that, this study also aims to provide a specific overview on the changes of employment trends over the years for all sub – sectors relevant to shipping and port logistics industry in Malaysia.

This study utilizes data from ‘ Economy Census Report 2011 – Transportation and Storage Services’ published by Department of Statistics Malaysia which is usually updated once in every 5 year starting from 2000 with reference to the year before. Hence, this paper has used data from year 2000 to year 2010 to forecast the required manpower for year 2011. Result shows that the total short – term forecasted human resource demand for year 2011 is 75, 956 people. Comparing to year 2010, it is a slight decrease of 0.44%.

Meanwhile, the findings of this study reveals that the sub – sectors of shipping and port logistics industry in Malaysia are segregated at the moment. In general, shipping and port logistics industry in Malaysia are delegated to be under Ministry of Transport (MOT) Malaysia, together with road as well as air transport. Data provisions relevant to shipping and port logistics industry in Malaysia are reflected to be segregated as it is inconsistent with industrial standard of the nation. Instead, data is always provided generally under titles such as ‘ Sea Transport ’, ‘ Cargo Handling and Stevedoring Services’, ‘ Storage and Warehousing ’, ‘ Port Operations ’ and the like in various reports for ‘ Transportation and Storage Services ’. Owing to the distinctive characteristics of the mentioned businesses, this study justified that precise and comprehensive data provision in accordance to a nation’s standard industrial code as what we could find in Korean case,

is very fundamental. If Malaysia aims to become unrivalled maritime nation, identifying exact talent gap by investigating all relevant sub – sectors, is necessary.

On the other hand, the research limitation of this paper states that the outdated data as well as small data sample size has restricted the quality of this study. Hence, this study proposes Malaysia to constantly update the statistics for accurate short – term forecasts due to the nature of shipping and port logistics industry which is subjected to cornucopian internal and external influences in this ever – changing world. For a better understanding of the changes in employment trend over the years, we will need more data input. Specifically, bigger data sample could be attained in terms of having data for more industrial variables (such as number of facilities and storages, sales values) and more years.

As a sum, this study intends to call for attention on the specific data provisions for a longer period of time. The former could ensure better overall understanding of the different kinds of business nature and needs within the shipping and port logistics industry; while the latter could more adequately verify the forecasting results obtained. With this, this paper wishes to provide some insights into policy implications for the development of shipping and port logistics industry. To a larger extent, devising good policies which suit the characteristics of respective sub – sectors within shipping and port logistics could definitely facilitate effective nurturing process of talented manpower for shipping and port logistics industry in long term.

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국문초록

본 논문은 말레이시아 (Malaysia) 해운·항만 물류산업의 단기 인력수요 예측에 관하여 연구하였다. 말레이시아 해운 항만물류 산업과 연관된 지표들을 사용하여 추세분석과 회귀분석을 통해 직접적인 단기 인력수요에 대한 예측치를 제시하였다. 그리고 말레이시아 해운 항만물류 산업의 인력수요 예측결과를 한국의 해운 항만물류 산업 인력수요 예측결과와 비교하였다.

말라카 해협의 항만개발이 진행됨에 따라 해운 항만물류 산업의 인력수요가 증가하고 있는데, 외국인 노동력자에 대한 의존도가 높은 것이 문제점으로 지적되고 있다. 이러한 상황에서 본 연구는 말레이시아의 해운·항만 물류산업의 인력수요 예측 정확성을 높이기

위해 관련 데이터들을 수집하여 해운 항만물류 산업의 미래 인력수요를 예측해 보고자 하였다. 이 연구는 말레이시아 해운 항마물류 산업의 세부 업종별 소요인력 추세를 분석하고 이를 통해 산업의 전반적인 인력수요를 예측하였다.

말레이시아의 해운·항만 물류산업들은 독립된 산업영역을 구축하고 있지 않다. 말레이시아의 해운 항만 물류산업은 내륙 및 항공 운송산업과 함께 교통부 (Ministry of Transport; MOT)에서 총괄하여 주관하고 있다. 말레이시아 교통부의 해운·항만 물류산업 유관분야에 관해 집계되는 데이터들은 일반적으로 '해상운송업', '화물하역 서비스업', '물류창고업', '항만관리 및 운영업', 그리고 '운송 및 보관 서비스업'을 포함하고 있다. 해운 항만물류 산업은 다양한 업종을 포함하고 있으므로, 타 산업과 달리 산업의 세부분류에 따른 데이터의 정의 및 분류를 명확히 할 필요가 있다. 이를 위해 본 연구에서는 말레이시아 해운 항만물류 산업의 세부분류의 구분을 한국의 표준산업분류 코드에 기초하여 해당 데이터들을 분류하였다. 말레이시아가 해양강국을 지향한다면 해운 항만물류 산업의 세부업종별 인력 수요와 공급에 대한 조사를 통해 수급상의 정확한 갭을 확인하여야 할 것이다.

또한, 본연구는 말레이시아 해운 항만물류 산업의 단기 인력수요 예측의 정확성을 높이기 위해서 관련 최신 통계자료들을 지속적으로 집계하여 갱신할 필요가 있다는 것을 제안하였다. 해운·항만 물류산업은 급변하고 있는 세계경기에 따라 지속적으로 대·내외적인 영향을 받고 있다. 그러므로 해운 망만물류 산업의 변화의 추세와 미래동향을 정확히 알기 위해서는 산업 내외의 다양한 관련지표의 수집 뿐만 아니라 이들 데이터를 장기간에 걸쳐 확보하는 것이 필수적이다.

결론적으로 본 연구는 장기간에 걸친 양질의 세분화된 데이터의 수집 및 확보 필요성을 강조한다. 말레이시아 해운 항만물류 산업의 세부 업종별 데이터는 다양한 업종의 사업특성과 요구사항을 잘 이해할 수 있도록 해주며, 장기간의 데이터는 예측결과의 정확성을 높여준다. 이 연구는 말레이시아 해운 항만물류 산업에 대한 정책의 실행 방향성을 제시하였다. 본 연구를 통해 장기적인 관점에서 말레이시아 해운·항만 물류산업의 효과적인 인력양성이 촉진될 것으로 기대한다.

Chapter 1 : Introduction

1.1 Importance and Objectives of this Research

Metaphorically, shipping is a faithful, one – of – a – kind, and forbearing servant of the global trade and economy. It plays heavy mass as a part of international trade; and lays a concrete foundation for many fundamental offshore economic activities. Without ships that carry all kinds of cargo across the world's oceans, nations would not be able to trade. And globalization as we are experiencing today where consumers have unprecedented access to an array of goods and services at the ever best fair prices of the moment would remain as a far – fetching dream.

As we know, shipping industry is a volatile market subjected to dynamic environment and fast – changing demand from the people. The profound risks such as fluctuations in bunker prices, the typical cyclical effect of business, seasonal elements and the like have been putting much stress in shipping community to consolidate respective competitive positions. No one could actually bet their last dollar on when the current downturn of the industry will end and hence, to survive through the crisis, adaptability to changes is the key to secure competitiveness. These days, we can easily observe that current economic activities do not veer from the emphasis on skillful human resources with technology know – how on physical resources such as equipment and raw materials. Professionals create state – of – the – art kind of technologies which brings about differentiation and uniqueness of services to safeguard competitive edge over the other competitors. Hence, it is undeniably that human resources are currently perceived as the foundation of sustainable growth and core talent with creative ideas is

taking over the role as deity to beat down other competitors. Owing to such awareness, human resource management of shipping and port logistics industry appears to be of utmost importance.

" China, Malaysia tout new 'port alliance' to reduce customs bottlenecks and boost trade. " (South – China Morning Post, 2016)

" Malacca eyes slice of shipping giant Singapore's business with new $3 billion port. " (CNBC, 2016)

" Malaysia and China ink $7.3bn Melaka Gateway project" (Nikkei Asian Review, 2016)

" Malaysia is an important part of China's Maritime Silk Road. Will Malacca's port initiative shake up the regional port sector?" (Global Ports Forum, 2016)

Above are among the eyes – striking titles for many media such as newspapers in China and Malaysia; or global port as well as shipping forums, especially in the end of last year. Date back to 15th century, Malacca was an essential port for the ancient Silk Road, playing host to Chinese navigator Zheng He. Re-rising to China's 21st century Maritime Silk Road and as part of this Silk Road reboot, Malaysia had gained US$410 million of non-financial direct investment from China in 2015 (South – China Morning Post, 9th April 2016); and US7.3 billion to build a deep seaport under Melaka Gateway project which expected to be the biggest in the region when it is completed in 2025 (Nikkei Asian Review, 3rd September 2016) . Hence, it is evident that due to the strategic location of Malaysia in the middle of East and West trade routes, shipping and port logistics emerged as the crucial national key industries to drive Malaysia's economic and international competitiveness.

Despite the grand investment and favourism by other investors due to strong competitiveness and business-friendly environment, there is much

skepticism on the capability of Malaysia to cope with the future growth of the industry. To illustrate, one of the debatable issues falls upon the heavy dependence on foreign seafarers and services provided by foreign shipping companies. Along with the increase of trades, container throughput and simultaneous implementations of several future shipping plans, also rises in tandem the need to cultivate a local professional labour pool in order to maintain the bright prospects of the field with high value added activities and services. Hence, this paper aims to highlight the particular issue.

In the light of such concern, this study is resolute in addressing the significance of presenting a thorough overview of manpower demand forecasting for shipping and port logistics in Malaysia. Human resource demand forecasting for shipping and port logistics of Malaysia is scarce, especially a comprehensive one that consistently reviews on all relevant sub – sectors of shipping and port logistics in Malaysia. Hence, the current available statistics on labour force of Malaysia's shipping and port logistics are mostly in scattered mode. The deficiency of a complete report which analyses maritime sectors of Malaysia critically is said to have diminished the significance of maritime industry to our nation. Particularly, current surveys and researches usually group shipping and port logistics industry sectors under the big titles " Transport, storage and communications ", " Services " and the like. Thus, the data available at the moment in pertaining to transportation (especially sea transportation) and storage is too wide in scope for us to understand exactly the talent gap of the said field. We will need a more specific report that could enable us to perceive better the necessary amount of best fit manpower. Definitely, this call is for a long – term benefits to the maritime industry in Malaysia. Only by understanding the present discrepancy between manpower demand and supply via study on

previous data, we can then develop appropriate human resource plan accordingly.

Apart from that, this paper would also like to suggest that short – term forecasts would be more meaningful to Malaysia than mid to long term forecasts due to the nature of industry. Especially at this critical moment when we are accelerating our pace to cope with demand for our on-going projects, we require detailed forecasts from time to time in order to maintain flexibility in responding with contingency plans.

In addition to that, this study has also provided a comparison of manpower demand forecasting for shipping, port, and logistics industries between Malaysia and Korea. This aims to provide a few insights on how to raise precision and accuracy of human resource demand forecasting for Malaysia's shipping and port logistics by referring to another nation which emphasizes much on its maritime industry.

The last but not least, adjustment on data transparency concern is also proposed to be done for the sake of learners; and to ease as well as facilitate the future researches. Studies on the past allowed us to better understand the environment that we function with, either internally or externally; as well as when well analysed, allow us to see the patterns, irregularities and intersections that we can reflect further into future or draw a lesson from. Easy accessibility to data by public could at positive end, educate the residents about current growth situation of the nation; and elicit better public participation in driving national growth.

1.2 Methodology and Scope of Research

In order to fulfill the objectives designated by this research, this paper started off with an introduction regarding its importance and objectives. The complexities of nature for shipping and port logistics are first reviewed; followed by the illustration of the scenarios of Malaysia's shipping and port logistics' current position which led to the urge of forecasting manpower demand; and then ended with the description of methodology and scope of research.

On the other hand, Chapter 2 illustrates about the literature reviews on human resource forecasting techniques, human resource forecast in shipping and port logistics, as well as human resource forecast in Malaysia context.

Meanwhile, Chapter 3 focuses on the overview of Malaysia's shipping and port logistics, covering basic information on the total fleet, container throughput, on – going projects and the like. Besides, it also sheds light on the economic value and contribution of maritime industry to the nation's economy

Chapter 4 then, utilizes data from " Economic Census 2011 - Transportation & Storage Services " with reference year 2010 to present trend projections of number of employees for the sub – sectors of shipping and port logistics Malaysia. Data was then analysed by using multiple variable regressions. Depending on the results of multiple regressions, sub – sectors with significant statistical values were then proceeded with single variable regression for the relevant human resource forecast; while sub – sectors with insignificant statistical values were progressed with time series polynomial regression for the subsequent forecasting.

Lastly, Chapter 5 concludes the findings of this research in prior. Following the section, the limitations of this paper were being discussed critically in order to provide insights on the implications as well as directions for future researches.

Chapter 2 : Literature Review

2.1 Theoretical Discussion of Industrial Human Resource Supply and Demand

2.1.1 The importance of Human Resource Planning

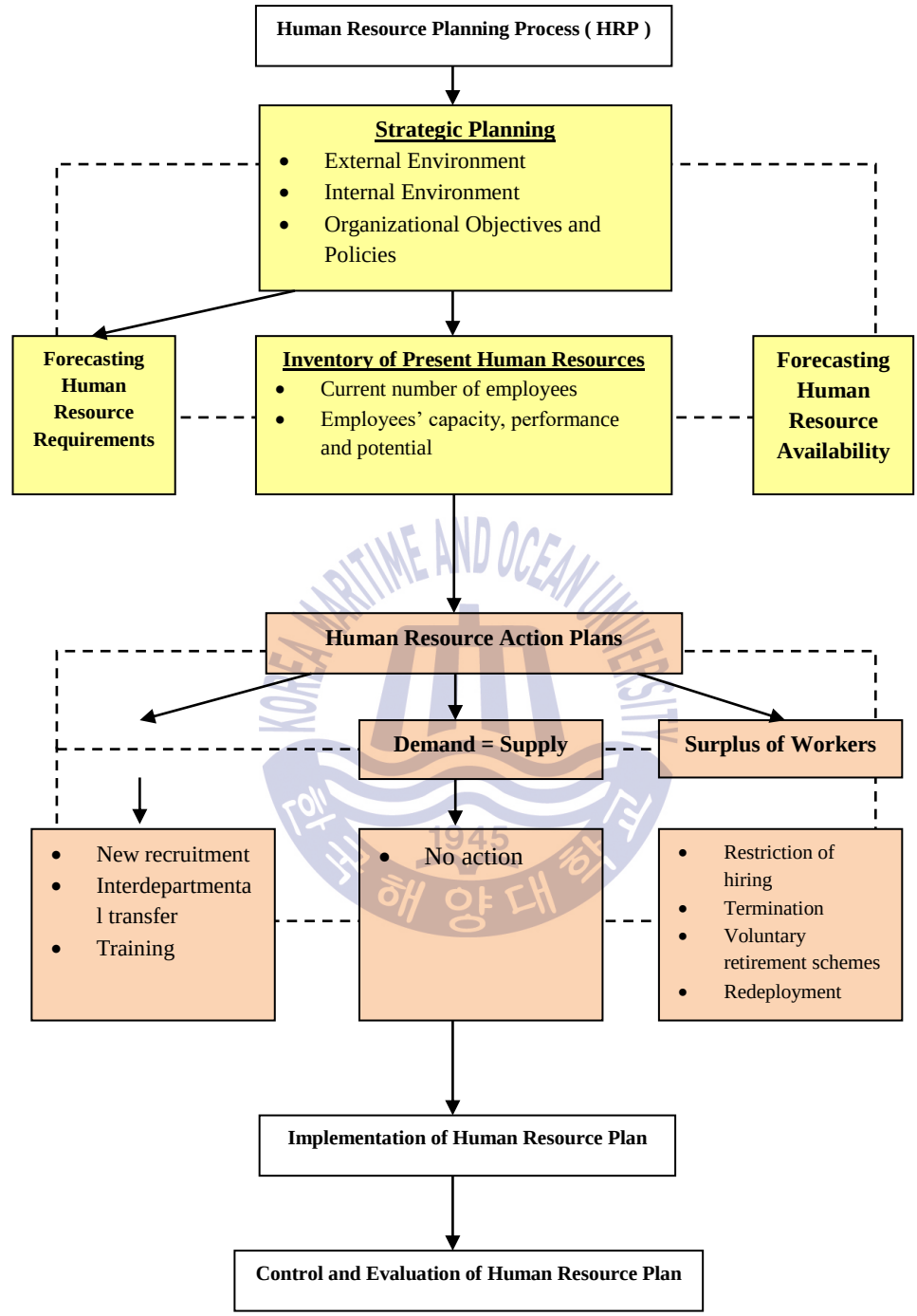
Reginald H. Jones, the former chairman and CEO of the General Electric Company which was acknowledged as the global best – managed company by Fortune 500 in April 1981, once said that *' When we classified. . . [our] . . . businesses, and when we realized that they were going to have quite different missions, we also realized we had to have quite different people running them.'* (Fombrun, C., 1982) It is then much palpable that a vast range of skill categories are needed to suit industrial demands. Here the human resource forecasting comes into play as the lubricant greasing the mechanism of labour market. To illustrate, human resource forecasting is appreciated for its foresight of diagnosing the inequality between demand and supply of particular skills in the labour market (Wong, J., Chan, A., & Chiang, Y. H., 2012). In addition to that, a holistic employment outlook is definitely a responsive buzzer to alert the industry about future skill deficiencies; a reliable beacon to enlighten an organization for wise choices on human capital investments; as well as a resourceful guidebook to the policy makers in devising human resource plans (Neugart, Michael; Schömann, Klaus, 2002). Justifiably, developing plan for making up the requirement of forthcoming manpower with desired skills is apparently the major concern of those committing themselves in human resource planning.

Industrial employment is notoriously strenuous to model as it grows in parallel with many other influential elements such as technological advancement, evolvement of industrial structure, industrial shifts, societal changes, shift in purchasing trends of the consumers and the like. Indeed, our industrial environment is in a constant state of flux and the dynamicity has incited the adjustment of manpower supply and demand pattern in order to serve the global needs. In adapting to the fast-changing world, an organization should be able to decode flexibly and quickly to the signals of changes in the market. Somehow if the balance of supply and demand of labour force could not be observed strategically; and the right man with the right skills failed to fall in place at the right time, then the scarcity of adroit manpower could probably put the organization effectiveness in jeopardy due to the snag of productivity; while a glut of human resource supply is actually squandering away our public resources (Hilleberandt and Meikle, 1982; Kao, C., & Tau Lee, H., 1998). Human resource has been all the whiles, being deemed as a promising source that can contribute to the sustained competitive strength of an organization by being scarce, unique, irreplaceable and valuable to the organization (Barney, J.,1991; Wright, P. M., McMahan, G. C., & McWilliams, A., 1994). Consequently, human resource management has become a dominant factor in securing competitive advantages.

Further into details, the labour supply and demand outlook is in line with the signals emanating from the contemporary labour market, indicating if there is supply – demand imbalance. In the manpower supply and demand management, the manpower supply and demand outlook cues the next course of action by labor market as well as the education and training market. In particular, the human resource forecast by industry postulates

new employment information such as labour market trend, rate of employment change, job replacement and expansion rate and so on. On top of that, as a matter of fact, specially catered training could only be devised if and only if training needs could be conscientiously examined (Agapiou, A., 1996). Hence, with the insights evoked by human resource forecasting, a more precise estimates of future employment needs and supply at organizational, regional, or national level so as to ensure the ceaseless supply of exact required labour pool for the prosperous growth of an economy is not without hope. In addition, the future labor market is bound to be affected by past and present industrial structure and technological development, and past and present are the most important criteria for understanding future time, in this sense the supply and demand of manpower can function as a flexible standard in understanding and responding to the future labour market (OECD, 2008).

Figure 2.1 : Human Resource Planning Process and Steps



Source : Author

Developing countries are actively managing at the national level until they reach the demand and supply of human resources. Even though the availability of data needed for labour supply and demand has been more systematically understood than in the past, the labour supply and demand is still under uncertainty of forecasts. The gap between supply and demand does not coincide with the level of human capacity and the capacity of the emission power. Efficient and systematic manpower supply and demand forecast are needed to identify the inconsistencies and anticipate future changes in supply and demand. A variety of techniques are used in manpower forecasting, including the statistical analysis of current trends and the use of mathematical models. At national level, these include the analysis of census statistics; at organizational level, projections of future requirements may be made from sales and production figures. Human resource forecasting forms part of the human resource planning process.

2.1.2 Methodology of Forecasting Human Resource Demand

As being acknowledged, forecasting stems on past experience, data or information; concurrently taking into account contemporary developments and changes in order to probe about future conditions as well as to foresee expected demand as a response to adapt to the environment and to perform optimally.

Not to surprise, there are gargantuan amount of ways to forecast the human resource demand. Wong, J., Chan, A., & Chiang, Y. H., (2012) had classified forecasting means into four major clusters, particularly : time series projection, ‘ bottom – up ’ coefficient approach, ‘ top – down ’ forecasting models, and the market signaling approaches while critically reviewed forecasting models in his paper. To illustrate, time series projection is mainly about extending the trend which illustrates the past behavior of particular demand into future, involving the use of simple linear extrapolation measure to a more convoluted stochastic model for adaptive forecasting, in which more complex methods are believed to constitute better predictions. On the other hand, ‘ bottom – up ’ coefficient approach requires the employee demand of each successive level of an organization, starting from the lowest of the hierarchy to be forecasted in prior; and then tally up the information collected. Aggregating the manpower demand deriving from every single unit serves to represent the outlook of manpower requirements for the overall organization or industry. Meanwhile, a ‘ top – down ’ forecasting model being the predominant used of forecasting mean, indicates that the output of the industry as well as the developments in the rest of the economy such as structural transformations, technical and technological advancements, wage – price mechanism, economic as well as investment policies and the like, are closely related to human resource

demands. Lastly, market signaling approaches were brought into play to avoid exclusive dependence on the trends spelled out by past data. Identification of specific skill requirements and job opportunities is achieved by capturing the market indicators, for example the employment patterns judging from education and training perspectives, information on job enrolments, trend of unemployment rate, movements of relative wages, traditions of screening process by employers and the like.

Undoubtedly, there is a vast range of forecasting methods. And, different researchers have been analyzing the methods and reviewing the literatures with own distinctive ways. Despite of the differences, a principle that remains unchanged is, the prediction of manpower demand rigidly relies upon the organizational objectives, strategic business plans in responding to the dynamic changes of industry and nature of the upcoming organizational activities. Decision on which measure to pursue, usually depends on the considerations like time frame of the forecast, capacity of the organization and the precision of data. To be specifically directed against this, Sutanto E. M (2004) had concluded that the factors affecting the choice of forecasting technique are environment and size of an organization, feasibility of the particular chosen technique against economical or labor market's ambiguities, as well as what possible fortes could be derived from the method used in comparing to other competitors who operate in the same market.

The following table is a summary of the most commonly used and general demand forecasting methods. It is classified into qualitative, quantitative and systematic methods according to the nature of analyzing as well as the complexity degree of calculation methods involved by devoting

due considerations to the real time and dynamic changes in the environments of the organization or industry.

Further into details, qualitative techniques include managerial judgment, expert opinion, Delphi analysis, conjoint analysis, and index analysis :

Managerial judgment

A method involves two approaches to make estimation on the human resource demand, namely 'bottom-up approach' and 'top-down approach'. The former requires line managers to predict departmental needs and the top management forecasts the overall demand based on respective proposals; while the latter allows the top management to forecast for each department and forecast results will be reviewed and approved by the departmental leaders.

Expert opinion

An approach which engages may be a single expert or several experts who are expertise in the field of targeted research. Polling together the response from a few experts to make forecast about a particular scenario is commonly addressed as panel consensus.

Delphi method

A panel of experts engaged in more often than not, a multiple rounds of estimation. Experts judge from own expertise regarding few factors chosen by the researcher, ranging from sales, efficiency performance, production to technological considerations, societal influences, economical aspects, demographical concerns and the like. Participants are prohibited to

meet with each other so as to prevent group thinking and result from each round of estimation is sent back to participants for further adjustments in order to eventually, reach consensus on and being converted into a single standard of result.

Conjoint analysis

Probing users to look into consumers' priorities and considers their favorites in forecasting future demand.

Index analysis

An analysis which uses an economic data set to measure the relative change of an activity over a period of time in comparison to a standard or base value, summarizing the movements that present in a group of related variables such as consumer price index, cost-of-living index (COLI) and the like.

Table 2.1 Qualitative Methods of Demand Forecasting

Qualitative Methods of Demand Forecasting			
	Method	**Strengths**	**Weaknesses**
Managerial Judgement	People in position such as the line managers advise on the amount of human resource needed for their department; or the top management predicts for the overall requirement of an organization	Incorporates knowledge of corporate plans in making estimates	Vulnerable to subjective decision due to variation of personality

Expert Opinion	Panel of experts with experience and knowledge of the enquired field, product or similar product market forecast the human resource requirements	• Suitable for condition where data in the past is difficult to be retrieved • Right expertise is the key to success	Individual biases could lead to doubts on experts' credibility
Delphi Method	Experts go through several rounds of estimates with basically no face – to – face meeting with each other	Incorporates future plans and knowledge of the experts related to market, industry and technical development	• Subjective in nature and hence ignorance of important data might happen in the process of adjusting self position in relative to others • Time consuming is a concern for participants to consider committing themselves in the survey

Conjoint Analysis	• Analyze the perceptions of value and services in consumers' perspective • Understand how customers prioritize a product's features and attributes to secure competitive edge	• Widely used in enterprises with high accuracy • High cost consumer survey required • Particularly suitable for predicting the market response of a new product	In circumstances where survey is poorly devised with abundant of choices, respondents opt for simplification strategies; and might end up making emotional choices
Index Analysis	Compare and evaluate a small number of relevant variables under various conditions for a time period	• Used especially to compare business activity, the cost of living, and employment pattern • Provides fairly close approximation to the underlying trend in a wide range of circumstances	• Suitable for predicting the selection of rare products, such as real estate projects, rather than industrial products • A number of prior studies on selectivity are needed

On the other hand, quantitative techniques can be divided into simulation models, Markov analysis, regression analysis, time series analysis, and diffusion model.

Simulation models

This model served to answer the ‘ What if ’ questions of the interested scenarios by analyzing the probability distributions of a range of parameters for an event. Users are made to understand how a system could function in overall under the numerous hypotheses made.

Regression analysis

A statistical method with mathematical applications to scrutinize the causal relationships between numerous measurable output factors of an organization and its employment level, in which the former will be independent variables of the analysis and the latter constituting the dependent variable.

Time series analysis

Highly utilized in macroeconomics and finance is a typical forecasting model developed to forecast by taking into account the latent trend, cyclic, and seasonal circumstances (Bryant, D. R., Maggard, M. J., & Taylor, R. P., 1973). The forecaster is supposed to be cognizant of some repetitive or continuing patterns displayed by data in the past; and then, map it onto future time frame for getting the figures of the upcoming requirements. However, there is controversy on the assumption of continuity from the past to future as discontinuity will lead to hefty forecast inaccuracies.

Diffusion model

Especially used to forecast the demands for new products and new technologies by assuming consumers' initial purchase is linearly proportionate to the number of previous buyers.

Markov Analysis

Useful tool which helps to develop transition matrix by identifying the movement trends of the employees especially in the internal environment of an organization.

Table 2.2 Quantitative Methods of Demand Forecasting

Quantitative Methods of Demand Forecasting			
	Method	**Strengths**	**Weaknesses**
Simulation models	Predicts the upcoming employment needs by modeling the transformation of system over time according to their mathematical or logical relations as well as the probabilities of future events	• Makes several assumptions that fits the configurations of research interests about the future demand • Can simultaneously examine multiple factors regarding the external and internal environment of a system	Costly and complicated due to detailed data requirements

Regression Model	• Statistical analysis on the correlation between independent and dependent variables by allowing adjustment of seasonal elements • The closer the correlation value is to either -1 or 1 rather than 0, the easier is the relationship between two variables to be predicted • The nature of relationship is depicted by the positive or negative sign of the correlation number	• Easy to know the sensitivity of variables, especially strength and movement of a linear relationship between two variables • Can be used to measure the sensitivity of changes in the external environment which prone to stimulate uncertainties in an industry. • Easily applied by using Excel	• Fairly large sample size is required for a statistically significant result • Fundamental statistical and analytical skills are needed to run the regression analysis and to understand the result analyzed

Time Series Analysis	Causal relationship modeling with variables and time lags; and then extrapolates the trend into future	• Adequately trustworthy, comparably simple and inexpensive in fields where historical data collection is easy • Avoids the influx of individual judgments into forecasting	• More suitable for producing short term forecasting due to its limited forecast approach • Requires larger and more long –term data sample than other forecasting methods to make results statistically significant • Lack of insights into the influences that provoke the variations of manpower demands and occupational structure such as governmental policy

Diffusion Model	Models the adoption process of new products or technologies in a marketplace	• Illustrates the life cycle of S – shaped growth for a new product or technology • Reflects the impact of marketing on sales by depicting the interaction between innovator and imitator buyers	Assumes constancy over long time period for the parameters in model is impractical in realistic world
Markov Analysis	• Probabilistic method of capturing the employment movement	• Data driven on 2 approaches to provide clearer forecast for a period of time ➢ <u>Stock approach :</u> (Quantities in a point of time) ➢ <u>Flow approach :</u> (Comparing the quantities that change over a period of time)	• Assumes that nature of jobs has not changed over time • Not suitable for companies with high turnover rate

Systematic techniques can be divided into market outlook forecast, system dynamics, and artificial neural network in detail.

Market outlook forecast

This technique functions by studying the historical projected behavior of the market participants based on the combination of both "soft" indicators like surveys and interviews for consumers' sentiment, and "hard" indicators such as sales volume, value of assets, production amount and the like.

System dynamics

Employs a broader scope of database compared to other numerical and statistical models is an especially meaningful mean to understand and gain insight of a messy situation by illustrating the causal loop diagrams.

Artificial neural network

Illustrating the biological brain function, ANN is a computational method that studies interconnections among a large collection of related simple units called artificial neurons. Various strengths of connections between neurons denote discrete relationships of neurons to the different phases of each system.

Table 2.3 Systematic Approach of Demand Forecasting

Systematic Approach of Demand Forecasting			
	Method	**Strengths**	**Weaknesses**
Market Outlook Forecast Information	Collects information pertaining to the behavior of market participants	Devine to detect real time changes of products and exogenous factors for a long term	Big sample of market participants are fundamental for the derivation of statistically significant results
System Dynamics	Portrays the dynamic changes of a complex process by modeling the causal relationship between variables.	Showcases the system behavior and probe the contexts under which the researched system will evolve; and towards which direction	• Projected results are somehow subjective due to cultural, political and value differences • Condition with plenty variables could be sophisticated to be interpreted
Artificial Neural Network	Locates, predicts and generalizes the underlying patterns between generated data sets.	• Being non linear model, it is ideal and flexible enough for classifying and recognizing the causal relationship which is complex and requires a lot of data analysis • Leverages on marketing issues to find future customers	• Derives a result using a certain algorithm without prior knowledge • Lack of explanation of cause and effect relationships

Not least to be mentioned, some other techniques of forecasting include Nominal Group Technique founded by Delbecq and VandeVen which encourages group brainstorming on formulating assessment of a particular context; workload analysis which depicts the necessary workforce for the operation's continuum; ratio trends analysis which calculates the ratio of past data which is relevant to number of employees for the respective category such as production, sales performance, work load, and then estimates the future demands based on the ratio established; Bureks Smith Model which utilizes a mathematical model to forecast human resource in according to a few dominant variables which impact an organization's overall requirement towards manpower; work – study techniques that forecast the manpower demands by dividing the length of operations with actual working hours per employee; and single averaging method which balances among diverse viewpoints perceived.

2.1.3 Overview Projections of Human Resource Forecasting across Nations and the Major Labour Market Models

Aiming to identify the best manpower demand and supply forecasting practices among the OECD countries, Neugart and Schömann (2002) had presented the table below to review the time horizon, frequency of data updates, methodologies, structure of modeling, data used, result application and other features of the manpower demand and supply forecasting for respective countries.

Comparing across the countries, we could notice that the countries shared both common and distinctive features. To illustrate, most nations practice medium – term forecast in a time horizon of between five and ten years, without placing much emphasis on latest information, seasonal elements or short – term business cycle effects. On top of that, there is also issue of time lag inherence issue in the statistical forecasting model. For the sake of hedging from those impacts stimulated by latest short-term changes, increasing number of countries have opted for a yearly or biannual update of the forecasts. Despite so, Austria, France and Spain still practice irregular updates of information.

Table 2.4 Overview of Projections on Manpower Demand and Supply Forecasts in OECD Countries

	Austria	Canada	France	Germany	Great Britain
Time horizon	2000–2005	2000–2004	2000–2010	1999–2010	2001–2006/2010
Interval for updates	Irregular in past	5 years	Irregular	5 years	1 year
Major data sources	Census and census sample, socio-economic database, national accounts, companies' databases, micro-data from unemployment insurance and social security systems	Census, monthly labour force survey	Labour force survey, national accounts	Labour force survey, national accounts, social security records	Census, labour force survey combined with industrial data for employment status and gender, derived from establishment-based surveys
Who pays for the forecast?		Labour Ministry (HRDC)	Ministry of Employment in internal research service department	Federal and regional governments	The research institute originally funded by the Department for Education and Employment
Who does the forecast?	Independent research institutes (WIFO, IHS)	Independent research institutes; federal forecasts are supplemented by regional and sectorial forecasts	Statistical and Economic Research Department of the French Ministry of Employment (DARES)	Independent research institutes and federal research institutes	Independent research institute (IER)
Who uses the forecast?	There doesn't seem to be a high demand for formal forecasting results.	Federal government for training programmes; sector councils to assess training needs, develop curricula and occupational standards and evaluate effectiveness of training efforts; career counsellors and individuals	State and regional government, social partners and specialized committees	Mostly for governmental use	Policymakers; sub-models exist which allow policy simulations on the regional level
Implementation	Only weak implementation of results; quality assessment through informal knowledge and knowledge of practitioners	Federal Labour Ministry, Provincial Ministries of Education or Labour Ministries	National Ministry of Education and regional governments in charge of further training policies	Differences in the implementation between regions; no close links for the use of regional and national forecasts	Department for Education and Employment delegates responsibility to profit-making local partners that receive public funding; non-corporatist approach
Other features (access to the forecasts, particularities of the forecasts)	Special short-term quantitative prognosis for the apprenticeship market	Widespread use of forecasts; hardcover and Internet version; CD-ROMs are distributed to schools	Links between education and labour ministries in implementation fostered	Limited transparency and accessibility	Additional special survey on skill shortages

Source : Neugart and Schömann (2002)

Table 2.4 (Cont.) Overview of Projections on Manpower Demand and Supply Forecasts in OECD Countries

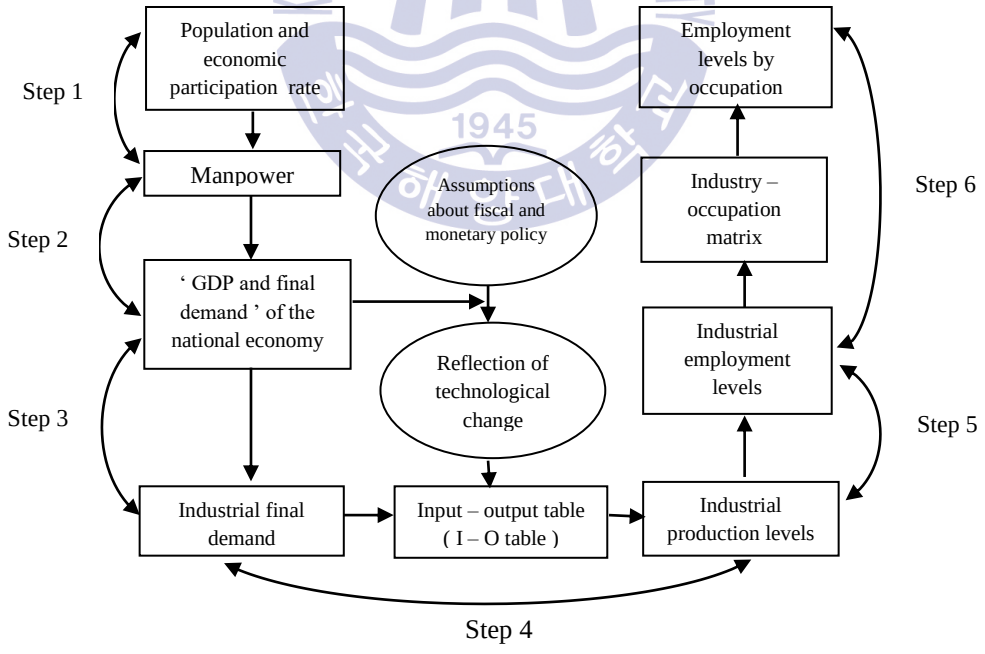
	Ireland	Japan	Netherlands	Spain	USA
Time horizon	2000–2005	1998–2010	2001–2006	2000–2010	2000–2010
Interval for updates	2 years	5 years	2 years	Irregular	2 years
Major data sources	Annual labour force survey, quarterly national household survey	Census, basic survey of employment structure	Labour force survey	Labour force survey and national accounts	Census, labour force data, employment statistics
Who pays for the forecast?	National Employment and Training Authority (FÁS)	Ministry of Labour	Ministries of Research, Labour and Agriculture; Central Employment Board; LDC Expertise Centre for Career Issues	Foundation, and a regional government in case of regional forecasts	Ministry of Labour
Who does the forecast?	Independent research institute (ESRI)	Research Committee for Employment Policy	Independent research centre (ROA)	Research institute	Statistical Institute of the Ministry of Labor (BLS)
Who uses the forecast?	Government and state agencies for planning employment and education policies; guidance for science, technology and innovation policies; firms and trade unions; career counsellors; individuals	One of the major resources for the discussion of employment measures	Ministries of Research, Labour and Agriculture; individuals for educational choices; firms to forecast supply shortages; employment offices	Little established discussion beyond expert groups so far	Government agencies for training, education and immigration policies; career counsellors; firms; individuals
Implementation	Department of Enterprise, Trade and Employment; Department of Education and Science; social partners are represented on the board of FÁS	Government, social partners	Much involvement of social partners in planning and design of qualification profiles	Mostly through national training institute and local governments	Responsibility on the state level
Other features (access to the forecasts, particularities of the forecasts)	Gender sub-model	Large governmental commission presents results and spurs public debate; part of the economic outlook debate	Besides the general occupational outlooks, the perspectives of school-leavers are shown	Simple macro-economic projection methods to derive a baseline projection for skill needs	Much of the material can be obtained from the Internet; every state is required to produce state employment projections

Source : Neugart and Schömann (2002)

On the other hand, among the countries that being acclaimed for applying the finest labor supply and demand forecast are Australia, Canada, United States, United Kingdom, Germany, and Netherlands which have used macroeconomic model as their bedrock to forecast labor supply and demand (Boswell, C., Stiller, S., & Straubhaar, T., 2004).

The medium – term forecasting model of Bureau of Labor (BLS) in United States which is revised biannually every 10 years is appreciated for its deeply disaggregated projections by industry – related factors such as cumulative growth of the economy, GDP by consuming sector and product, inter – relationships of the industry, labour force levels, participation rates by demographic characteristics and the like. BLS is favoured for its easy accessibility by the public. However, this approach is apprehended for the concern of imbalance prospects which are prone to demand side.

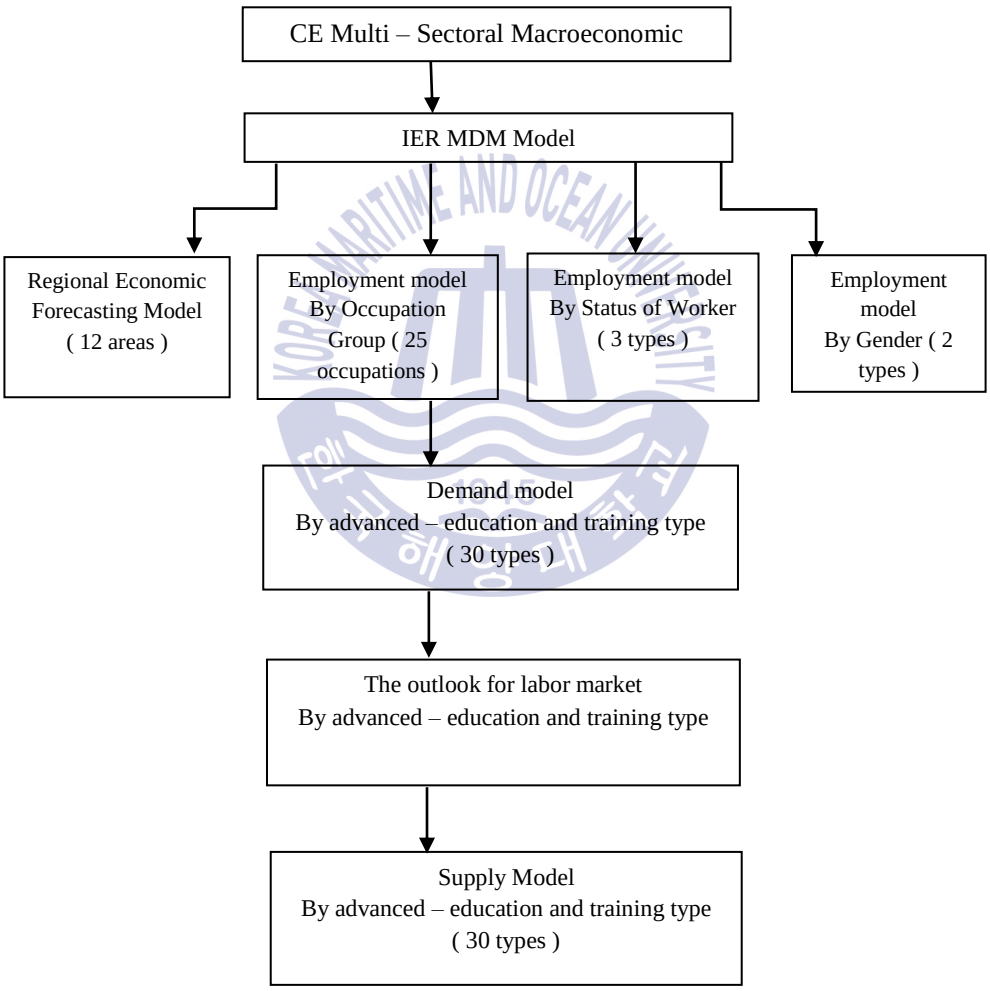
Figure 2.2 BLS's Model of the Employment Projections



Source : Shin, Y.J., Ryoo, D.K., Kim, H.D., Kim, G.H., Lee, S.Y., Karimi, J. (2012)

The Institute for Employment Research (IER) model in England has a forecast period of 10 years, projecting changes in the relative shares of varied occupations within each industry by considering the employment adjustments in the economy as a whole, changes in the share of respective industries; as well as breaking down employment by occupation and employment status.

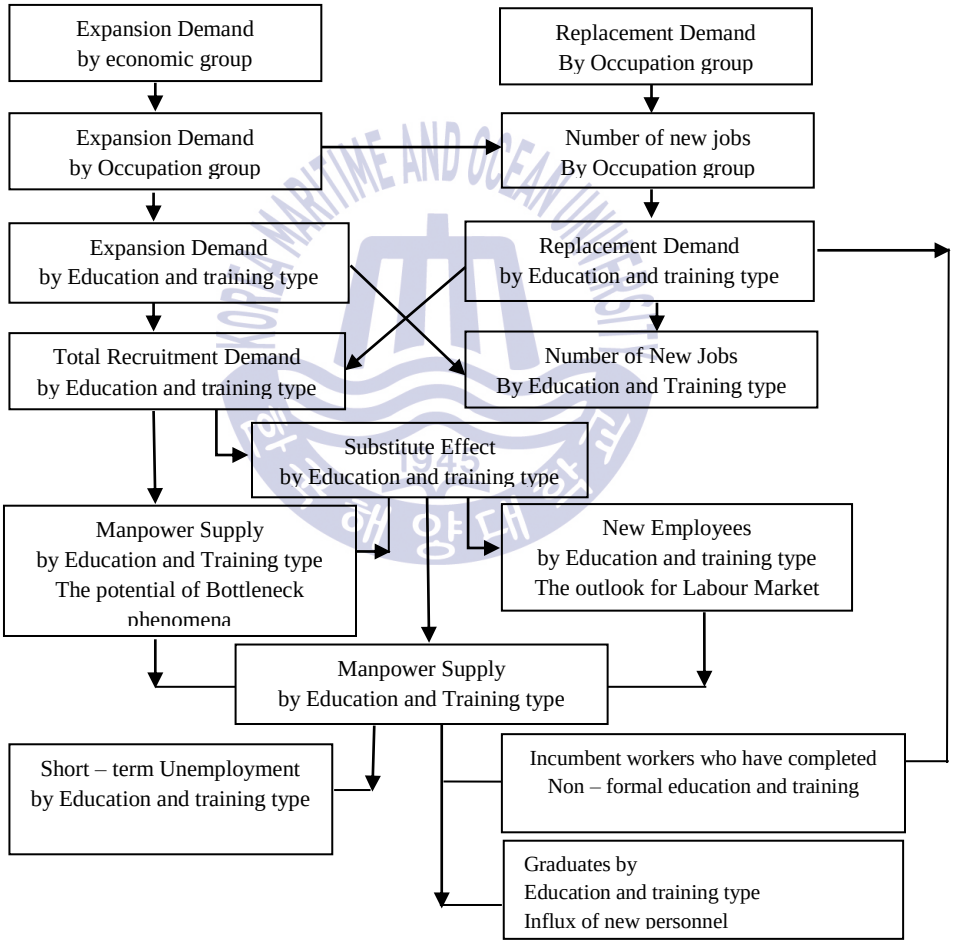
Figure 2.3 IER's Local Economy Forecasting Model, LEFM



Source : Shin, Y.J., Ryoo, D.K., Kim, H.D., Kim, G.H., Lee, S.Y., Karimi, J. (2012)

The ROA (Researchcentrum voor Onderwijs en Arbeids mark) of Netherlands accentuates on information provision with two – year renewal in every five years. ROA is prone to quality forecasting rather than quantitative forecasting (Shin, Y.J. et al., 2015), emphasizing on sophisticated modeling of labour market issues which is a benign to reducing skills shortages and educational investments; rather than explicitly devoting to the figures of overall occupational demand and supply.

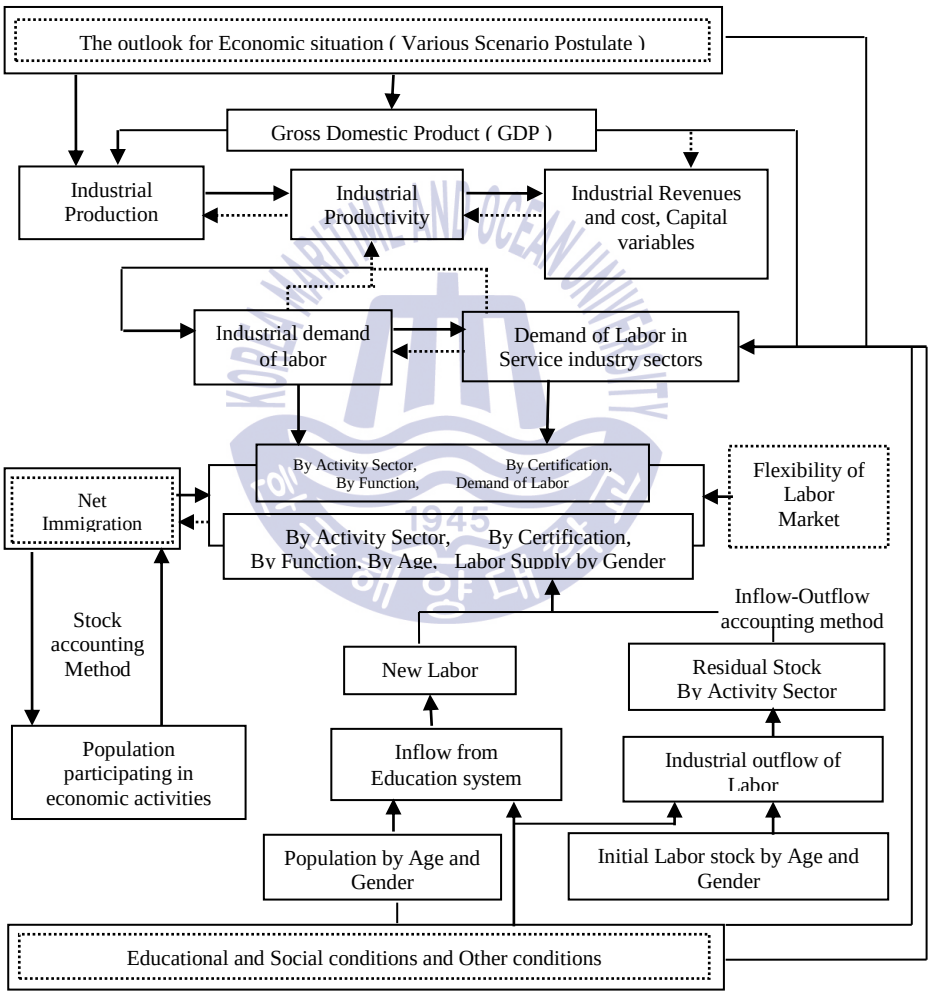
Figure 2.4 ROA's Labour Market Model



Source : Grip, A. de & J. A. M. Heijke(1998), *Beyond Manpower Planning: ROA's Labour Market Model and Its Forecast to 2002*, Maastricht: ROA.

In Germany, the IAB (Institute for Arbeit und Berufsforschung) model predicts labor demand by industry sectors and forecasts labor demand by fields of activity. Unlike BLS, it does not emphasize much on forecasting labor demand for educational and training purposes. 30 year long term perspective model depicts the drawback on time concern in responding to changes.

Figure 2.5 IAB's Labour Market Model



Source : Michael Neugart and Klaus Schomann eds 2002, Forecasting Labour Markets in OECD Countries, Measuring and Tackling Mismatches, Cheltenham, UK : Edward Elgar, pp. 18 – 19

Centre of Policy Studies (COPS), a research centre at Monash University is assigned to forecast the labour market in Australia. Since 1994, COPS system has been providing a biannual briefing service to their government agencies who responsible for vocational education and training in Australia. Australian's relatively advanced forecast is done on an enormous set of data, ranging from national accounts, population census and foreign trade statistics to income and expenditure surveys. In addition to that, application of a CGE model in their approach has also reflected their state-of-the-art economic modeling of quantitative forecasts (Boswell, C., Stiller, S., & Straubhaar, T., 2004)

Being an integrated demand and supply model, the Canadian Occupational Projection System (COPS) which is devised by Human Resources Development Canada (HRDC), is capable to forecast for 139 occupations and 5 broad skill categories, focusing on shortages and surplus projections by occupations and level of education. The Federal-Provincial partnership engaging all 10 Provinces is a positive example of enhancing the quality of forecasts by concerted effort from all levels of the nations.

Results of the manpower supply and demand forecasting are constructive for a wide range of parties and industries, from education and vocational training academies, employment services agencies, human resources planners to employer and employees association, depending on the respective nature of results being postulated by different approaches pertaining to forecasting manpower supply and demand.

2.1.4 Functions of Labour Market Outlook

Generally, the functions or significance of labour market outlook could be classified into two, namely policy function and information function. Policy function indicates how the outlook could provide insights to government or other relevant policy makers of an organization in formulating policy for the operations and development continuum; while information function refers to how labour market could provide meaningful information to educational institutions and job seekers regarding workforce mobility, educational as well as skill requirements for various job entry and the like.

Traditionally, the labour market outlook played a heavy mass on policy function, but as time goes, the information function is gradually expanding. This is due to information on employment prospects and future changes in the job world could help to minimize the various costs incurred for matching the right skills with right demand and at the right timing; as well as improving the overall efficiency of the industry by contributing to knitting the disparity between demand and supply.

Table 2.5 Functions of Labour Market Outlook

Functions	Purposes	Remarks
Policy Function	Development of human resource with the required skills	Formulation of curriculum and the specifications of education and training programs in adjusting to the labour market trend and taken impacts of technology into considerations
	Employment policies such as training and retraining, collective bargaining strategies, labour regulations, agreement settlements and the like	Provide insights from studies on the skill composition of the labour market, participation rate and productivity, wage index, career pattern, employment and unemployment rate, job creation measures and more
	To devise appropriate industrial policy	Governance of the investment size on various industries of the nation in promoting balance between demand and supply of manpower towards securing competitive advantages for prolonged economic growth
Information function	Career path and career choices	Enabling the students, employees and job seekers to develop career plans by understanding future skill requirements for various occupations
	Career guidance and career counseling	Enabling the students, employees and job seekers to understand location of job vacancies; as well as matching the educational and skill requirements of these job openings with own experiences and academic background
	Employment research and direction of future education development	Provide vision into future academic researches

2.1.5 Previous Researches Pertinent to Forecasting Human Resource Demand and Supply Plan

Table 2.6 Summary of Previous Researches on Forecasting Human Resource Demand and Supply Plan

Author / Publisher (Year of Publish)	Title of paper	Analysis Approach	Important remark (s)
Milkovich, G. T., Annoni, A. J., & Mahoney, T. A. (1972).	The use of the Delphi procedures in manpower forecasting	Delphi procedures	This paper made use of systematic expert judgment in generating manpower forecasts; as well as analyzed the informational elements used by expert panels when they involved in Delphi procedures.
Freeman, R. B. (1976)	A cobweb model of the supply and starting salary of new engineers	Cobweb model	This study utilized cobweb model which is fitter for overall market dynamics and emphasizes on the relatively fixed time delay between the choice to engage in engineering and exact entrance into the labor market. Results indicates that the supply of new entrants to engineering over the period 1948-72 is highly responsive to economic conditions and proposed the needs to develop detailed econometric models in forecasting future manpower demand.

Kwak, N. K., Garrett Jr, W. A., & Barone, S. (1977)	A stochastic model of demand forecasting for technical manpower planning	Stochastic model. Bayesian decision analysis	This research presented a short – term demand forecasting for a particular functional skill group by using stochastic technique which allows selective changes on the number and level of multi – project demand curves.
Harvey, E. B., & Murthy, K. S. R. (1988)	Forecasting manpower demand and supply: A model for the accounting profession in Canada	Macro – econometric model with judgmental adjustments	This paper demonstrated a method which was named as data-to-the-model approach by using combinations of results from large macro econometric models (derived from available occupational data) with judgmental values (in the absence of data) to give us the desired results in forecasting manpower.
Lin, C. T., Wang, S. M., & Chiang, C. T. (2001)	Manpower supply and demand of ocean deck officers in Taiwan	Markov Transition Matrix and Grey Model	This paper targeted to forecast the annual total quantity of supply of every level in the hierarchy of deck officers; as well as to forecast the annual total demand for deck officers.
Wong, J. M., Chan, A. P., & Chiang, Y. H. (2005)	Time series forecasts of the construction labour market in Hong Kong: the Box-Jenkins approach	Time – series Box-Jenkins approach to develop Autoregressive Integrated Moving Average	This research analysed and forecasted Hong Kong's five key indicators in the construction labour market : productivity, employment level, unemployment rate,

		(ARIMA) models	underemployment rate and real wage. It was revealed that the proposed forecasting models have reasonably good predictive performance except for construction employment, and the most accurate model is the construction real wages.
Wong, J. M., Chan, A. P., & Chiang, Y. H. (2007)	Forecasting construction manpower demand: A vector error correction model	Johansen's Co-integration Test and Vector Error Correction (VEC) model	This study aimed to set up a long term relationship between the aggregate demand for construction manpower and a range of inter-related economic variables; and it managed to find out that the most effective factors in examining the demand of construction manpower are construction output and labour productivity.
Dubra, E., & Gulbe, M. (2008)	Forecasting the labour force demand and supply in Latvia	Econometric model	This paper analysed the problems of Latvian labour market so as to realize its possible development by using an econometric model which forecasts labour force demand and supply that covered up to 120 professions, 15 separate sectors, 37 aggregated groups of professions for the time period 2007–2030.
Sang-Hyun Park, Sang M. Lee, Seong No	A dynamic manpower forecasting	System Dynamics (SD) simulation	This study intended to establish an integrated model which

Yoon, Seung-Jun Yeon, (2008)	model for the information security industry	model	consolidates three dominant factors (feedback structure, time lags, and a flexible saturation point) to forecast manpower for the information security (IS) industry
Scheffler, R. M., Liu, J. X., Kinfu, Y., & Dal Poz, M. R. (2008)	Forecasting the global shortage of physicians: an economic-and needs-based approach	Economic-and needs-based approach	This paper forecasted the future demand of physicians in WHO region, to determine where likely shortages will occur by 2015 (the target date of the Millennium Development Goals) from both needs – based and demand – based views (Needs – based model was used for the former while econometric model was used for the latter). Results indicated that some countries experiencing a needs-based shortage, some facing a demand-based shortage, or both.
Barber, P., & López-Valcárcel, B. G. (2010)	Forecasting the need for medical specialists in Spain: application of a system dynamics model	System Dynamics (SD) simulation model, Delphi method	Realising the fact of Spain undergoing a change of trend from surpluses of medical doctors to current shortage, this study created a supply and demand/need simulation model for 43 medical specialties in Spain by using system dynamics. Delphi method was used by experts to set the ratio of specialists

			needed per 1000 inhabitants. Result then disclosed the specialties with the greatest medium-term shortages out of the 43 specialties studied.
Chung, S. H., Jung, D. C., Yoon, S. N., & Lee, D. (2010)	A dynamic forecasting model for nursing manpower requirements in the medical service industry	System Dynamics Simulation	By using SD, this study proposed a forecasting model of supply and demand for nursing manpower. Model developed from SD was believed to be valuable and practical in modeling long-term decision-making for dynamic management.
Ho, P. H. (2010)	Forecasting construction manpower demand by Gray model	Single – variable first-order Gray model	In accordance to the issue in which most of the accurate forecasts models usually require a colossal amount of data; or require the data to follow a particular distribution pattern when there is sufficient amount of data, this paper explored the use of the gray model in forecasting construction manpower based on a limited amount of data. It also managed to prove Gray model's accuracy when being applied in forecasting other time series under the condition with limited available data.

2.2 Human Resource Forecasting of Maritime Industry

Due to the accelerating world fleet, increasing number of advanced as well as technically sophisticated ships and port operation systems to meet the growing seaborne trade, professional manpower either on board or offshore is of utmost importance.

2.2.1 Forecasted Seafarers Shortage by BIMCO / ICS

In accordance with BIMCO / ICS MANPOWER's latest 5 – year forecasting report, the Supply / Demand Balance of manpower in 2015 is as shown in Table 2.7. The estimated global supply of seafarers in 2015 is at 1,647,500 people, of which 774,000 are officers and 873,500 are ratings.

Table 2.7 Summary of the Estimated Global Supply of Seafarers 2005 – 2015

Rank	**2005**	**2010**	**2015**
Officers	466,000	624,000	774,000
Ratings	721,000	747,000	873,500
Total	1,187,000	1,371,000	1,647,500

Source : BIMCO

Meanwhile, a total of 1,545,000 seafarers are estimated as the global demand for seafarers in 2015, with approximately 790,500 officers and 754,500 ratings being required by the industry. Table 2.8 shows the summary of estimated global demand for seafarers from 2005 to 2015.

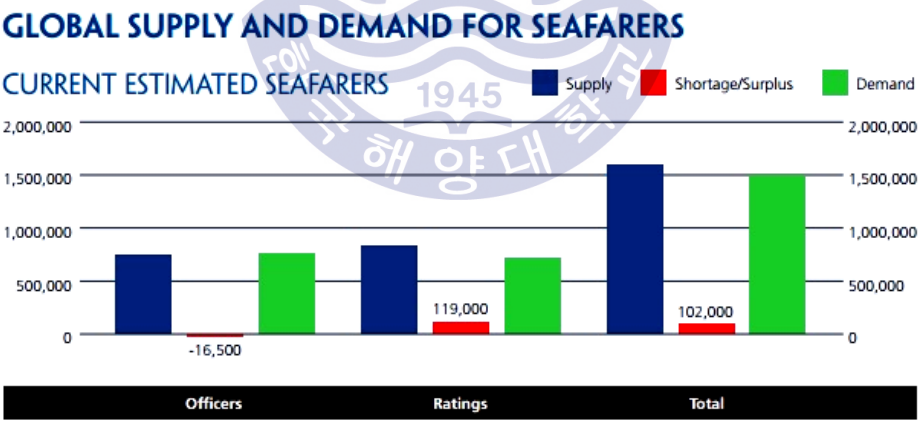
Table 2.8 Summary of Estimated Global Demand for Seafarers 2005 – 2015

Rank	2005	2010	2015
Officers	476,000	637,000	790,500
Ratings	586,000	747,000	754,500
Total	1,062,000	1,384,000	1,545,000

Source : BIMCO

Inductively, a shortage of 16,500 officers and a surplus of 119,000 ratings could be observed from the current supply-demand context, with an overall surplus of 102,500 seafarers. A summary is depicted by the graph in Figure 2.6 below.

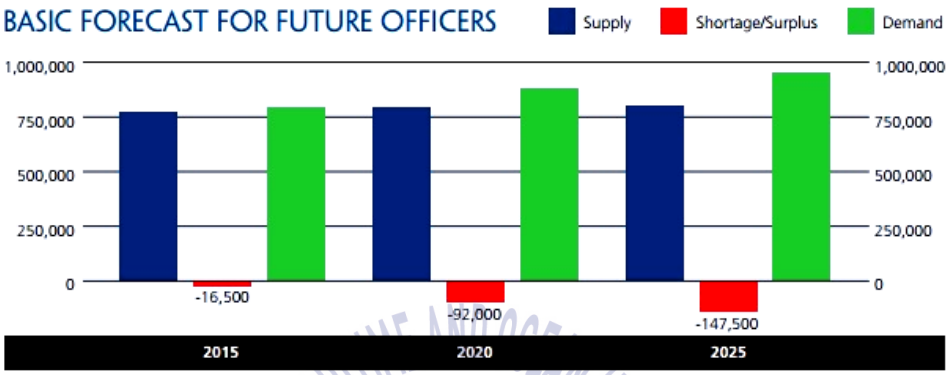
Figure 2.6 Estimated Future Supply – Demand for Seafarers 2005 – 2015



Source : BIMCO

Projected the trend into year 2025, a shortfall of 147, 500 officers is then forecasted. Figure 2.7 shows the shortfalls of officers in 2015, 2020 and 2025 respectively.

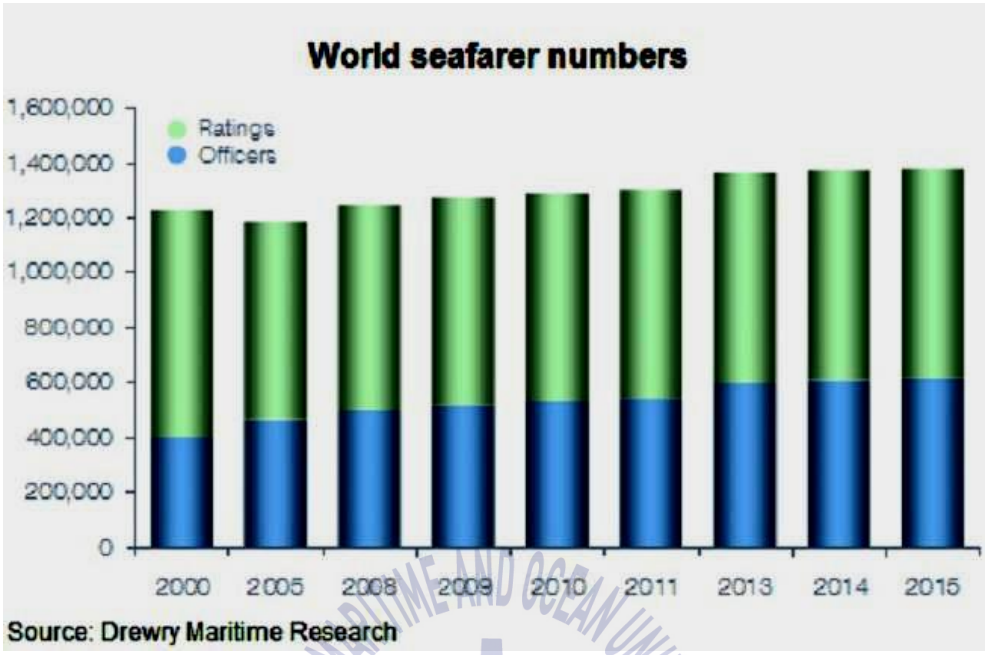
Figure 2.7 Estimated Future Supply – Demand for Officers by 2025



Source : BIMCO

Following the forecasting report by BIMCO / ICS, Drewry's Manning Report (2015) then recapped the order of ship officers by that moment to be at 615,000 people; and there is a nominal shortfall of approximately 15,000 officers. Assuming that to remain until 2019, shipping industry by then will require additional 42,500 officers.

Figure 2.8 World Seafarer Numbers



However, Drewy's 2016's release which dated 23rd June 2016 indicated that the shortage of officers might be eased by the slow growth of global shipping fleet. In specific, the shortcoming of officer supply was forecasted to recede from 20,900 at the end of 2015 to 7,700 by the end of 2020. Despite so, there is still gap existence between supply and demand. And, human resource or human element remains, undeniably, the concrete foundation for upgrading the value of shipping industry and sustaining the maritime transportation system.

2.3 Human Resource Forecasting in Malaysia

2.3.1 The Beginning of Human Resource Planning

Contemplate retrospectively, one of the few spearheading projects relevant to manpower planning in Malaysia was credited to the large – scale manpower survey done by federal government in 1965 that included both public and private sectors. The particular survey assisted by United Nation, was duly designated to better prepare Malaysia for her First Malaysia Plan especially from the perspectives of manpower and education. The findings addressed a forcible plea for attention being placed on the deficiency of highly skilled and educated labour pool for attracting private investment; and meeting up the production as well as employment demands of the plan (Mehmet, O., 1972; Morris, D., Wood, G., & Yaacob, A. Y. (2001)). Accordingly, unparalleled priority was devoted on leveraging a series of training programs and vocational as well as technical courses for developing the required qualified manpower.

Undoubtedly, developing from a ruling commodity producer, Malaysia is now a principally industrialized country: the manufacturing sector accounted for around 35 percent of GDP. Not until later when Malaysia's competitive advantage of being preferred platform for low-cost mass production was fraught by Japanese semiskilled operations and China's comparatively lower cost, Malaysia realized about the lust for moving from sweatshop tenure to managerial mode in order to secure highly value added production paradigms.

Walking into year 2017, Malaysia is currently tapping into its 11th Malaysia Plan. For your information, Malaysia Plan is a comprehensive blueprint of government development policies and strategies, each covering a 5 – year agenda starting from the first in year 1965. Almost all of the

Malaysia Plan implemented had focused on education and employment issue back in the nation. To illustrate, the 11th Malaysia Plan has addressed expediting the development of human capital for a progressive nation as one of the six thrusting ideas; as well as inquiring industries to accentuate on technical and vocational education or coaching as one of the six changes in game rules (The Eleventh Malaysia Plan, 2016-2020). On top of that, Vision 2020 which was introduced by Dato Seri Dr. Mahathir Bin Mohamad in 1991 had also put great emphasis on HRD by justifying the needs to promote the development of an educated, flexible, innovative, numerate and multi-skilled workforce in order to become developed country.

2.3.2 Agencies Related to Labour Force of Malaysia

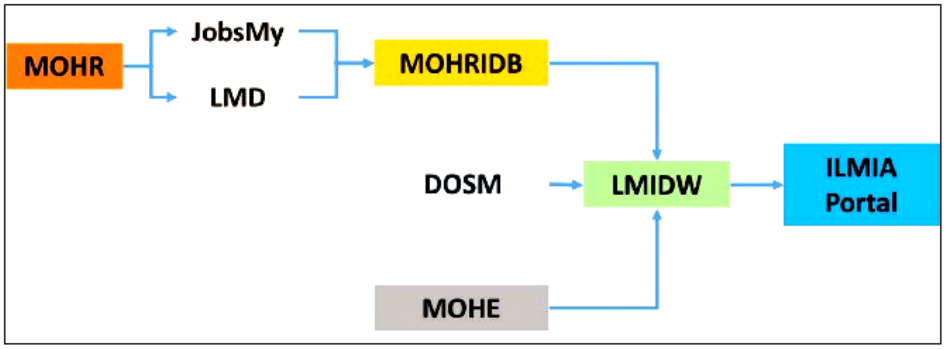
The authority which is directly related to the human resource management in Malaysia is being called Ministry of Human Resources (abbreviated *MOHR*). Established in 1970s, MOHP is mainly to devise labor administration and labor welfare policies; only until mid-1980s, the Ministry was then assigned to facilitate manpower planning through the monitoring and analysis of labor market information, as well as industrial training. Matching the human resource demand with the right skills in the fast changing and technological – advanced world, is apparently the most thrilling challenge in hand. Meanwhile, other parties who engage themselves actively in manpower management and planning of Malaysia are Malaysian Institute of Human Resource Management (MIHRM) who is always at the forefront of the industry to promote good practice of Human Resource Management; Economic Planning Unit (EPU) of the Prime Minister's Office with its Human Capital Development section, in charge of safeguarding the optimum deployment of human resources via creating

employment opportunities and improving the quality of human resources in correspondence to the nation's economic development; Institute of Labour Market Information & Analysis (ILMIA) who in – charges of research and surveys towards enhancing the labour market information; as well as National Vocational Training Department whose mission is to formulate the curriculum of training programs towards supplying professional workforce for nation's economy needs.

As mentioned before, ILMIA plays its fundamental role in serving the labour market information system in Malaysia. Particularly, ILMIA targets to atone and restructure the scattered data sources; as well as to redress the dearth of integration or coordination in compiling labour market data. One of the credits contributed by ILMIA is unequivocally the setup of Malaysia's first labour market information system portal by deriving data from Department of Statistics Malaysia (DOS), government agencies as well as private labour market data compilers in December 2013, in which the data obtained was stored in Labour Market Information Data Warehouse (LMIDW).

According to the current sources of data for LMIDW of Malaysia are depicted by the figure below. The major data providers are Ministry of Human Resources (MOHR), Department of Statistics Malaysia (DOSM) and Ministry of Higher Education (MOHE) and inclusion of data from other parties such as Technical and Vocational Education and Training (TVET) and Ministry of Youth and Sports Malaysia (IKBS) are in planning.

Figure 2.9 Sources of Data for Labour Market Information Data Warehouse (LMIDW) of Malaysia



Source : Game Changers for Human Capital Development and Sarawak Corridor : Moving Towards 2020 (2016)

The MOHRIDB is an integrated database of Jobs Malaysia database (JobsMy) and Labour Market Database (LMD), specially devised to be used as centralised database system within agencies and divisions of MOHR. Both JobsMY and LMD are in fact the only two data sources from Labour Department that are included in LMIDW. The rest information such as retrenchments are yet a part of LMIDW system. On the other hand, DOSM retrieved most of its data from monthly Labour Forece Surveys, annual salaries and wages survey and economic census which conducted once in every 5 years. Economic Census and Labour Force Survey are currently the data input for Key Indicators of the Labour Market. Nevertheless, the provision of KILM could only be acquired from DOSM in aggregated form but not as metadata which could be deployed for other purposes unless concesus obtained based on mutual agreement between ILMIA and DOSM. Last but not least, Ministries of Education and Higher Education provides information on the graduates' enrolment and output levels.

2.3.3 Structure of Malaysia's Current Workforce

While according to the press release dated 16th June 2017 on key statistics of labour force in Malaysia which was updated to April 2017, the structure of Malaysia's workforce is as shown below :

Table 2.9 Structure of Malaysia's Workforce

		Month–on–month		Year–on–year	
Indicator	**April 2017**	**March 2017**	**Change (%)**	**April 2017**	**Change (%)**
Labour Force (' 000)	14,941.5	14,932.5	0.1	14,675.3	1.8
Employed (' 000)	14,429.6	14,421.7	0.1	14,163.7	1.9
Unemployed (' 000)	511.9	510.8	0.2	511.5	0.1
Outside labour force (' 000)	7,122.5	7,121.8	0.0	7,012.5	1.6
Labour Force Participation Rate (LFPR) (%)3.5	67.7	67.7	-	67.7	-
Unemployment rate (%)	3.4	3.4	-	3.5	- 0.1
Seasonally adjusted unemployment rate (%)	3.4	3.3	0.1	3.6	- 0.2

Source : Monthly Labour Force Survey, Department of Statistics Malaysia (DOS)

Labour force participation rate in Malaysia in overall has been observing consistency over the year at 67.7%. And the nation has successfully brought down the unemployment rate as well as seasonally adjusted unemployment rate by 0.1 % and 0.2% respectively, comparing to 2016.

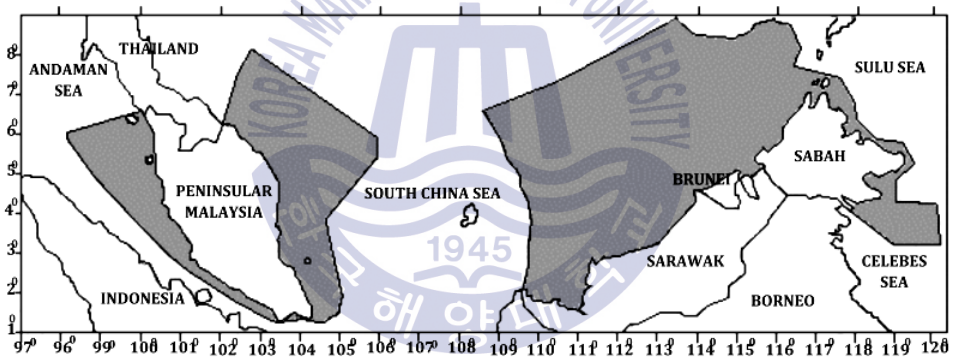
Chapter 3 :
Malaysia's Shipping and Port Logistics

3.1 Overview of the Maritime Industry of Malaysia

3.1.1 Overview of the Maritime Industry of Malaysia

By virtue of an extended jurisdiction of the Economic Exclusive Zone (EEZ), Malaysia has maritime areas which are much larger than its land mass as illustrated in the diagram below :

Figure 3.1 Economic Exclusive Zone (EEZ) of Malaysia



EEZ Areas of Malaysia

Source : Adapted from 1979 Malaysian EEZ Map (The New Map, No. 26, Addition No.1, No.5745, 21 December 1979), Department of Survey and Mapping.

As mentioned in the introduction, shipping and port logistics' immense role in facilitating the economic growth of Malaysia can never be overemphasized. Malaysian depends on seaborne transport to carry almost 95% of its trade internationally, generating revenues, employment

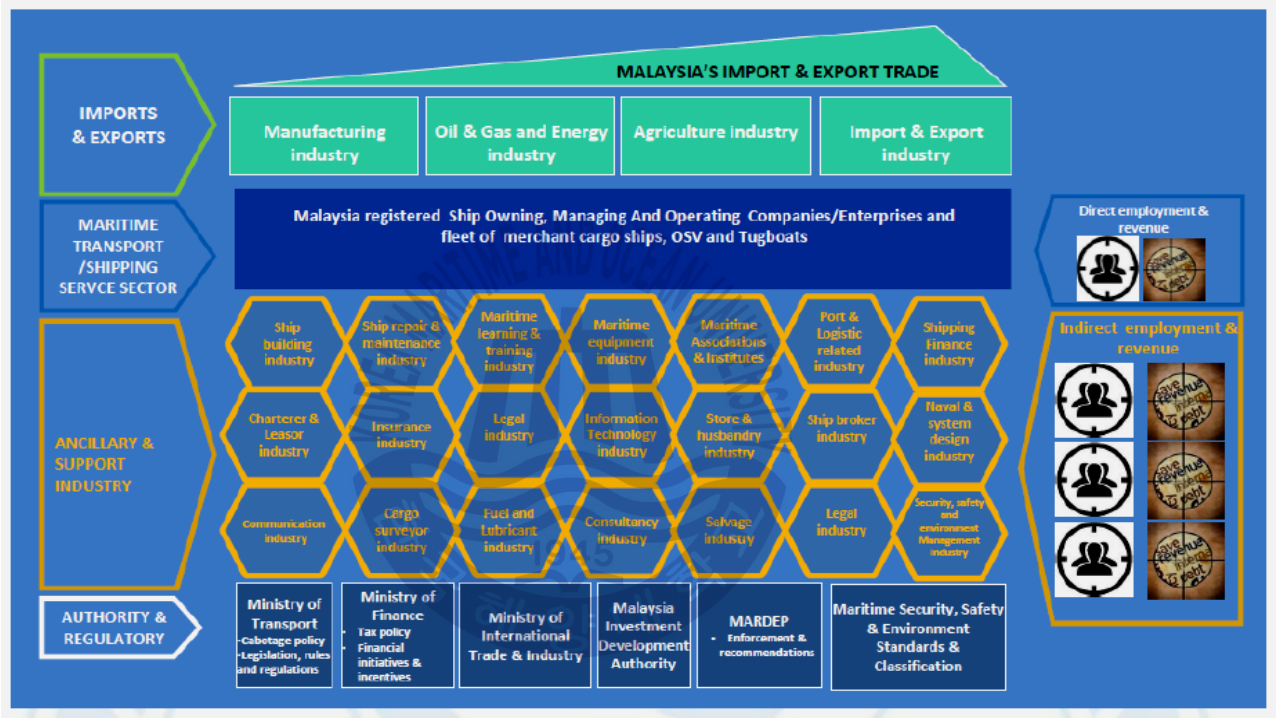
opportunities, investment influx and astounding multiplier effects to the nation (Nazery Khalid, 2012). Ships give us exceptional access to the products and raw materials from all over the globe; and unprecedented trading networks which engage nations that initially seem impossible to become trading partners due to geographical boundaries. In accordance to UNCLOS III of 1982, article 56, Malaysia, as the coastal state has sovereign rights for the purpose of exploring and exploiting, conserving and managing the natural resources, whether living or non-living, of the waters superjacent to the seabed and of the seabed and its subsoil, and with regard to other activities, for the economic exploitation and exploration of the zone, such as the production of energy from the water, currents and winds (United Nation, 1982). Consequently, the economic growth of Malaysia is said to be closely allied to a wide spectrum of the ocean. Key economic activities such as container shipping services, marine tourism, shipbuilding or repairing, as well as offshore exploration of oil and natural gases in Malaysia, do especially worth some prominent attention from the nation.

3.1.2 Illustration of Malaysia's Maritime Industry Structure, Maritime Goverance Structure, Maritime Cluster as well as Maritime Ancillary and Support Industries

According to Malaysia Shipping Master Plan (MSMP)'s conceptual plan (Thompson, N. J., 2015), the maritime industry structure and maritime governance structure are as shown in the figures below.

Maritime industry structure of Malaysia covers 4 major scopes, namely imports and exports trades of manufacturing products, oil and gas as well as energy, agriculture products and the like; maritime transport or shipping service sectors that in – charge of managing the ships' registry and fleets' operations; ancillary and support industry which encompasses of shipbuilding, ship insurance, ship brokering and others; as well as authority and regulatory which manage the maritime industry, particularly Ministry of Transport (MOT), Marine Department (MARDEP), Ministry of Finance and more.

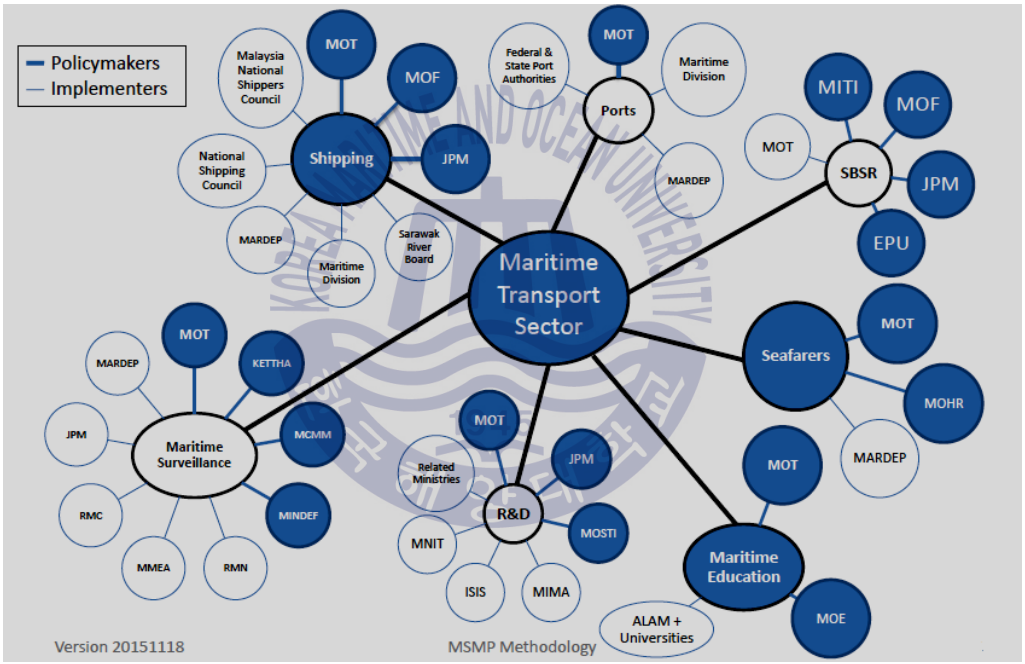
Figure 3.2 Maritime Industry Structure of Malaysia



Source : Thompson, N. J., (2015). A Malaysian Shipping Master Plan. *Malaysia National Shipping Conference 2015 : Revitalizing Malaysian Shipping for a Stronger Economy*

Meanwhile, Ministry of Transport (MOT) appears to be the major governance party for Malaysia's maritime transport sector. The figure below had broken down the industry into 7 sub – sectors, specifically shipping, shipbuilding and ship repair, seafarers, maritime education, research and development, as well as maritime surveilance; and subsequently, classified the policymakers and implementers for respective sub – sector.

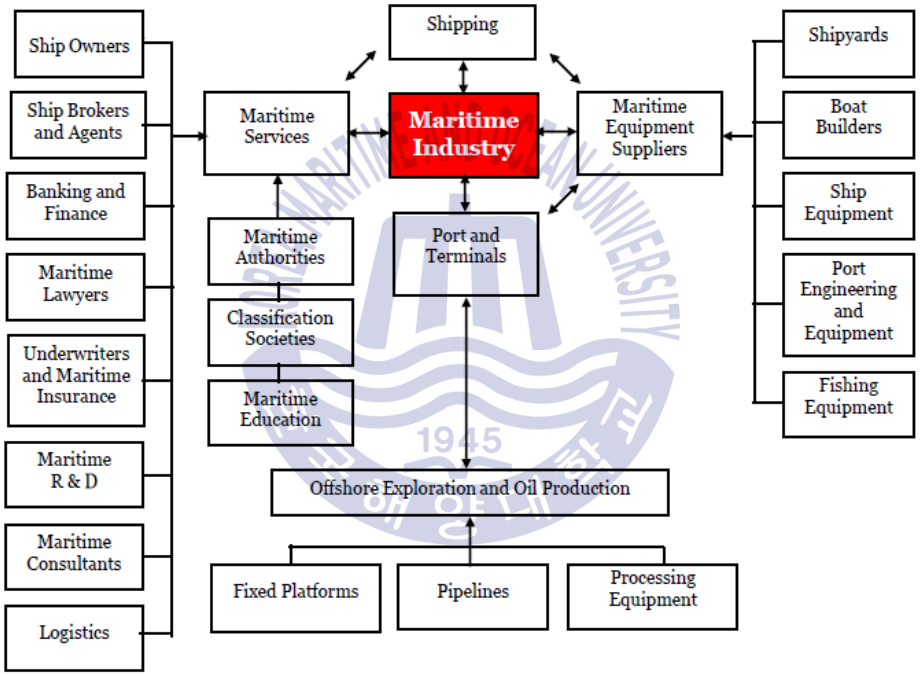
Figure 3.3 Maritime Governance Structure of Malaysia



Source : Thompson, N. J., (2015). A Malaysian Shipping Master Plan. *Malaysia National Shipping Conference 2015 : Revitalizing Malaysian Shipping for a Stronger Economy*

Looking at the Malaysian Maritime Cluster, the 4 main branches are shipping, maritime services, port and terminals, as well as maritime equipment suppliers. Shipping is the holy part of maritime industry; while maritime services could range from brokering, banking and financing, researching to logistics; then port and terminals enclose offshore exploration and oil production; and lastly, maritime equipment supply encompasses of shipyards, boat builders, port equipment and fishing utilities.

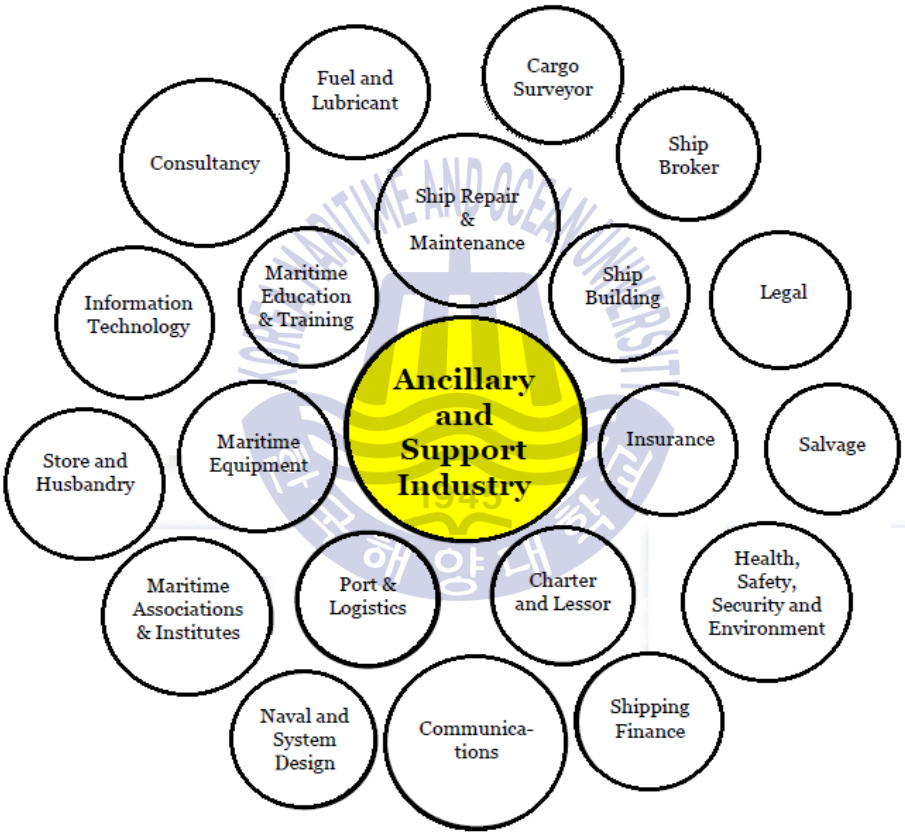
Figure 3.4 Maritime Clusters of Malaysia



Source : Razali Yaacob (2015)

Backing up the main maritime industry of Malaysia is an array of ancillary and support industries such as naval system and design, ship repair and maintenance, insurance, maritime education and Training, charter and lessor, salvage and others.

Figure 3.5 : Ancillary and Support Industries for Maritime Industry of Malaysia

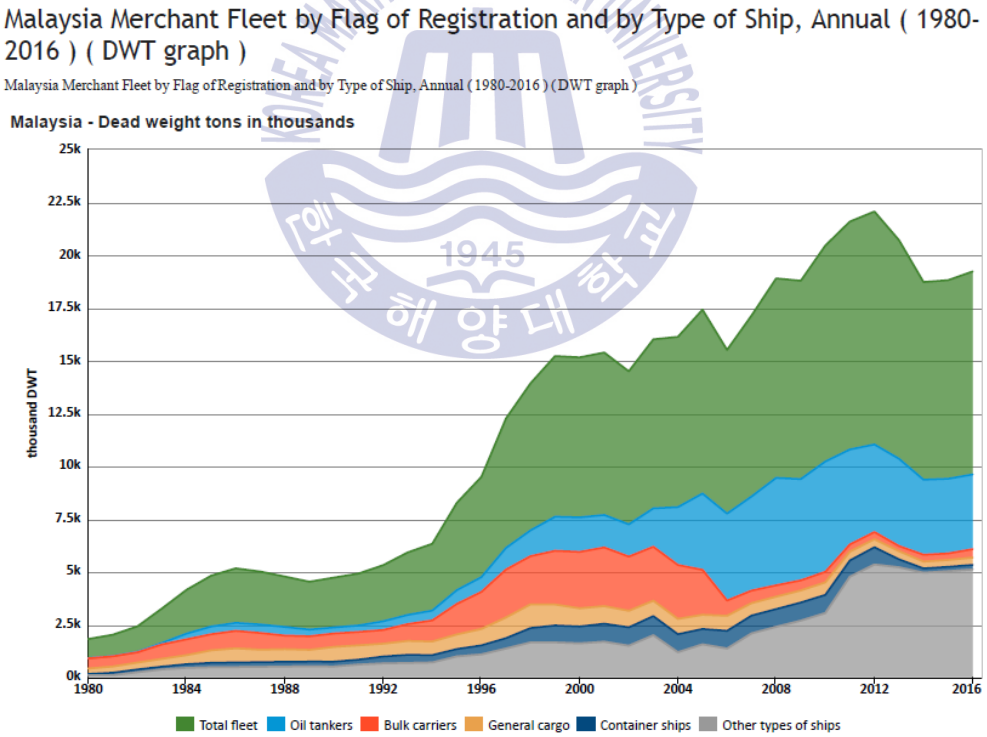


Source : Razali Yaacob (2015)

3.1.3 Malaysia's Merchant Fleet Size by Deadweight Tonnes

Below shown is the graph of annual update by UNCTAD regarding Malaysian merchant fleet by flag of registration and by type of ship in thousand dead weight tons, starting from year 1980 to 2016. Obviously, there is a significant growth of Malaysia's total merchant fleet throughout the years. In Malaysia's shoes, oil tankers and other types of ships constitute big portions of the total fleet; while bulk carriers, general cargos and container ships' deadweight tons are shrinking.

Figure 3.6 Malaysia Merchant Fleet by Registration and by Type of Ship
(1980 – 2016)



Source : United Nations Conference on Trade and Development (UNCTD)

Table 3.1 Malaysia Merchant Fleet by Registration and by Type of Ship (1980 – 2016)

Ship Type Name/ Year	1980	1984	1988	1992	1996	2000	2004	2008	2012	2016
Total fleet	909.24	2075.39	2388.25	2657.43	4748.37	7577.47	8063.79	9448.37	11031.26	9611.57
Oil tankers	6.91	270.95	407.45	412.15	698.90	1633.74	2739.82	5086.63	4148.42	3537.15
Bulk carriers	483.41	751.21	643.91	648.23	1754.94	2671.07	2553.46	538.44	339.94	400.38
General cargo	255.94	425.62	597.15	607.11	777.12	861.51	724.30	586.86	379.66	343.21
Container ships	61.81	177.93	225.24	326.75	429.51	799.37	854.79	841.78	817.79	220.57
Other types of ships	101.18	449.69	514.50	663.18	1087.91	1611.78	1191.42	2394.66	5345.47	5110.26

Source : United Nations Conference on Trade and Development (UNCTD)

3.2 Economic Contribution of Maritime Industry in Malaysia

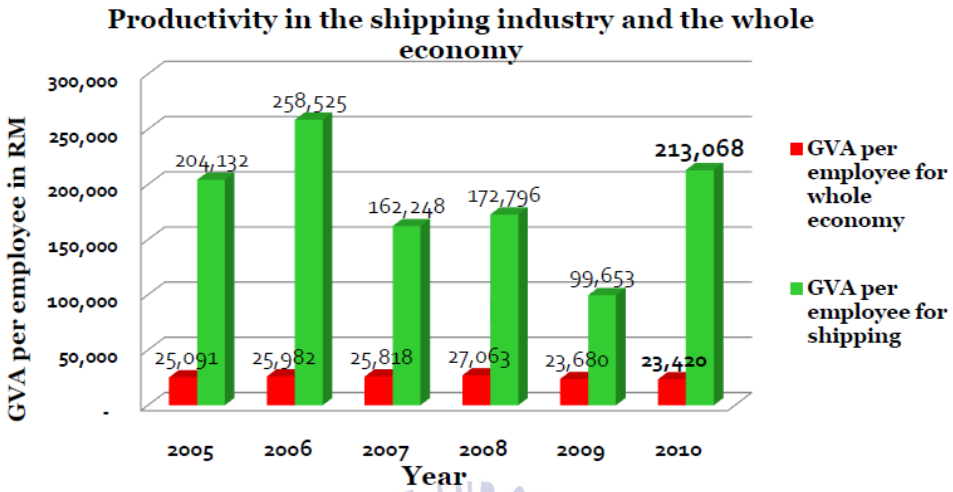
As the cliché goes, ‘what is not measured is not done, managed or improved’, there were a few calls regarding the need to measure economic contribution of maritime industry and its relevant sub – sectors so that the worthiness could be appreciated wholly with concerted effort of policy push and proper resources allocation (Nazery Khalid, 2012; Sharidan M.Ali, 2012; Cheryl Rita Kaur, 2015). The wisdom holds true in this complex and far-reaching industry.

According to Daniel Workman (2017), Malaysia shipped products that worth about US$189.6 billion around the globe in 2016. Malaysia’s exports represent roughly 1.2% of overall global exports forecasted at $16.236 trillion in 2015. Among the top five countries imported from Malaysia in 2016 are Singapore with shipments’ value US$27.6 billion (14.6% of Malaysian total exports), China $23.7 billion (12.5%); United

States $19.4 billion (10.2%); Japan $15.2 billion (8%) and Thailand $10.6 billion (5.6%). On the other hand, goods worth as much as US$168.5 billion were imported by Malaysia from around the globe in 2016. To illustrate, other Asian countries were Malaysia's major import targets, constituting 72.9% of total imports by value in 2016; 11.7% of import sales to Malaysia supplied by European trade partners; 8.6% worth originated from North America; while Africa accounted for 1% of Malaysian imports. Without seaborne trades, imports and exports which contribute to Malaysian GDP are just impractical.

On top of that, during Maritime Institute of Malaysia (MIMA) National Shipping Conference 2015 at Hotel Istana Kuala Lumpur, Captain Razali Yaacob from Netherlands Maritime Institute of Technology (NMIT) had presented the graph below which depicts contribution of shipping industry to Malaysian GDP as a high productivity industry. A relatively high labour productivity of RM213,068 (as measured by GVA per employee) for shipping could be observed as compared to an economy – wide average of RM23,420.

Figure 3.7 Productivity in the Shipping Industry and the Whole Economy of Malaysia (2005 – 2010)



Source : Razali Yaacob (2015)

Meanwhile, Cheryl Rita Kaur at The East Asian Seas Congress 2015 also presented some statistics regarding the output and final demand estimation for selected maritime sectors, the maritime sector gross output as well as maritime share in primary inputs and imports (%) based on imports, import duties and commodity taxes values; in order for us to realize the economic contribution of the sector.

Looking at Table 3.1 to Table 3.3 , we can notice that the top 3 major contributors to the maritime sectors off Malaysia are crude petroleum and natural gas production, petroleum refineries as well as marine fishing.

Table 3.2 Output and Final Demand Estimation for Selected Maritime Sectors (RM' 000)

Industry	Output (RM' 000)
Marine fishing	1,733,584
Catching of marine fish from estuary, coastal or deep waters	1,676,720
Catching of freshwater and diadromous fish	9,083
Breeding and cultivation of fish	9,483
Crude petroleum and natural gas production	8,142,507
Canning, preserving and processing fish	339,557
Petroleum refineries	3,386,336
Ship building and repairing	377,825
Repair and maintenance of boats of all kind	114,343

Source : Cheryl Rita Kaur (2015)

Table 3.3 Maritime Sector Gross Output 2000 (RM Million)

Industry	**Gross Output Share (%)**
Marine fishing	0.71
Crude petroleum and natural gas production	3.31
Processing, canning and preservation of fish, etc.	0.14
Petroleum refineries	4.24
Manufacture of miscellaneous petrol and coal products	1.00
Manufacture of marine engines	0.20
Manufacture of fishing equipment and requisites	0.18
Ship building and repairing	0.10
Pipeline transport	1.04
Ocean and coastal water transport	1.05
Supporting services to water transport	0.18
Marine insurance	0.02
Beach resorts, sea sport and recreation	0.06
Marine administration	0.65
Maritime education	0.33
Maritime subtotal estimate	13.21
Non-maritime subtotal estimate	86.79
TOTAL	**100.00**

Source : Cheryl Rita Kaur (2015)

Table 3.4 Maritime Share in Primary Inputs and Imports (%) Based on Imports, Import Duties and Commodity Taxes Values

Industry	**Value Added**
Marine fishing	1.09
Crude petroleum and natural gas production	6.21
Processing, canning and preservation of fish, etc.	0.05
Petroleum refineries	5.54
Manufacture of miscellaneous petrol and coal products	0.39
Manufacture of marine engines	0.11
Manufacture of fishing equipment and requisites	0.12
Ship building and repairing	0.05
Pipeline transport	1.31
Ocean and coastal water transport	1.32
Supporting services to water transport	0.22
Marine insurance	0.04
Beach resorts, sea sport and recreation	0.08
Marine administration	0.92
Maritime education	0.46
Maritime subtotal estimate	17.90
Non-maritime subtotal estimate	82.10
TOTAL	**100.00**

3.3 Malaysia's Port and Logistics

Indeed, there are many ports and harbours in Malaysia in total. As could be shown in the picture below, there are together 31 ports including sea ports, fishing ports, oil depots, transshipment ports and the like.

Figure 3.8 Distributions of Ports in Malaysia

Source : Ministry of Transport Malaysia (http://www.mot.gov.my **)**

However, there are 10 major ports in total which Malaysia tallies the container throughput by quarter in a year, namely Port Klang, Penang, Johor, Kuantan, Bintulu, Tanjung Bruas, Kuching, Miri, Rajang, Sabah, Port Dickson, Kemaman, Teluk Ewa and Tanjung Pelepas.

We can easily notice that Port Klang handled most freight weight tones, followed by Tanjung Pelepas and Bintulu (See Table 3.4).

Table 3.5 Total Cargo Throughput by Ports, Malaysia 2016

('000) FREIGHTWEIGHT TONNES

BIL No	PELABUHAN Ports		SUKU PERTAMA First Quarter	SUKU KEDUA Second Quarter	SUKU KETIGA Third Quarter	SUKU KEEMPAT Fourth Quarter
1	KELANG	EKSPORT Export	27,485	28,274	28,821	29,129
		IMPORT Import	31,885	33,544	33,128	33,191
		PINDAH KAPAL Trans-shipment	-	-	-	-
		JUMLAH Total	**59,370**	**61,818**	**61,949**	**62,320**
2	PULAU PINANG	EKSPORT Export	3,346	3,501	3,270	3,700
		IMPORT Import	3,997	4,041	4,157	4,288
		PINDAH KAPAL Trans-shipment	182	169	148	180
		JUMLAH Total	**7,525**	**7,710**	**7,574**	**8,168**
3	JOHOR	EKSPORT Export	2,631	2,848	2,799	2,896
		IMPORT Import	4,447	4,205	4,118	4,178
		PINDAH KAPAL Trans-shipment	-	-	-	-
		JUMLAH Total	**7,078**	**7,053**	**6,917**	**7,074**
4	KUANTAN	EKSPORT Export	4,822	1,947	2,590	2,790
		IMPORT Import	1,000	1,002	1,037	1,153
		PINDAH KAPAL Trans-shipment	-	-	-	-
		JUMLAH Total	**5,822**	**2,949**	**3,627**	**3,942**
5	BINTULU	EKSPORT Export	9,624	8,968	9,285	10,433
		IMPORT Import	1,609	1,587	1,417	1,697
		PINDAH KAPAL Trans-shipment	354	355	303	367
		JUMLAH Total	**11,587**	**10,910**	**11,005**	**12,497**
6	TANJUNG BRUAS	EKSPORT Export	25	22	28	9
		IMPORT Import	104	135	155	167
		PINDAH KAPAL Trans-shipment	-	-	-	-
		JUMLAH Total	**129**	**157**	**182**	**176**
7	KUCHING	EKSPORT Export	509	555	636	561
		IMPORT Import	1,700	1,671	1,728	1,803
		PINDAH KAPAL Trans-shipment	-	-	-	-
		JUMLAH Total	**2,208**	**2,226**	**2,364**	**2,364**
8	MIRI	EKSPORT Export	1,150	1,197	977	1,170
		IMPORT Import	140	163	136	152
		PINDAH KAPAL Trans-shipment	-	-	-	-
		JUMLAH Total	**1,290**	**1,360**	**1,113**	**1,321**

Source : ASEAN Port Association Malaysia (MAPA)

('000) FREIGHTWEIGHT TONNES

BIL No	PELABUHAN Ports		SUKU PERTAMA First Quarter	SUKU KEDUA Second Quarter	SUKU KETIGA Third Quarter	SUKU KEEMPAT Fourth Quarter
9	RAJANG	EKSPORT Export	84	71	71	72
		IMPORT Import	235	277	289	308
		PINDAH KAPAL Trans-shipment	-	-	-	-
		JUMLAH Total	**319**	**348**	**360**	**380**
10	SABAH	EKSPORT Export	4,987	4,489	6,478	5,738
		IMPORT Import	3,047	3,049	2,938	2,817
		PINDAH KAPAL Trans-shipment	-	-	-	-
		JUMLAH Total	**8,034**	**7,538**	**9,416**	**8,555**
11	PORT DICKSON	EKSPORT Export	428	458	496	681
		IMPORT Import	2,941	2,772	2,745	3,290
		PINDAH KAPAL Trans-shipment	-	-	-	-
		JUMLAH Total	**3,369**	**3,230**	**3,241**	**3,972**
12	KEMAMAN	EKSPORT Export	849	965	1,086	795
		IMPORT Import	665	510	540	415
		PINDAH KAPAL Trans-shipment	-	-	-	-
		JUMLAH Total	**1,514**	**1,475**	**1,625**	**1,210**
13	TELUK EWA	EKSPORT Export	887	689	669	682
		IMPORT Import	149	140	121	106
		PINDAH KAPAL Trans-shipment	-	-	-	-
		JUMLAH Total	**1,036**	**830**	**790**	**787**
14	TANJUNG PELEPAS	EKSPORT Export	1,354	1,407	1,341	1,445
		IMPORT Import	483	532	542	576
		PINDAH KAPAL Trans-shipment	31,286	31,114	26,736	30,384
		JUMLAH Total	**33,123**	**33,054**	**28,620**	**32,404**
	JUMLAH BESAR Grand Total	EKSPORT Export	58,181	55,392	58,546	60,100
		IMPORT Import	52,400	53,629	53,050	54,140
		PINDAH KAPAL Trans-shipment	31,823	31,638	27,187	30,931
		JUMLAH Total	**142,403**	**140,658**	**138,783**	**145,171**

Source : ASEAN Port Association Malaysia (MAPA)

According to Global Competitiveness Report 2016 / 2017, Malaysia ranked 25th of out of 138 countries. Looking into details, under the 2nd pillar infrastructure of Global Competitiveness Report 2016 / 2017, Malaysia's port quality obtained score 5.4, ranked 17th out of 138 countries.

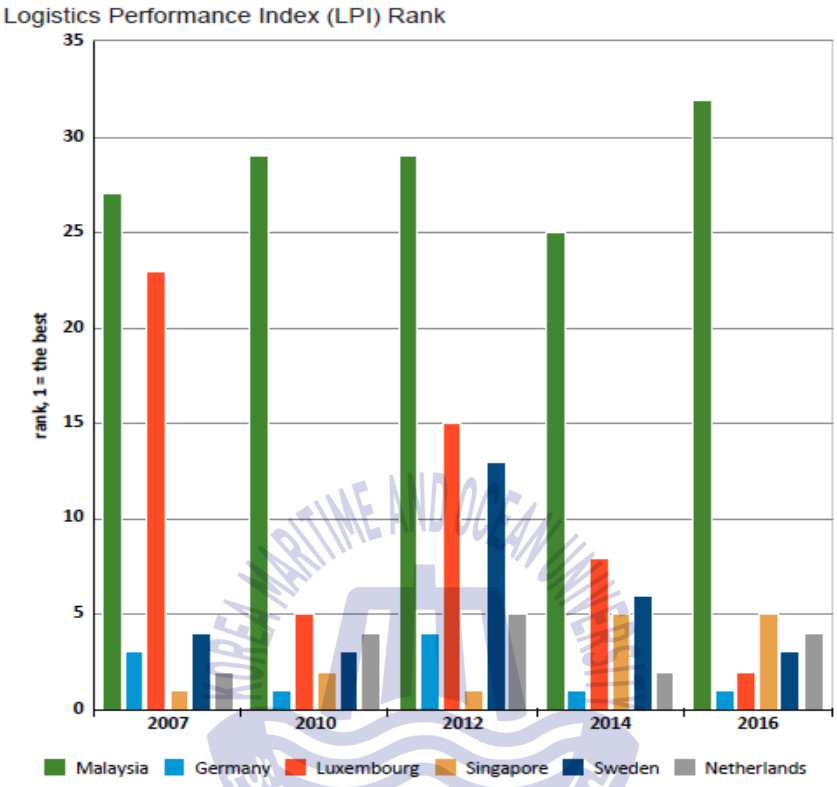
Table 3.6 Global Competitiveness Index for 2nd Pillar in Detail

4.4	2nd pillar: Infrastructure	24	5.4
2.01	Quality of overall infrastructure	19	5.5
2.02	Quality of roads	20	5.5
2.03	Quality of railroad infrastructure	15	5.1
2.04	Quality of port infrastructure	17	5.4
2.05	Quality of air transport infrastructure	20	5.7
2.06	Available airline seat kilometers millions/week	23	1921.6
2.07	Quality of electricity supply	39	5.8
2.08	Mobile-cellular telephone subscriptions /100 pop.	27	143.9
2.09	Fixed-telephone lines /100 pop.	72	14.3

Source : World Economic Forum, Global Competitiveness Report 2016 / 2017

On the other hand, the graph and table below showed the Logistics Performance Index (LPI) of Malaysia from year 2007 – 2016, comparing to other nations which came into top 5 rankings of LPI in 2016.

Figure 3.9 Malaysia's Logistics Performance Index (LPI) Rankings from Year 2007 -2016



Location	Units	Scale	2007	2010	2012	2014	2016
Malaysia	rank, 1 = the best	units	27	29	29	25	32
Germany	rank, 1 = the best	units	3	1	4	1	1
Luxembourg	rank, 1 = the best	units	23	5	15	8	2
Singapore	rank, 1 = the best	units	1	2	1	5	5
Sweden	rank, 1 = the best	units	4	3	13	6	3
Netherlands	rank, 1 = the best	units	2	4	5	2	4

Source : www.knoema.com

3.4 Issues Encountered & Future Needed Developments

The Government has already extended all kinds of support to this industry, for example through putting in place policies such as the Cabotage Policy and load entering at Port Klang, designating the shipbuilding / ship repairing sector as a strategic sector, extending financial assistance to shipowners in the form of Shipping Fund, and providing Federal funds to dredge port harbors. Given that the maritime industry is one that requires huge capital expenditure, astute planning and strong state support to flourish, nothing short of a full commitment by the Government is required to enable Malaysia to optimally harness its potential as a maritime nation and for the maritime industry to enhance its contribution to the nation's economy. Notwithstanding, maritime industries of Malaysia are still obsessed with many shortcomings.

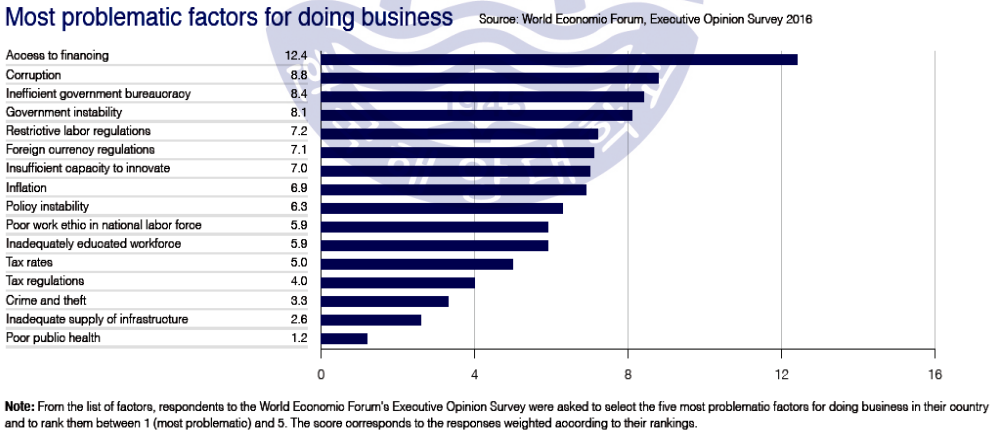
One of the issues that has been bouncing upon Malaysia for quite a long time and used to be a hot topic is the lack of multimodal transport. To illustrate, Malaysia is using containers for the maritime part of trips; however, loading as well as unloading take place at port rather than at the origin and destination of their cargo. Undeniably, this eliminates cost advantages of container use as well as fails to encourage door – to – door movement of containers. Hence, there is a need to upgrade inland connections or linkages with maritime networks and infrastructure.

Apart from that, high costs of land access to ports due to the poor performance or hinterland connection, reinforced by production agglomeration causing excessive concentration of exported – related activities in port cities. Essentially, this restricted benefits of trade growth to the areas immediately surrounding ports, resulting imbalance economic growth.

Speaking of economic growth, the public usually recalled of East Malaysia. Sabah and Sarawak do worth more attention. Feeder services, infrastructure development and the kind of thorough development could help to stimulate Malaysia's growth as a whole. Indirectly, this could also help to overcome problems of added space requirements and congestion of traffic servicing ports.

Not least to be mentioned, there is also an evident urge of simplification of trade documentation as being discussed in " Issues and Challenges of Logistics in Malaysia : A Perspective ". Particularly, Global Competitiveness Report 2016 / 2017 had listed this matter as the third problematic factor of doing business in Malaysia, with 8.4 score.

Figure 3.10 Most Problematic Factors for Doing Business in Malaysia, Year 2016



Note: From the list of factors, respondents to the World Economic Forum's Executive Opinion Survey were asked to select the five most problematic factors for doing business in their country and to rank them between 1 (most problematic) and 5. The score corresponds to the responses weighted according to their rankings.

Source : World Economic Forum, Global Competitiveness Report 2016 / 2017

There are some other pushes of improvements needed for example, synchronization of port operations, development of efficient freight forwarding industry , reduction of ship turnaround time by realigning or streamlining of service route (Borneo Post Online : Challenges within Shipping Industry), fuel – efficient ships and increase in bunker fuel surcharge.

3.5 The Main Challenge : *Over – reliance on Foreign Seafarers/* Shortage of Local Qualified *Seafarers*

Nevertheless, out of the so many issues faced, this paper would like to focus on the needs to cater for the right amount of manpower, with the right skills and at the right time.

As handling containers is becoming more efficient in container ports, Malaysia seems facing a challenging time in keeping pace with the rapidly growing demand for berth and storage space. Accordingly, China, Malaysia had touted new 'port alliance' to reduce customs bottlenecks and boost trade of Malaysia as key port of call in China's maritime Silk Road as well as One Belt One Road Initiatives; as well as developing Malacca Gateways. As could be anticipated, huge demand for port services will be created but we have no sufficient human resources to sustain the demand for talent.

In correspondence to the aforementioned, Malaysia's shipping industry needs professional labour pool to secure its competitiveness. There are a few on – going efforts in awakening public regarding current human resource demand, for example, Malaysia Shipping Master Plan MSMP; one of the MIMA National Shipping Conference 2015's presentations which

entitled “ Coordinated Approach to Develop Workforce Capability Across the Industry through Maritime Skills-based Education and Training ” by Capt Razali b Yaacob and more.

And as being concerned, a successful policy has to take into account that education, training and lifelong learning policies must respond flexibly to the shifts in the demand for skills and qualifications, and in due time (Neugart, M., & Schömann, K., 2002). Hence, before we are able to devise a comprehensive and perfect plan to develop the required workforce, it is vital to forecast and recognise the gap between demand and supply.

Chapter 4 : Data Analysis

4.1 Data Inputs for the 5 Sub – sectors with Meaningful Data

This study utilized principal statistics data for Transportation and Storage Services from Report of Economy Census 2011. Together 5 sub – sectors relevant to maritime industries were being studied, namely sea transport, cargo handling and stevedoring services, storage and warehousing services, port operation services and lastly, shipping and forwarding services. Below shown are the raw data obtained for all 5 sectors.

Table 4.1 Principal Statistics of Sea Transport, 2000-2010

Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Number of Establishments	370	367	364	348	325	392	395	323	327	343	411
Value of Gross Output (RM '000)	7,187,835	7,069,898	6,951,961	8,159,511	9,458,859	10,211,396	10,554,068	11,915,723	12,851,120	9,878,975	11,761,366
Value of Intermediate Input (RM '000)	3,985,444	3,880,437	3,775,430	4,256,025	4,633,729	5,857,754	5,936,846	7,142,949	7,916,356	6,451,209	7,206,951
Value Added (RM '000)	3,202,391	3,189,461	3,176,531	3,903,486	4,825,130	4,353,642	4,617,222	4,772,774	4,934,764	3,427,766	4,554,416
Total Number of Persons Engaged during December or the Last Pay Period											
Total	16,974	17,137	17,300	18,378	16,977	16,102	18,914	20,997	21,042	19,198	20,973

Source : Department of Statistics Malaysia, Official Portal : Home » Publications » Free Download » Main Category : Economy » Sub – category : Transportation and Storage » Economy Census 2011 – Transportation and Storage Services

Table 4.1 Principal Statistics of Sea Transport, 2000-2010

Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Working Proprietors & Unpaid Family Workers	57	56.5	56	60	52	44	44	31	26	23	56
Paid Employees (Full - Time)	16,624	16,694	16,764	18,001	16,527	15,656	18,395	20,512	20,604	18,806	20,363
Paid Employees (Part - Time)	293	386.5	480	317	398	402	475	454	412	369	554
Salaries & Wages Paid (RM '000)	462,633	466, 843.5	471,054	598,119	588,917	539,283	853,462	871,541	874,213	873,192	1,028, 156
Values of Fixed Assets Owned as at the End of the Year (RM '000)	11,070, 318	11,042, 077	11,013, 836	12,702, 473	10,620, 889	13,795, 121	17,346, 268	15,445, 399	15,606, 984	17,331, 371	26,747, 768

Source : Department of Statistics Malaysia, Official Portal : Home » Publications » Free Download » Main Category : Economy » Sub – category : Transportation and Storage » Economy Census 2011 – Transportation and Storage Services

Table 4.2 Principal Statistics of Cargo Handling / Stevedoring Services 2000-2010

Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Number of Establishments	136	138.5	141	138	128	226	299	312.5	326	391	456
Value of Gross Output (RM '000)	1,006, 708	821,365	636,022	578,133	411,249	1,066, 972	1,405, 833	1,570, 936	1,736, 039	1,744, 109	1,752, 179
Value of Intermediate Input (RM '000)	569,985	509,161	448,337	358,325	229,148	737,460	807,427	964, 843.5	1,122, 260	1,127, 977.5	1,133, 695
Value Added (RM '000)	436,723	312,204	187,685	219,808	182,101	329,512	598,406	606, 092.5	613, 779	616, 131.5	618, 484
Total Number of Persons Engaged during December or the Last Pay Period											
Total	11,018	8,865.5	6,713	6,003	5,284	8,067	9,045	9387.5	9,730	9486.5	9,243
Working Proprietors & Unpaid Family Workers	109	106.5	104	86	76	84	108	102	96	156	216

Source : Department of Statistics Malaysia, Official Portal : Home » Publications » Free Download » Main Category : Economy » Sub – category : Transportation and Storage » Economy Census 2011 – Transportation and Storage Services

Table 4.2 Principal Statistics of Cargo Handling / Stevedoring Services 2000-2010

Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Paid Employees (Full - Time)	6,843	5993.5	5,144	4 ,721	4 ,090	7 ,025	8,097	8572.5	9,048	8847	8,646
Paid Employees (Part - Time)	4,066	2765.5	1,465	1,196	1,118	958	840	713	586	483.5	381
Salaries & Wages Paid (RM '000)	189,632	144,442	99,252	102,840	94,653	161,374	206,964	222,206	237,448	231, 451.5	225,455
Values of Fixed Assets Owned as at the End of the Year (RM '000)	541,500	326,629	111,758	226,632	202,628	320,662	519,610	657, 193.5	794,777	606, 113.5	417,450

Source : Department of Statistics Malaysia, Official Portal : Home » Publications » Free Download » Main Category : Economy » Sub – category : Transportation and Storage » Economy Census 2011 – Transportation and Storage Services

Table 4.3 Principal Statistics of Storage & Warehousing Services, 2000-2010

Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Number of Establishments	18	20	22	35	33	36	42	52.5	63	156.5	250
Value of Gross Output (RM '000)	94,219	125, 289.5	156,360	384,897	453,621	569,229	552,157	567,162	582,167	747, 270.5	912,374
Value of Intermediate Input (RM '000)	25,706	42,423	59,140	229,069	142,575	255,804	293,568	302,907	312,246	377,004	441,762
Value Added (RM '000)	68,513	82, 866.5	97,220	155,828	311,046	313,425	258,589	264,255	269,921	370, 266.5	470,612
Total Number of Persons Engaged during December or the Last Pay Period											
Total	615	784.5	954	2,674	2,343	1,747	2,570	2810	3,050	4,018	4,986
Working Proprietors & Unpaid Family Workers	1		-	2	2	-	-		-		58

Source : Department of Statistics Malaysia, Official Portal : Home » Publications » Free Download » Main Category : Economy » Sub – category : Transportation and Storage » Economy Census 2011 – Transportation and Storage Services

Table 4.3 Principal Statistics of Storage & Warehousing Services, 2000-2010

Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Paid Employees (Full - Time)	599	768.5	938	2,670	2,324	1,727	2,550	2798.5	3,047	3965.5	4,884
Paid Employees (Part - Time)	15	15.5	16	2	17	20	20	11.5	3	23.5	44
Salaries & Wages Paid (RM '000)	12,284	17,753	23,222	64,932	58,014	55,694	85,717	88, 087.5	90,458	114, 560.5	138, 663
Values of Fixed Assets Owned as at the End of the Year (RM '000)	262,317	322, 770.5	383,224	366,191	299,917	469,915	528,733	589, 706.5	650,680	1,124, 329.5	1,597, 979

Source : Department of Statistics Malaysia, Official Portal : Home » Publications » Free Download » Main Category : Economy » Sub – category : Transportation and Storage » Economy Census 2011 – Transportation and Storage Services

Table 4.4 Principal Statistics of Port Operations Services, 2000-2010

Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Number of Establishments	9	9	9	9	9	10	11	13.5	16	17	18
Value of Gross Output (RM '000)	1,237,506	1,618,527	1,999,548	2,320,234	2,635,751	2,790,030	2,887,158	3,292,533.5	3,697,909	3,590,254	4,631,640
Value of Intermediate Input (RM '000)	520,569	572,766.5	624,964	738,133	809,747	947,564	980,089	1,251,357	1,522,625	1,415,602	1,405,964
Value Added (RM '000)	716,937	1,045,760.5	1,374,584	1,582,101	1,826,004	1,842,466	1,907,069	2,041,176.5	2,175,284	2,174,652	3,225,676
Total Number of Persons Engaged during December or the Last Pay Period											
Total	8,085	8546.5	9,008	9,976	10,025	10,070	10,192	10,613	11,034	12,651	12,661
Working Proprietors & Unpaid Family Workers	-		-	-	-	-	-		-	-	-

Source : Department of Statistics Malaysia, Official Portal : Home » Publications » Free Download » Main Category : Economy » Sub – category : Transportation and Storage » Economy Census 2011 – Transportation and Storage Services

Table 4.4 Principal Statistics of Port Operations Services, 2000-2010

Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Paid Employees (Full - Time)	8,085	8546.5	9,008	9,976	10,025	10,070	10,192	10613	11,034	12,651	12,661
Paid Employees (Part - Time)	-		-	-	-	-	-		-	-	-
Salaries & Wages Paid (RM '000)	269,895	309,071	348,247	375,877	388,006	426,204	396,235	423, 852.5	451,470	452,281	508,034
Values of Fixed Assets Owned as at the End of the Year (RM '000)	4,925, 560	5,151, 233.5	5,376, 907	5,733, 507	5,723, 471	6,199, 965	6,363, 889	7,750, 225	9,136, 561	10,762, 569	10,237, 605

Source : Department of Statistics Malaysia, Official Portal : Home » Publications » Free Download » Main Category : Economy » Sub – category : Transportation and Storage » Economy Census 2011 – Transportation and Storage Services

Table 4.5 Principal Statistics of Shipping & Forwarding Agencies Services 2000-2010

Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Number of Establishments	704	737.5	771	750	760	976	1,019	1022	1,025	1237.5	1,450
Value of Gross Output (RM '000)	1,510,698	1,605,489	1,700,280	2,303,452	2,714,805	4,087,703	4,363,501	5,289,378.5	6,215,256	6,675,643.5	7,136,031
Value of Intermediate Input (RM '000)	990,786	1,037,407	1,084,028	1,515,801	1,702,268	3,035,277	3,046,889	3,800,001	4,553,113	4,626,076	4,699,039
Value Added (RM '000)	519,912	568,082	616,252	787,651	1,012,537	1,052,426	1,316,612	1,489,377.5	1,662,143	2,049,567.5	2,436,992
Total Number of Persons Engaged during December or the Last Pay Period											
Total	10,645	11,767.5	12,890	15,015	14,574	15,689	17,481	17,709	17,937	23,183.5	28,430
Working Proprietors & Unpaid Family Workers	244	265	286	261	281	346	326	315	304	371.5	439

Source : Department of Statistics Malaysia, Official Portal : Home » Publications » Free Download » Main Category : Economy » Sub – category : Transportation and Storage » Economy Census 2011 – Transportation and Storage Services

Table 4.5 Principal Statistics of Shipping & Forwarding Agencies Services 2000-2010

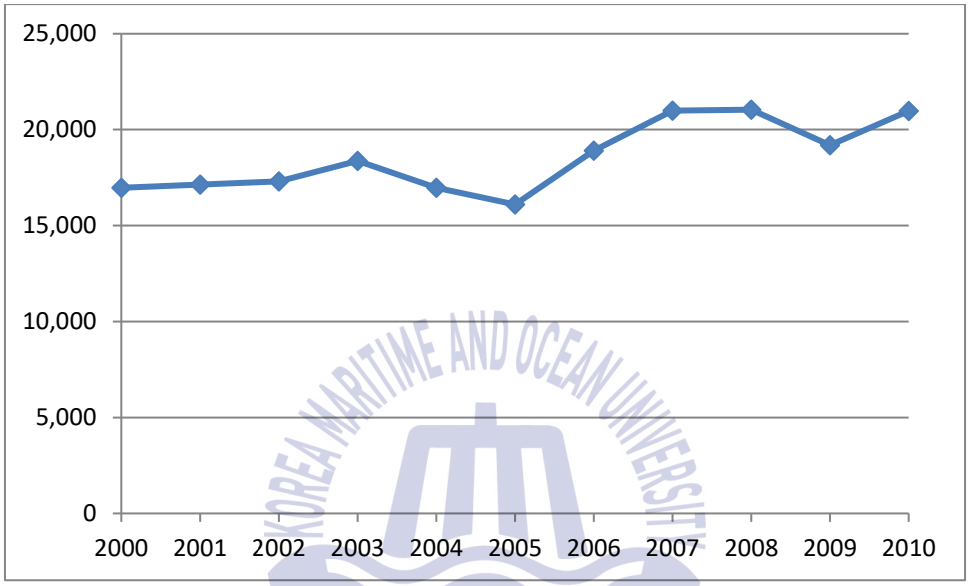
Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Paid Employees (Full - Time)	10,263	10, 962.5	11,662	13,846	14,017	14,998	16,883	17,147	17,411	22465	27,519
Paid Employees (Part - Time)	138	540	942	908	276	345	272	247	222	347	472
Salaries & Wages Paid (RM '000)	251,794	270,461	289,128	370,939	380,169	395,884	509,259	530, 151.5	551,044	690, 033.5	829,023
Values of Fixed Assets Owned as at the End of the Year (RM '000)	311,601	334,050	356,499	444,616	469,347	544,359	995,988	847,595	699,202	919,598	1,139, 994

Source : Department of Statistics Malaysia, Official Portal : Home » Publications » Free Download » Main Category : Economy » Sub – category : Transportation and Storage » Economy Census 2011 – Transportation and Storage Services

4.2 Data Analysis of Forecasting Human Resource Demand for Shipping and Port Logistics Malaysia

4.2.1 Sea Transport

Figure 4.1 Trend Line Illustration of Number of Employees for Sea Transport in Malaysia (2000 – 2010)



The above shown is the trend of number of employees for sea transport in Malaysia during years 2000 to 2010. Observing the trend of data, we can conclude that the number of employees had increased slowly from year 2000 to 2002 before coming to a more significant growth in year 2003. However, following the growth was a slump of number of employees between years 2003 to 2005. Then, the number of employees surged again to above 20,000 people in year 2007, before reaching the maximum number of employees in year 2008. Lastly, the graph illustrates a slip-back-trend from year 2008 to 2009 before rising back in year 2010.

Table 4.6 Number of Employees and Percentage of Changes for Sea Transport in Malaysia (2000 – 2010)

Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
No. Of Employees	16, 974	17, 137	17, 300	18, 378	16, 977	16, 102	18, 914	20, 997	21, 042	19, 198	20, 973
% of Changes (%)		1.0	1.0	6.2	-7.6	-5.2	17.5	11.0	0.2	-8.8	9.2

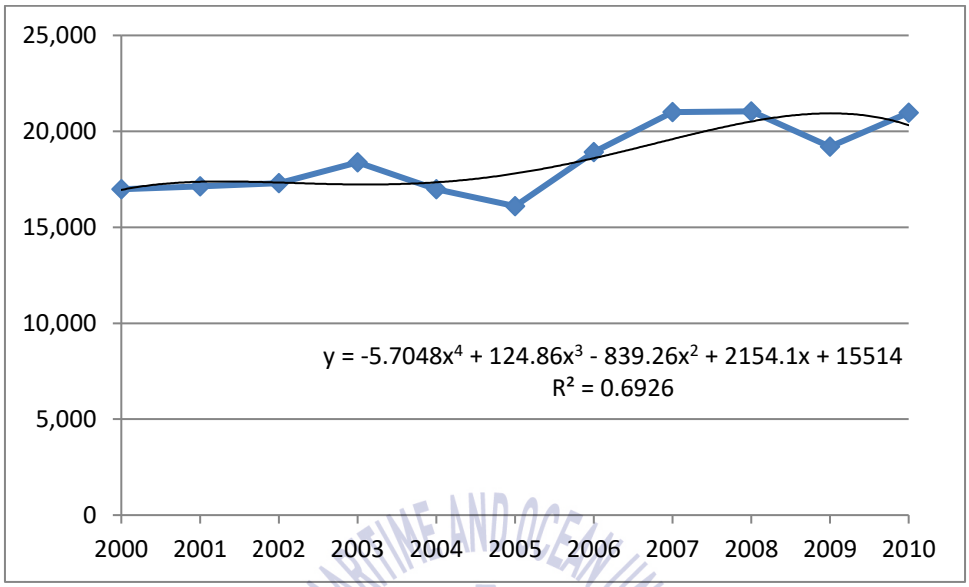
As for the percentage of changes, the number of employees increased most substantially (17.5%) in year 2006. On the other hand, the number of employees dropped most drastically in year 2009, constituting a decreasing percentage of 8.8 %.

Table 4.7 Results of Regression for Logarithm of Data Set of Sea Transport in Malaysia (2000 – 2010)

	Coefficients	*Standard Error*	*t Stat*	*P-value*
Intercept	8.13	5.63	1.44	**0.24**
X Variable 1	0.37	0.86	0.43	**0.69**
X Variable 2	-4.01	4.77	-0.84	**0.46**
X Variable 3	2.47	2.68	0.92	**0.43**
X Variable 4	1.46	2.05	0.71	**0.53**
X Variable 5	0.30	0.51	0.60	**0.59**
X Variable 6	-0.04	0.80	-0.04	**0.98**

The above table illustrates the result of regression for logarithm of data set of sea transport from year 2000 to 2010. A glance at the table reveals that the statistical significance is below par in which all the p – values are at least 0.2 and above. Therefore, we opted for simple time series regression model to analyze the data.

Figure 4.2 Illustration of 4th Order – polynomial Time Series Line of Number of Employees for Sea Transport (2000 – 2010)



The given line graph delineates a 4th order – polynomial time series line being mapped on to the trend line of number of employees for sea transport. 4th order – polynomial time series was chosen to reach 69.26% coefficient of determination.

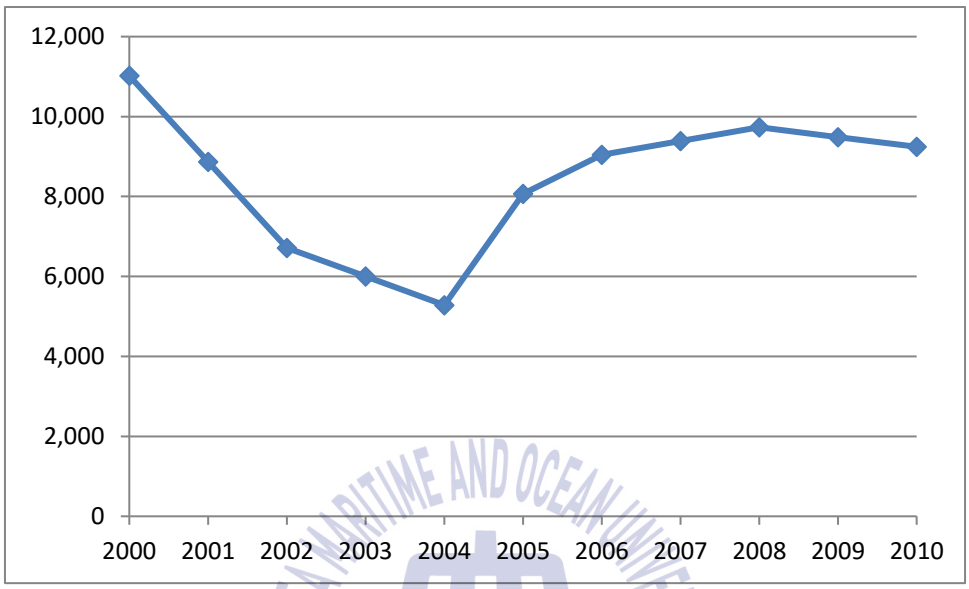
Table 4.8 Forecasted Number of Human Resource Demand for Sea Transport in Malaysia, Year 2011

Polynomial Regression Equation	2011 Human Resource Forecast
$y = -5.7048x^4 + 124.86x^3 - 839.26x^2 + 2154.1x + 15514$	17973.11

According to the polynomial regression equation obtained, we can therefore forecast that human resource demand for sea transport in 2011 is around 17973 people.

4.2.2 Cargo Handling and Stevedoring Services

Figure 4.3 Trend Line Illustration of Number of Employees for Cargo Handling and Stevedoring Services in Malaysia (2000 – 2010)



Presented graph above depicts the trend of number of employees for cargo handling and stevedoring services in Malaysia, starting from year 2000 to 2010. The graph kicks off with the number of employees plummeted starting from year 2000 and bottomed out in the year 2004. As could be observed from the graph, there was a sharp increase of employee number in year 2005. Then following the leap in year 2005 was a gradual growth until year 2008, before it started to decrease slowly until year 2010.

Table 4.9 Number of Employees and Percentage of Changes for Cargo Handling and Stevedoring Services in Malaysia (2000 – 2010)

Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
No. Of Employees	11,018	8,865.5	6,713	6,003	5,284	8,067	9,045	9387.5	9,730	9486.5	9,243
% of Changes (%)		-19.5	-24.3	-10.6	-12.0	52.7	12.1	3.8	3.6	-2.5	-2.6

Further into details, the drastic fall at the beginning phase of the graph indicates a dramatic change of percentage in year 2002, constituting a decrease of 24.3% compared to previous year. However, the number of employees increased by half in year 2005,
constituting changes of 52.7%.

Table 4.10 Result of Regression on the Data Set of Cargo Handling and Stevedoring Services in Malaysia (2000 – 2010)

	Coefficients	*Standard Error*	*t Stat*	*P-value*
Intercept	-3007.41	2361.21	-1.27	**0.29**
X Variable 1	44.01	13.49	3.26	**0.05**
X Variable 2	4564.42	2101.076	2.17	**0.12**
X Variable 3	-4564.44	2101.078	-2.17	**0.12**
X Variable 4	-4564.45	2101.08	-2.17	**0.12**
X Variable 5	0.16	0.04	3.59	**0.04**
X Variable 6	-0.001	0.004	-0.43	**0.70**

Meanwhile, the table above provides us the result of regression on the data set of cargo handling and stevedoring services. X variable 1 (number of establishment) and X variable 5 (Salaries & Wages Paid) showed statistical significance by p – value lower than 0.05. As a

consequence, X variable 5 with 0.03693 of p – value was chosen over X variable 1 for single variable regression analysis.

Table 4.11 Result of Single Variable Regression on the X variable 5 (Salaries & Wages Paid) of Cargo Handling and Stevedoring Services in Malaysia (2000 – 2010)

R Square	F	Coefficients		t	p-value
0.65	15.15	Y – intercept	3.23	2.19	0.06
		X Variable 5	0.48	3.89	0.004

In accordingly, the above shown is the result of R square, F, coefficients, t and p-value for the single variable regression.

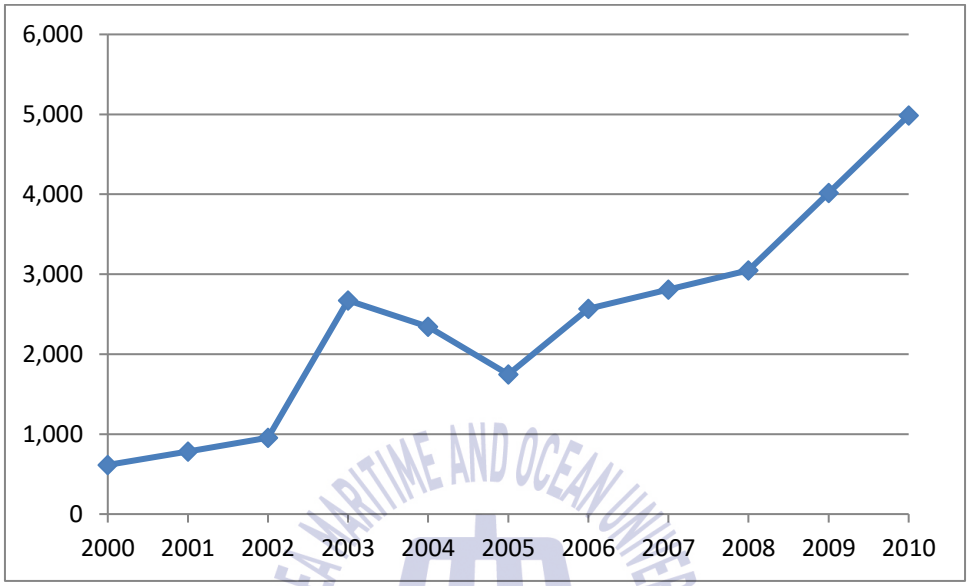
Table 4.12 Forecasted Number of Human Resource Demand for Cargo Handling and Stevedoring Services in Malaysia, Year 2011

	2010 Salaries & Wages Paid (RM '000)	2011 Human Resource Forecast
Value (LN)	225,455 (12.33)	9466.65 (9.16)

Based on the regression model, applying logarithm on the value obtained by adding both coefficients and multiplication with logarithm of 2010 year's salaries and wages amount could then enable us to forecast the human resource demand of 2011 to be 9467 people.

4.2.3 Storage and Warehousing

Figure 4.4 Trend Line Illustration of Number of Employees for Storage and Warehousing in Malaysia (2000 – 2010)



In general, the number of employees for storage and warehousing services in Malaysia throughout the years 2000 to 2010 had portrayed an upward trend. The number of employees had grown progressively for the first three years before marking a rapid climb in the year 2003. However, we could also observe a downward trend between years 2003 to 2005. Despite the fall, ever since 2005, the number of employees rose noticeably in 2006; increased gradually between years 2006 to 2008; and then hiked up swiftly throughout years 2008 to 2010.

Table 4.13 Number of Employees and Percentage of Changes for Storage and Warehousing in Malaysia (2000 – 2010)

Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
No. Of Employees	615	784.5	954	2,674	2,343	1,747	2,570	2,810	3,050	4,018	4,986
% of Changes (%)		27.6	21.6	180.3	-12.4	-25.4	47.1	9.3	8.5	31.7	24.1

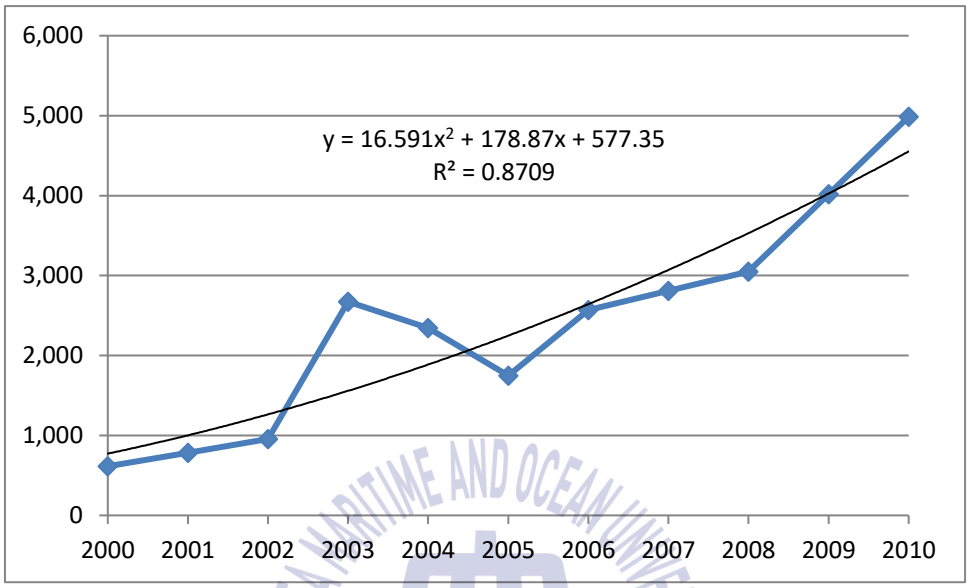
Now, turning to the details of percentage of changes, the increase of number of employees from yearb2002 to 2003 is the most significant upward trend over the years, constituting 180.3% of addition. Meanwhile, the decrease in number of employees from year 2004 to 2005 (-25.4%) is more substantial than the drop from year 2003 to 2004 (- 12.4%).

Table 4.14 Result of Regression on the Data Set of Storage and Warehousing in Malaysia (2000 – 2010)

	Coefficients	*Standard Error*	*t Stat*	*P-value*
Intercept	11.06	33.86	0.33	**0.77**
X Variable 1	0.20	1.34	0.15	**0.89**
X Variable 2	-10.30	13.94	-0.74	**0.51**
X Variable 3	4.57	6.34	0.72	**0.52**
X Variable 4	5.33	7.27	0.73	**0.52**
X Variable 5	0.64	1.15	0.56	**0.62**
X Variable 6	0.10	1.84	0.05	**0.96**

The table above indicates the result of regression for multiple variables. It can be clearly seen that the p – values for all variables are equally high, which is at least 0.50 and above. For the sake of better statistical significance, we decided on time series regression to analyze the data set.

Figure 4.5 Illustration of 2nd Order – polynomial Time Series Line of Number of Employees for Storage and Warehousing in Malaysia (2000 – 2010)



The shown graph above is the 2nd polynomial regression trend line. With 2nd order chosen, statistical significance as much as 87.09% could be reached.

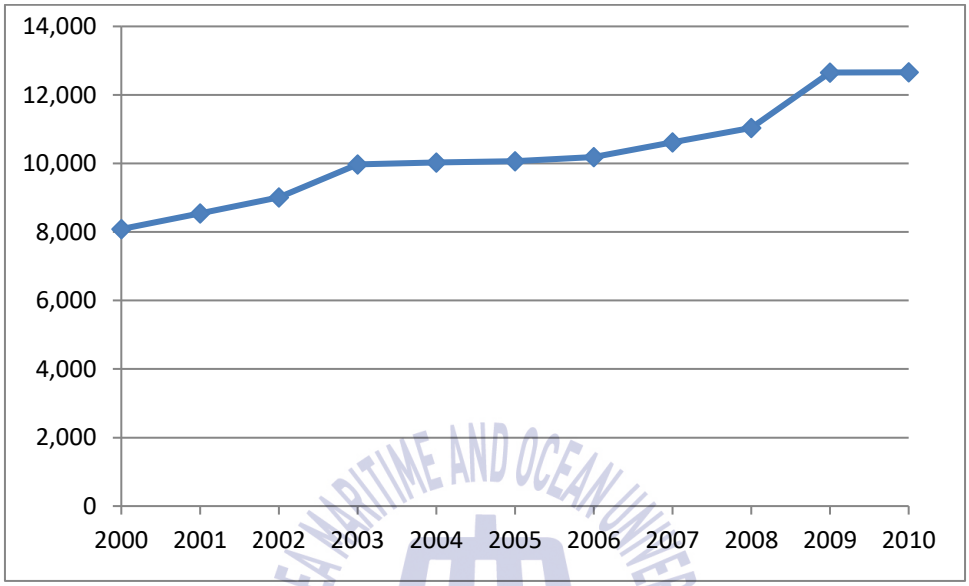
Table 4.15 Forecasted Number of Human Resource Demand for Storage and Warehousing in Malaysia, Year 2011

Polynomial Regression Equation	2011 Human Resource Forecast
$y = 16.591x^2 + 178.87x + 577.35$	5112.90

Deducing from the 2nd order polynomial regression equation, we could forecast the human resource demand for storage and warehousing services in 2011 to be around 5113 people.

4.2.4 Port Operation

Figure 4.6 Trend Line Illustration of Number of Employees for Port Operation in Malaysia (2000 – 2010)



Over the years 2000 to 2010, the number of employees for port operation services in Malaysia displayed a gentler upward trend. Especially between years 2003 to 2005 and from year 2009 to 2010, the graph shows almost plateau trend. While from the year 2002 to 2003 and from year 2008 to 2009, the number of employees had increased more significantly compared to the rest of the years.

Table 4.16 Number of Employees and Percentage of Changes for Port Operation in Malaysia (2000 – 2010)

Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
No. Of Employees	8,085	8, 546.5	9, 008	9, 976	10, 025	10, 070	10, 192	10, 613	11, 034	12, 651	12, 661
% of Changes (%)		5.7	5.4	10.7	0.5	0.4	1.2	4.1	4.0	14.7	0.1

The percentage of changes of number of employees between the years well – supported the descriptions for the graph above. Exclude the two significant rises in year 2003 and year 2009, the growth of number of employees for the rest of the years are all below than 6.0%.

Table 4.17 Result of Regression on the Data Set of Port Operation in Malaysia (2000 – 2010)

	Coefficients	*Standard Error*	*t Stat*	*P-value*
Intercept	1.18	2.77	0.43	**0.70**
X Variable 1	0.76	0.31	2.44	**0.09**
X Variable 2	8.03	2.84	2.82	**0.07**
X Variable 3	-3.28	1.09	-3.00	**0.06**
X Variable 4	-4.92	1.81	-2.71	**0.07**
X Variable 5	0.49	0.37	1.35	**0.27**
X Variable 6	-0.20	0.25	-0.80	**0.48**

P – values for the regression analysis of data set of port operation from year 2000 to 2010 is denoted as above. Comparing across the X variables, we had settled on using X variable 3 (Value of Intermediate Input) to proceed with single variable regression analysis.

Table 4.18 Result of Single Variable Regression on the X variable 3 (Value of Intermediate Input) of Port Operation in Malaysia (2000 – 2010)

R Square	F	Coefficients		t	p-value
0.91	79.32	**Y – intercept**	4.87	9.89	0.0000092
		X Variable 3	0.32	8.91	0.000020

From the single variable analysis, the value of R square, F, coefficients, t and p – values are calculated. The above table serves as clearer reference on respective values.

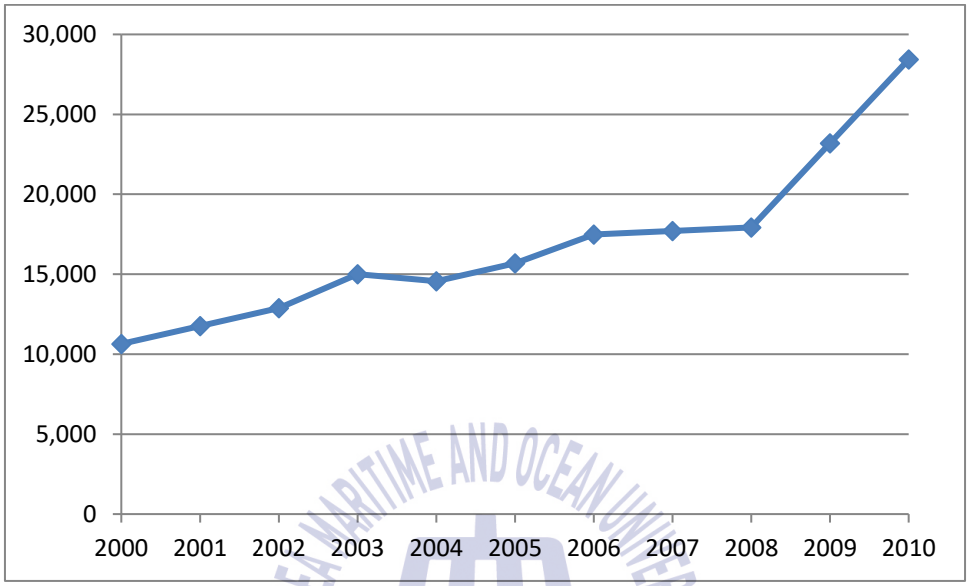
Table 4.19 Forecasted Number of Human Resource Demand for Port Operation in Malaysia, Year 2011

	2010 Value of Intermediate Input (RM '000)	2011 Human Resource Forecast
Value (LN)	1,405,964 (14.16)	12084.01 (9.40)

According to the regression model, we can forecast the human resource demand of 2011 to be 12084 people by applying logarithm on the value which is obtained from adding both coefficients and multiplication with logarithm of 2010 year's value of intermediate input.

4.2.5 Shipping and Forwarding Companies

Figure 4.7 Trend Line Illustration of Number of Employees for Shipping and Forwarding Companies in Malaysia (2000 – 2010)



The graph above has outlined a rising trend for the number of employees of shipping and forwarding agencies services in Malaysia between the years 2000 to 2010. The graph depicts a moderate growth from year 2000 to 2003; a slight fall in year 2004 before rising back noticeably between years 2004 to 2006; followed by a marginal climb from year 2006 to 2008; and ended with substantial soar from year 2008 to 2010.

Table 4.20 Number of Employees and Percentage of Changes for Shipping and Forwarding Companies in Malaysia (2000 – 2010)

Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
No. Of Employees	10, 645	11, 767.5	12, 890	15, 015	14, 574	15, 689	17, 481	17, 709	17, 937	23, 183.5	28, 430
% of Changes (%)		10.5	9.5	16.5	-2.9	7.7	11.4	1.3	1.3	29.2	22.6

The percentage of changes in number of employees showcased high increase of changes in 2009 and 2010, which were 29.2% and 22.6 % respectively. The increase percentage of significant growth between years 2000 to 2003 and between years 2004 to 2006 is within the range of 7.7% to 16.5%.

Table 4.21 Result of Regression on the Data Set of Shipping and Forwarding Companies in Malaysia (2000 – 2010)

	Coefficients	*Standard Error*	*t Stat*	*P-value*
Intercept	-9.91	11.77	-0.84	**0.46**
X Variable 1	1.20	0.37	3.23	**0.05**
X Variable 2	11.23	14.68	0.77	**0.50**
X Variable 3	-7.97	10.12	-0.79	**0.49**
X Variable 4	-3.42	5.03	-0.68	**0.55**
X Variable 5	1.05	0.80	1.32	**0.28**
X Variable 6	-0.50	0.17	-2.94	**0.06**

The table enumerates the respective p – values for the regression analysis of data set of shipping and forwarding agencies services in Malaysia between the years 2000 to 2010. X variable 1 (No. of

Establishment) with sound p – value was considered for further single variable regression analysis.

Table 4.22 Result of Single Variable Regression on the X variable 1 (No. of Establishment) of Shipping and Forwarding Companies in Malaysia (2000 – 2010)

R Square	F	Coefficients		t	p-value
0.85	44.85	Y – intercept	1.26	1.00	0.35
		X Variable 1	1.25	6.70	0.00015

The values of R square, F, coefficients, t and p – values calculated from single variable regression analysis are presented inn table shown above.

Table 4.23 Forecasted Number of Human Resource Demand for Shipping and Forwarding Companies in Malaysia, Year 2011

	2010 No. of Establishment (Unit)	2011 Human Resource Forecast
Value (LN)	1,450 (7.28)	31,319 (10.35)

Following regression model, the human resource demand of 2011 could be forecasted as 31319 people by first adding both coefficients and multiplication with logarithm of 2010 year's number of establishments; then applying logarithm on the resulted value.

4.2.6 Summary of the Short – term Forecasted Human Resource Demand for Shipping and Port Logistics Malaysia in 2011

Table 4. 24 Summary of Data Regarding the Short – term Forecasted Human Resource Demand for Shipping and Port Logistics Malaysia in 2011

No.	Sectors of Industry	Forecasting Approach	Factor Used	Forecasted Human Resource Demand for Year 2011	Year 2010	Rate of Change (%)
1	Sea Transport	Polynomial Regression	No. of Employees	17,973	20,973	-14.30
2	Cargo Handling and Stevedoring Services	Multiple Regression	Salaries & Wages Paid	9,467	9, 243	2.42
3	Storage and Warehousing	Polynomial Regression	No. of Employees	5,113	4,986	2.55
4	Port Operation	Multiple Regression	Value of Intermediate Input	12,084	12,661	-4.56
5	Shipping and Forwarding Companies	Multiple Regression	No. of Establishment	31,319	28,430	10.16
Total				**75,956**	**76,293**	**-0.44**

Summarising the 5 sub – sectors relevant to shipping and port logistics Malaysia, we can conclude that the total short – term forecasted human resource demand for year 2011 is 75, 956 people. Comparing to year 2010, it is a slight decrease of 0.44%.

4.3 Comparison between Malaysia's and Korea's Human Resource Forecast

4.3.1 Comparison of Classifications of Sub – sectors for Shipping and Port Logistics in Malaysia and Korea

The Korean research paper entitled " The Study on the Forecasting of Human Resource Demand and Supply Plan in Shipping and Port Logistics Industry " by Han Hee Jung (2015) had forecasted 18 sub – sectors relevant to shipping and port logistics in Korea. Data of those 18 sub – sectors were available for research purposes by that moment. Unlike Malaysia, the data of labour force regarding shipping and port logistics industry is only available for a few sub – sectors. And, the sub – sectors with meaningful data source for this study are limited to only first five. Table below summarises the sub – sectors with data of labour force available for both Malaysia and Korea.

Table 4.25 Comparison of Sub – sectors which Provide Labour Force Data for Shipping and Port Logistics Industry in Malaysia and Korea

No.	Sub – sectors which Provide Labour Force Data for Shipping and Port Logistics Industry in Malaysia	No.	Sub – sectors which Provide Labour Force Data for Shipping and Port Logistics Industry in Korea
1	Sea transport	1	International passenger transportation business
2	Cargo handling and stevedoring services	2	International cargo transportation business
3	Storage and warehousing	3	Domestic passenger transportation business
4	Port operation	4	Domestic cargo transportation business
5	Shipping and forwarding companies	5	Other marine transportation business
6	Inland water transport	6	Inland water passenger transportation business
7	Other support activities for transportation	7	Other inland water transportation business
		8	Other water transportation supporting services
		9	Multimodal freight forwarding business
		10	General warehouses
		11	Refrigeration and freezing warehouses
		12	Agricultural products warehouses
		13	Dangerous goods storage warehouses
		14	Other storage and warehouses
		15	Transportation within ports
		16	Operation of ports and other marine terminals
		17	Ferry Services
		18	Water cargo handling

Source : Han – Hee Jung (2015)

Comparing and matching both Malaysia and Korea's forecasts, we can find 14 sub – sectors studied by Han Hee – Jung (2015) relevant in corresponding to the 5 sub – sectors being studied in Malaysia's case. The sub – sectors could be further grouped into the following table.

Table 4.26 Comparison between Malaysia and Korea Regarding the Differentiation, Classification and Grouping of Sub – sectors Relevant to Shipping and Port Logistics Industry (According to Relevancy)

No.	Sub – sectors of Shipping and Port Logistics Industry in Malaysia	Sub – sectors of Shipping and Port Logistics Industry in Korea
1	Sea Transport	International passenger transportation business
		International cargo transportation business
		Domestic passenger transportation business
		Domestic cargo transportation business
		Other marine transportation business
2	Cargo Handling and Stevedoring Services	Transportation within ports
		Water cargo handling
3	Storage and Warehousing	General warehouses
		Refrigeration and freezing warehouses
		Agricultural products warehouses
		Dangerous goods storage warehouses
		Other storage and warehouses
4	Port Operation	Operation of ports and other marine terminals
5	Shipping and Forwarding Companies	Multimodal freight forwarding business

4.3.2 Comparison between Malaysia and Korea Regarding the Input Factors for Human Resource Demand Forecast of Shipping and Port Logistics Industry (According to Each Sub – sectors)

Comparing the input factors for both nations, we can notice that Malaysia had used the number of employees, salaries and wages, value of intermediate inputs and number of establishments to forecast human resource needs. While on top of those mentioned, Korea had also used number of facilities and storage, sales value, and value of tangible assets to forecast manpower demand, offering more choices on input factors.

Table 4.27 Comparison between Malaysia and Korea Regarding the Input Factors for Human Resource Demand Forecast of Shipping and Port Logistics Industry (According to Each Sub – sectors)

Sub – sectors of Shipping and Port Logistics Industry in Malaysia	Sub – sectors of Shipping and Port Logistics Industry in Korea	Input Factors for Malaysia	Input Factors for Korea
Sea Transport	International passenger transportation business	No. of Employees	No. of Establishments
	International cargo transportation business		Salaries & Wages Paid
	Domestic passenger transportation business		Value of Tangible Assets
	Domestic cargo transportation business		No. of Employees
	Other marine transportation business		No. of Facilities and Storage
Cargo Handling and Stevedoring Services	Transportation within ports	Salaries & Wages Paid	Sales Value
	Water cargo handling		No. of Employees
Storage and Warehousing	General warehouses	No. of Employees	No. of Employees
	Refrigeration and freezing warehouses		Value of Tangible Assets
	Agricultural products warehouses		No. of Employees
	Dangerous goods storage warehouses		No. of Facilities and Storage
	Other storage and warehouses		No. of Establishments
Port Operation	Operation of ports and other marine terminals	Value of Intermediate Input	No. of Employees
Shipping and Forwarding Companies	Multimodal freight forwarding business	No. of Establishment	No. of Employees

4.3.3 Comparison between Malaysia and Korea Regarding the Forecasting Approaches and Summary of Meaningful Results of Human Resource Demand Forecasts for Shipping and Port Logistics Industry (According to Each Sub – sectors)

Malaysia's forecast utilized multiple regression approach for 3 out of 5 sub – sectors which were being studied, namely cargo handling and stevedoring services, port operation as well as shipping and forwarding companies. Meanwhile, Korea's forecast used multiple regression approach for 8 out of 14 sub – sectors which were being studied, namely international passenger transportation business, international cargo transportation business, domestic passenger transportation business, other marine transportation business, transportation within ports, refrigeration and freezing warehouses, dangerous goods storage warehouses as well as other storage and warehouses. Given multiple regression approach indicating meaningful and more precise forecasts, then we can induce that 3 out of 5 sub – sectors in Malaysia's shipping and port logistics industry had shown meaningful forecasts for the future; whereas 8 out of 14 sub – sectors in Korea's shipping and port logistics industry had shown meaningful forecasts for the future.

Table 4.28 Comparison between Malaysia and Korea Regarding the Forecasting Approaches and Summary of Meaningful Results of Human Resource Demand Forecasts for Shipping and Port Logistics Industry (According to Each Sub – sectors)

Sub – sectors of Shipping and Port Logistics Industry in Malaysia	Sub – sectors of Shipping and Port Logistics Industry in Korea	Forecasting Approaches Used by Malaysia	Meaningful Results for Malaysia	Forecasting Approaches Used by Korea	Meaningful Results for Korea
Sea Transport	International passenger transportation business	Polynomial Regression	No	Multiple Regression	Yes
	International cargo transportation business			Multiple Regression	Yes
	Domestic passenger transportation business			Multiple Regression	Yes
	Domestic cargo transportation business			Polynomial Regression	No
	Other marine transportation business			Multiple Regression	Yes
Cargo Handling and Stevedoring Services	Transportation within ports	Multiple Regression	Yes	Multiple Regression	Yes
	Water cargo handling			Polynomial Regression	No
Storage and Warehousing	General warehouses	Polynomial Regression	No	Polynomial Regression	No
	Refrigeration and freezing warehouses			Multiple Regression	Yes
	Agricultural products warehouses			Polynomial Regression	No
	Dangerous goods storage warehouses			Multiple Regression	Yes
	Other storage and warehouses			Multiple Regression	Yes
Port Operation	Operation of ports and other marine terminals	Multiple Regression	Yes	Polynomial Regression	No
Shipping and Forwarding Companies	Multimodal freight forwarding business	Multiple Regression	Yes	Polynomial Regression	No

4.4 Discussion and Implementation

As a wrap up, comparison between Korea's and Malaysia's human resource demand forecasting of shipping and port logistics industry suggests that Korea's forecasts are more precise and meaningful compared to Malaysia's case. A few underlying factors which contribute to this sum up are to be discussed below.

First and foremost, the precision and accuracy of Korea's human resource demand forecasts denote to its synchronization of data provision in according to the Korea Standard Industrial Code (KSIC). Before going into details, let's take a look at Table 4.29 below which shows Malaysia Standard Industrial Code (MSIC) 2008 Ver. 1.0; and Table 4.30 that shows Korea Standard Industrial Code (KSIC). Following the standard industrial codes of both nations, Section H is allocated for transportation and storage services. Each section is then classified into different divisions and finally further divided into different groups and specific items of services. The ' √ ' mark indicates sub – sectors with labour source data provision.

Table 4.29 Section H of Malaysia Standard Industrial Code (MSIC) 2008

Section H : Transportation and Storage			
Division 50 : Water Transport			
	Group 501 : Sea and coastal water transport		
Class		**Item**	**Description**
	5011		Sea and coastal passenger water transport
		50111	Operation of excursion, cruise or sightseeing boats
		50112	Operation of ferries, water taxis
		50113	Rental of pleasure boats with crew for sea and coastal water transport
	5012		Sea and coastal freight water transport

		50121	Transport of freight overseas and coastal waters, whether scheduled or not
		50122	Transport by towing or pushing of barges, oil rigs
√	**Group 502 : Inland water transport**		
Class		**Item**	**Description**
	5021		Inland passenger water transport
		50211	Transport of passenger via rivers, canals, lakes and other inland waterways
		50212	Rental of pleasure boats with crew for inland water transport
	5022		Inland freight water transport
		50220	Transport of freight via rivers, canals, lakes and other inland waterways
DIVISION 52 : WAREHOUSING AND SUPPORT ACTIVITIES FOR TRANSPORTATION			
Group 521 : Warehousing and storage			
Class		**Item**	**Description**
	5210		Warehousing and storage
√		52100	Warehousing and storage services
Group 522 : Support activities for transportation			
Class		**Item**	**Description**
	5222		Service activities incidental to water transportation
		52221	Port, harbours and piers operation services
		52222	Vessel salvage and refloating services
		52229	Other service activities incidental to water transportation n.e.c
√	5224		Cargo handling
√		52241	Stevedoring services
		52249	Other cargo handling activities n.e.c.
√	5229		Other transportation support activities
		52291	Forwarding of freight
		52292	Brokerage for ship and aircraft space
		52299	Other transportation support activities n.e.c

Source : Department of Statistics Malaysia (DOS) official portal » Methods & Classifications » Codes & Classifications » Economic Classifications » Malaysia Standard Industrial Code (MSIC) Ver. 1.0 2008

Table 4.30 Section H of Korea Standard Industrial Code (MSIC) 2008

Section H : Transportation and Storage				
Division 50 : 수상 운송업 Water Transport				
Group 501 : 해상 운송업 Sea and coastal water transport				
Class		**Item**		**Description**
	5011		외항 운송업	Sea water transport
√		50111	외항 여객 운송업	Sea passenger water transport
√		50112	외항 화물 운송업	Sea freight water transport
	5012		내항 운송업	Coastal water transport
√		50121	내항 여객 운송업	Coastal passenger water transport
√		50122	내항 화물 운송업	Coastal freight water transport
	5013		기타 해상 운송업	Other sea and coastal water transport
√		50130	기타 해상 운송업	Other sea and coastal water transport
Group 502 : 내륙 수상 및 항만 내 운송업 Inland water transport				
Class		**Item**		**Description**
√	5020		내륙 수상 및 항만 내 운송업	Inland water transport
		50201	내륙 수상 여객 및 화물 운송업	Inland passenger and freight water transport
√		50202	항만 내 여객 운송업	Harbour passenger transport
√		50209	기타 내륙 수상 운송업	Other inland water transport
Division 52 : 창고 및 운송관련 서비스업 Warehousing and support activities for transportation				
Group 521 : 보관 및 창고업 Warehousing and storage				
Class		**Item**		**Description**
	5210		보관 및 창고업	Warehousing and storage
√		52101	일반 창고업	General warehousing
√		52102	냉장 및 냉동 창고업	Refrigerated and frozen warehousing
√		52103	농산물 창고업	Farm products warehousing
√		52104	위험물품 보관업	Dangerous goods warehousing

√		52109	기타 보관 및 창고업	Other warehousing and storage
Group 529 : 기타 운송관련 서비스업 Support activities for transportation				
Class		**Item**		**Description**
	5292		수상 운송지원 서비스업	Service activities incidental to water transportation
√		52921	항구 및 기타 해상 터미널 운영업	Operation of harbour and marine terminal facilities
√		52929	기타 수상 운송지원 서비스업	Other service activities incidental to water transportation
	5294		화물 취급업	Cargo handling
√		52942	수상 화물 취급업	Marine cargo handling
	5299		그 외 기타 운송관련 서비스업	Other support activities for transportation n.e.c.
		52991	통관 대리 및 관련서비스업	Activities of customs agents and related services
		52992	화물운송 중개, 대리 및 관련 서비스업	Activities of freight forwarders and cargo agents and related services
		52993	화물 포장, 검수 및 계량 서비스업	Activities of cargo packing, checking and weighing services
		52999	그 외 기타 분류 안된 운송 관련 서비스업	Other supporting transport services n.e.c.

Source : Korea Standard Statistical Classification homepage » Industrial Classifications » Transportation & Storage

Unequivocally, the differences between the industrial codes should be appreciated for every country has its own industry nature. However, comparing between Malaysia's and Korea's cases, we can notice that Korea observes high consistency in providing data according to their standard industrial codes. While in Malaysia's context, despite that the classification of maritime industry as according to standard industrial code is specific, data provision of current researches and studies on labour force of shipping

and port logistics Malaysia unfortunately do not follow such specific classification. Particularly, the main data source report ‘ Economy Census 2011 – Transportation and Storage Services ’ had depicted figures and statistics for classifications of sub – sectors different from those stated in MISC 2008. And in fact, towards collecting more recent data regarding the manpower of shipping and port logistics Malaysia, the author had come across another report relevant to the manpower of shipping and port logistics in Malaysia, which entitled ‘ Statistics of Transportation and Storage Services 2015 ’ on the website of Department of Statistics Malaysia (DOS). But the particular report unfortunately, only presented data for 2 general categories, namely water transport as well as warehousing and support activities. Putting oneself in the shoe of audience, it is undoubtedly confusing to understand and compare the statistics when he or she reads those 3 reports. This implied that some effort on systematising and sychronising should be done. Systematic display of data based on the standard industrial code is believed to be able to provide a clearer glance on the contemporary manpower trend growth for any industry in Malaysia as the standard industrial code of a nation is devised to perfectly reflect its industrial characteristics as well as ensure its international comparability.

On top of the above, provision of data as according to standard industrial codes is also necessary because we need precision for a better forecasting results. For example, while Malaysia provides only data for ‘ Storage and Warehousing ’ in general; Korea presented data specifically for ‘ General warehouses ’, ‘ Refrigeration and freezing warehouses ’, ‘ Agricultural products warehouses ’, ‘ Dangerous goods storage warehouses ’ and ‘ Other storage and warehouses ’. Explicit data presentation by Korea is undeniably preferably encouraging, especially

when we are now towards emboldening high value added activities within the industry. It is a boon for us to know in specific the exact needs and talents that we are lack for. For instance, the skills needed to handle general storage are different from those required to handle dangerous goods storage. Inductively, tallying employees of ‘ Sea and Coastal Freight Water Transportation ’ as well as ‘ Sea and Coastal passenger water transportation ’ under the big hat of ‘ Sea Transport ’ is quite challenging for us to observe the required number of labour force with specific skills because the skills to handle freight is different from those to handle passenger. Despite some might claim the difference in between is not that significant, strategic planning towards achieving goal can never curtail precision in measurement.

Apart from that, consistency in updating the labour force data is evidently another contributor to the precision and accuracy of Korea’s human resource demand forecasts. Korea conducts Transportation Survey annually and hence, Han Hee Jung (2015) was able to use data from year 2000 to 2013 for her analysis. Whereas Malaysia conducts Economy Census for Transportation and Storage Services once in every 5 years which ends up this paper using data from 2000 to 2010. As a matter of fact, the gap between 2010 to current could lead to error in forecasting due to technological changes, seasonal changes and the like over the time gap. Worse still, there are some sub – sectors in Malaysia case had no information available for some years. Hence, Malaysia authority should consider updating data from time to time in order to secure accurate short – term forecasting and to facilitate effective long term forecasting.

The last but not least, the completeness of Korea’s database is another point needed to be mentioned. Looking into Korea’s case, by just browsing through the statistical database of Korea Standard Industrial

Services (KOSIS) for Transportation Survey, we can easily obtain the necessary figures by marking the sub – sectors, variables and time that we wish to retrieve. In contrast to Malaysia's circumstances, we do not usually conduct this kind of survey for maritime transportation as a whole; and hence, we need to collect scattered data authentically from sources everywhere in the nation or virtually browsing through different official government websites for example Department of Statistics (DOS), Ministry of Transportation (MOT), Maritime Institute of Malaysia (MIMA) and the like. But, it is never an easy job. Worsen by data transparency issue, it at times hinders effective research processes as well as hampers research passion. Hence, such an overview or explicit data allocation is of fundamental need to help saving a lot mundane work.

4.5 Planning Human Resource Supply

Towards accurate human resource demand forecast and effective manpower supply, government is undeniably playing its heavy mass. The government agencies should provide more data systematically to avoid beating – around – the – bush kind of perception on national labour market. Determination of human resource demand and supply at multiple levels like universal, national, provincial, regional, and local, should be conducted by eliciting cooperation from all relevant representatives such as Ministry of Human Resource (MOHR), Department of Statistics (DOS), Ministry of Transportation (MOT) and the like. The government should determine the number of employees in each sub – division within the shipping and port logistics industry as well as the required knowledge, skills, abilities, and other characteristics (KSAOs) by taking into account the technological

advancement trend, labour force participation rate and productivity level, economic growth, education attainment levels and more. Another important thing that the government should take note is unequivocally the forecasting and planning horizon as it judges about how far into future the insights could be provided under acceptable levels of uncertainties for operational, organizational as well as environmental concerns. Regardless of how complex and sophisticated the planning techniques are, the further into the future HR plans are, the higher the level of uncertainty. Hence, it is more reassuring for government to conduct short – term forecasts as well on top of the long – term forecasts. Consistency of data, updated

Based on the information on labour force market provided by our government, the company and associations should then forecast manpower demand and supply internally. Either skills inventory or human resource audit as a systematic computerized analysis of the staff members should be executed. And company should also mind about their forecasting and planning horizon as well because annual forecast could identify short – term or immediate workforce such as employee exits, replacements and promotions; while longer horizon could allow sufficient lead time to actively recruit, select, train, and transfer staff as required. Middle – term forecast can assist a company to procure human resource planning strategies.

Then, the government who in – charges of manpower demand and supply forecasting at larger extent as well as the associations or stake holders who can provide information about own internal human resource demand and supply, should come together and cooperate for long term control over human resource demand forecasting and supply planning. Both parties should supply information which could reflect the contemporary requirements in each context so that both parties can cater for their human

resource planning by matching internal and external environments. In addition to that, both authorities should also monitor any trend changes or structural changes in labour market so as to make meaningful adaptive plan accordingly. Planning is not static activity, neither the maritime industry is. Hence, plans should always be updated periodically to fit into contemporary needs.

Last but not least, the education authorities and government should also sit on a round table to devise education system that could help to develop required talents for Malaysia's Shipping and Port Logistics industry. Educational objectives were said to be best gained in the pursuit of all interest. Widest possible participation from all interested parties could hammer out most sensible alternatives to the problem we faced (Lyons, R., 1964). The least time span needed to cultivate a pool of competent labour force ranges between 2 to 3 years. Hence, to assure sustainable manpower supply for an industry, the human resource planner should have an adequate plan in hand about 2 or 3 years in prior to plan implementation date. To illustrate, Malaysia Transport Training (MATRAIN), Malaysia Maritime Academy (ALAM), Ministry of Higher Education Malaysia (MHE) as well as other private institutes should work hand in hand in drawing up a planning framework for resources allocation to education. More attention and effort should be rendered to further develop Maritime Education and Training (MET) in according to Standards of Training, Certification and Watchkeeping for Seafarers (STCW). As far as being concerned, ALAM remains as the only MET institute in Malaysia while we actually need more to nurture a sufficient pool of professional talents in as nearer future as we could.

Chapter 5 : Conclusion

5.1 Review of Findings

This study analyses the employment trends for 5 sub – sectors in shipping and port logistics industry of Malaysia, namely sea transport, cargo handling and stevedoring services, storage and warehousing services, port operations services as well as shipping and forwarding services. 3 out of the 5 sub – sectors being studied, namely cargo handling and stevedoring services, port operation as well as shipping and forwarding companies had showed meaningful results in the analysis of forecasting. The number of forecasted human resource demand is 17, 973 people for sea transport, 9,467 for cargo handling and stevedoring services, 5,113 people for storage and warehousing, 12,084 people for port operation, and 31,319 people for shipping and forwarding companies. With this, we conclude that the total forecasted human resource demand for shipping and port logistics Malaysia in year 2011 is 75,956 people.

Focusing on comparison with Korean case by Han Hee – Jung (2015), Korea's data on labour force is comparatively much more specific and up – to – date, which appears to be the shortcoming in Malaysia's context. There are together 18 sub – sectors being studied in Han Hee – Jung's paper and among them, 14 were found relevant to Malaysia's case and could be utilized for a comparison, namely, international passenger transportation business, international cargo transportation business, domestic passenger transportation business, domestic cargo transportation business, other marine transportation business, transportation within ports, water cargo handling, general warehouses, refrigeration and freezing

warehouses, agricultural products warehouses, dangerous goods storage warehouses, other storage and warehouses, operation of ports and other marine terminals and multimodal freight forwarding business. A sum of 8 out of 14 sub – sectors which were being studied portrayed meaningful results in forecasting, namely international passenger transportation business, international cargo transportation business, domestic passenger transportation business, other marine transportation business, transportation within ports, refrigeration and freezing warehouses, dangerous goods storage warehouses as well as other storage and warehouses.

Owing to the concerns of forecasting by using more recent data, a bigger data sample as well as detailed sub – sectors, it is evident that Korean case showed higher precision and accuracy in forecasting human resource demand for shipping and port logistics industry. General data provision in Malaysian case could have neglected the unique business natures of the sub – sectors within shipping and port logistics Malaysia. Worsen by the obsolete data, the forecasted results in Malaysian case could not be deemed to verify the human resource demand trends for shipping and port logistics in Malaysia.

5.2 Research Limitations

Unequivocally, the major research limitation of this study is regarding the inconsistency of data provision for shipping and port logistics Malaysia. Data provision in Malaysia does not follow the detailed classifications as shown in the nation's standard industrial code. Back to the scratch, this study entitles ' Human Resource Demand Forecasting of Shipping and Port Logistics in Malaysia '. To accentuate, this paper aims to gather the segregated labour force data of the sub – sectors pertaining to shipping and port logistics in Malaysia so as to provide an overview of the current demand trend. However, generalization of data provision has led to ignorance with regard to the unique natures for each of the businesses within shipping and port logistics industry. Owing to this particular concern, this study could not attain precision in its forecasting results.

Second limitation of this paper concerns about the data collection. To illustrate, the data provided by the report is of previous time frames, specifically from 2000-2010 as the report is updated once in every five years. The lack of recent data might lead to inaccuracy of forecasting result. This is because over the years, the pervasive risks of maritime industry could bring some structural changes to the variables that we used to forecast manpower demand. Hence, we could not simply assume that the former trend will continue into future. And as mentioned earlier, one of the most detailed data source pertaining to labour force of shipping and port logistics in Malaysia is the ' Economic Census 2011 - Transportation & Storage Services ' report with reference to year 2010. However, the report is only updated once in every 5 years. Up to the finalization of this paper, the ' Economy Census Report 2016 for Transportation and Storage Services ' is yet released.

Then, empty data for some of years is definitely detrimental to this research. Initially, 7 sub – sectors relevant to maritime industry (the 5 studied, including inland water transport and other support activities for transportation) were found. Nonetheless, two of the sub – sectors were eventually omitted from this study owing to information gap. There was basically no information provided for some of the years in the case of inland water transport. While in the case of other support activities for transportation, there was only mere provision of data for year 2010. Consequently, in a critical way, this study could not be taken as a full – scale and comprehensive study that duly represents the overview of human resource demand forecasting for shipping and port logistics in Malaysia.

Worse still, looking into details, the data sample used in this paper is extremely restricted. Forecasting results obtained from 10 years of data sample do not verify the correct distribution of the trend for the demand. As we know generally, a forecast will require at least 30 years of data sample to illustrate an accurate trend pattern. However, back in Malaysia, we only started ‘ Economy Census Report ’ from year 2000. Lacking evident support from the past, predictions into future could be doubtful.

On top of that, to avoid bias in reading and interpreting the content of this study, the following table depicts term definitions for the relevant sub - sectors of shipping and port logistics in Malaysia. To illustrate, ‘ Economic Census 2011 - Transportation & Storage Services ’ had referred to Malaysia Standard Industrial Code (MSIC) 2008 Ver. 1.0 for the following technical notes :

Table 4.30 Definition of Technical Terms in Economy Census Report 2011 on Transportation and Storage Services

1	**Sea and coastal water transport**	Refer to services of establishments which operate vessels for transporting freight and passengers overseas and coastwise. Towing and pushing services for boats / vessels on the high seas and managing operations of vessels for other owners are included. Inland water transport is excluded.
2	**Cargo handling / stevedoring**	Refer to services of establishments which provide loading and unloading of goods or passenger luggage irrespective of the mode of sea-going transport used for transportation and stevedoring services.
3	**Storage & warehousing**	Refer to services related to storage facilities for all kinds of goods in grain elevator, general merchandise warehouse, refrigerated warehouse etc. Included are warehousing of furniture, automobiles, lumber, gas and oil, textiles, food and agricultural product etc. as well as storage of goods in foreign trade zones.
4	**Port operations**	Refer to services related to waterway lock operation, traffic control activities, navigation pilotage, berthing activities and lighterage.
5	**Shipping & forwarding agencies**	Refer to freight forwarding and brokerage services (including custom house brokerage); ship brokerage services including ship leasing brokers, packing, crating, inspecting, sampling and weighting services to shippers or shipping organisations; and care of animals pending transport.
6	**Inland water transport**	Refer to services of establishments which operate vessels for transporting freight and passengers via rivers, canals and other inland waterways such as harbours and ports by boat and sampan whether scheduled or not. Rental of pleasure boats with crew for inland water transport are included.
7	**Other support activities for transportation**	Refer to the other services from support transport services . It is included towing and road side assistance, and crane services.

Source : Economy Census Report 2011 for Transportation & Storage Services

5.3 Implications and Recommendations for Future Research

This study is however, a pioneering contribution to Malaysia's maritime industry by addressing the urgency of gathering the scattered market information regarding labour force in shipping and port logistics of Malaysia; as well as puzzling them into a complete picture that could provide insights of specific human resource demand and supply of the industry and its relevant sub - sectors. It is hoped that its findings and deliberations will be able to provide valuable leads for other researchers; and pave the way for more in-depth exploration on this subject. Adding to discussions done in previous chapter, appropriate policies should be devised to manage the consistency of updating data and defining the sub – sectors of shipping and port logistics in Malaysia. Consistency in updating data could ensure validity of forecasting results by taking into account internal and external changes of the environment; while precision could assist to rev up the accuracy of our forecasting results.

To bear in mind, deficiency of adequate manpower is one of our current major traumas. When we understand that we need variety of talents to handle the different sub – sectors within an industry, we then began to aware of the push to meld our human resources planning and management with strategic planning. (Fombrun, C., 1982). In the pursuit of interests for a brighter future of Malaysia's shipping and port logistics industry, we need a better and thorough development policy. As shipping and port logistics industry are closely related, development policy of one field would certainly raise the inquiry of whether the other sub – sectors' pro – conditions for development have been decently taken care of. Hence, the government should be really precise in recognizing needs for different sub – sectors of

shipping and port logistics before we could devise strategic plans accordingly.

Another point which is worth to be mentioned is the call of this study for some adjustments to be done on data transparency. We are the future holistic generations cultivated by our education system, aiming to drive the balanced growth of the nation. Who else if not us, should crack our heads for the maximization of potential national developments ? Hence, it is vital presenting to us a view of the exact real extant situation and the trend distributions of supply demand plan so that we can be more sensitive towards contemporary needs and changes. To your believe or not, more innovative solution or researches could definitely be prompted by easy assessment of data; whereas passion of researching will dwindle away with limited sources of data.

Malaysia being gifted its strategic geographical location, should have devoted more attention and effort in advancing herself to be a strong maritime nation. All folks of life in Malaysia should perceive it in the same way before we are able to initiate greater move in improving our shipping and port logistics sectors.

" Together we stand !"

References

1. Agapiou, A. (1996). *Forecasting the supply of construction labour* (Doctoral dissertation, © Andrew Agapiou).
2. ASEAN Port Association Malaysia (MAPA)(2016). Total Cargo Throughput by Ports, Malaysia 2016. Retrievd from : ASEAN Port Association Malaysia (MAPA) http://www.apamalaysia.com/
3. Barber, P., & López-Valcárcel, B. G. (2010). Forecasting the need for medical specialists in Spain: application of a system dynamics model. *Human resources for health*, *8*(1), 24.
4. Barney, J. (1991). Firm resources and sustained competitive advantage. *Journal of management*, *17*(1), 99-120.
5. Boswell, C., Stiller, S., & Straubhaar, T. (2004). *Forecasting labour and skills shortages: how can projections better inform labour migration policies?*. EC, DG Employment and Social Affairs. 21-38
6. Bryant, D. R., Maggard, M. J., & Taylor, R. P. (1973). Manpower planning models and techniques: A descriptive survey. *Business Horizons*, *16*(2), 69-78.
7. Cheryl Rita Kaur (2015). THE EAST ASIAN SEAS CONGRESS 2015
8. Chew. A (9th April 2016). China, Malaysia tout new 'port alliance' to reduce customs bottlenecks and boost trade. *South – China Morning Post*. Retrieved from : http://www.scmp.com/news/asia/southeast-asia/article/1934839/china-malaysia-tout-new-port-alliance-reduce-customs

9. Choo. C. Y. (3rd September 2016). Malaysia and China ink $7.3bn Melaka Gateway project. *Nikkei Asian Review*. Retrieved from : http://asia.nikkei.com/Politics-Economy/International-Relations/Malaysia-and-China-ink-7.3bn-Melaka-Gateway-project?page=2
10. Chung, S. H., Jung, D. C., Yoon, S. N., & Lee, D. (2010). A dynamic forecasting model for nursing manpower requirements in the medical service industry. *Service Business*, *4*(3-4), 225-236.
11. Daniel Workman (1st February 2017). World's Top Exports : Malaysia's Top 10 imports. Retrieved from : http://www.worldstopexports.com/malaysias-top-10-imports/
12. Daniel Workman (25th February 2017). World's Top Exports : Malaysia's Top Trading Partners. Retrieved from : http://www.worldstopexports.com/malaysias-top-import-partners/
13. Department of Statistics Malaysia (1972). Malaysia Industrial Classification (MIC) (Updated)1972
14. Department of Statistics Malaysia (2008). Malaysia Standard Industrial Classification (MSIC) (Version 1) 2008. Retrieved from : https://www.dosm.gov.my/v1/uploads/files/4_Portal%20Content/3_Methods%20%26%20Classifications/2_List%20of%20References/MSIC_2008.pdf
15. Department of Statistics Malaysia Official Portal (2015) Economy Census 2011 – Transportation and Storage Services. Retrieved from : https://www.dosm.gov.my/v1/
16. Drewry Shipping Consultants (2015). Drewry Manning Report 2015. Free Resources of International Chamber of Shipping.

Retrieved from : http://www.ics-shipping.org/free-resources/all-free-resources-(full-list)

17. Drewry Shipping Consultants (23rd June 2016). Slowing shipping fleet growth to ease officer shortage. *Drewry Shipping Consultants News and Events*. Retrieved from : https://www.drewry.co.uk/news/news/slowing-shipping-fleet-growth-to-ease-officer-shortage
18. Dubra, E., & Gulbe, M. (2008). Forecasting the labour force demand and supply in Latvia. *Technological and economic development of economy*, *14*(3), 279-299.
19. Economic Planning Unit (2015). The Eleventh Malaysia Plan, 2016-2020
20. Fombrun, C. (1982). Conversation with Reginald H. Jones and Frank Doyle. *Organizational Dynamics*, *10*(3), 42-63.
21. Freeman, R. B. (1976). A cobweb model of the supply and starting salary of new engineers. *ILR Review*, *29*(2), 236-248.
22. Grip, A. de & J. A. M. Heijke(1998), *Beyond Manpower Planning: ROA's Labour Market Model and Its Forecast to 2002*, Maastricht: ROA
23. Han Hee Jung (2015). The Study on the Forecasting of Human Resource Demand and Supply Plan in Shipping, Port and Logistics Industry
24. Harvey, E. B., & Murthy, K. S. R. (1988). Forecasting manpower demand and supply: A model for the accounting profession in Canada. *International Journal of Forecasting*, *4*(4), 551-562.
25. Hillerbrandt, P. M., & Meikle, J. L. (1985). Resource planning for

construction. *Construction Management and Economics*, *3*(3), 249-263.

26. Ho, P. H. (2010). Forecasting construction manpower demand by Gray model. Journal of Construction Engineering and Management, 136(12), 1299-1305.
27. Kao, C., & Tau Lee, H. (1998). Demand for industrial management manpower in Taiwan: Viewpoints of quantity and skill. *International Journal of Manpower*, *19*(8), 592-602.
28. Kwak, N. K., Garrett Jr, W. A., & Barone, S. (1977). A stochastic model of demand forecasting for technical manpower planning. *Management science*, *23*(10), 1089-1098.
29. Lin, C. T., Wang, S. M., & Chiang, C. T. (2001). Manpower supply and demand of ocean deck officers in Taiwan. *Maritime Policy & Management*, *28*(1), 91-102.
30. Lyons, R. (1964). The OECD Mediterranean Regional Project. *The American Economist*, *8*(2), 11-22.
31. Malaysia's Logistics Performance Index (LPI) Rankings from Year 2007 -2016
    www.knoema.com
32. Mehmet, O. (1972). Manpower planning and labour markets in developing countries: a case study of West Malaysia. *The Journal of Development Studies*, *8*(2), 277-289.
33. Milkovich, G. T., Annoni, A. J., & Mahoney, T. A. (1972). The use of the Delphi procedures in manpower forecasting. *Management Science*, *19*(4-part-1), 381-388.
34. Morris, D., Wood, G., & Yaacob, A. Y. (2001). Securing diversity in human resources: lessons from Malaysia. *Asia Pacific Business Review*, *8*(1), 63-79.

35. Nazery Khalid (2012). Measuring the contribution of the maritime industry to Malaysia's economy
36. Neugart, M. and Schomann, K. (2002), Forecasting Labour Markets in OECD Countries, Measuring and Tackling Mismatches, Cheltenham, UK : Edward Elgar, pp. 18 – 19
37. Neugart, M., & Schömann, K. (2002). Employment Outlooks: Why forecast the labour market and for whom?.
38. Ng. T. (16th February 2016). Malaysia is an important part of China's Maritime Silk Road. Will Malacca's port initiative shake up the regional port sector?. *Global Ports Forum*. Retrieved from : http://globalportsforum.com/malaysia-is-an-important-part-of-chinas-maritime-silk-road-will-malaccas-port-initiative-shake-up-the-regional-port-sector/
39. OECD (2008). 2008 Annual Report on Sustainable Development Work in the OECD
40. Reuters (23rd November 2016). Malacca eyes slice of shipping giant Singapore's business with new $3 billion port. *Consumer News and Business Channel (CNBC)*. Retrieved from : http://www.cnbc.com/2016/11/23/malacca-eyes-singapores-shipping-business-with-new-3-billion-port.html
41. Sang-Hyun Park, Sang M. Lee, Seong No Yoon, Seung-Jun Yeon, (2008) "A dynamic manpower forecasting model for the information security industry", Industrial Management & Data Systems, Vol. 108 Issue: 3, pp.368-384
42. Scheffler, R. M., Liu, J. X., Kinfu, Y., & Dal Poz, M. R. (2008). Forecasting the global shortage of physicians: an economic-and needs-based approach. *Bulletin of the World Health*

Organization, *86*(7), 516-523B.

43. Shin, Y.J., Pai, H.S., Kim, H.D., Lee, S.Y. and Han, H.J. (2015) A Study on the Forecasting of Employment Demand in Kenya Logistics Industry. *Korea Institute of Navigation and Port Research*. 39 (2), pp. 115-123.
44. Shin, Y.J., Ryoo, D.K., Kim, H.D., Kim, G.H., Lee, S.Y., Karimi, J. (2012). Study on Prospecting of Africa's Logistics Industry and Developing Human Training Program in the Logistics Sector : Focusing Kenya in East Africa.
45. Sutanto, E. M. (2004). Forecasting: the key to successful human resource management. *Jurnal Manajemen dan Kewirausahaan (Journal of Management and Entrepreneurship)*, *2*(1), pp-1.
46. The Star, Sharidan M.Ali, 30th July 2012. Sectoral Economic Value Needed
47. Thompson, N. J., (2015). A Malaysian Shipping Master Plan. *Malaysia National Shipping Conference 2015 : Revitalizing Malaysian Shipping for a Stronger Economy*
    http://masa.org.my/malaysia-shipping-master-plan-revitalizing-shipping-industry/
48. United Nations Convention on the Law of the Sea of 10 December 1982
    Overview and full text
    http://www.un.org/Depts/los/convention_agreements/convention_overview_convention.htm
49. Wong, J. M., Chan, A. P., & Chiang, Y. H. (2005). Time series forecasts of the construction labour market in Hong Kong: the Box-Jenkins approach. *Construction Management and*

Economics, *23*(9), 979-991.

50. Wong, J. M., Chan, A. P., & Chiang, Y. H. (2007). Forecasting construction manpower demand: A vector error correction model
51. Wong, J., Chan, A., & Chiang, Y. H. (2012). A critical review of forecasting models to predict manpower demand. *Construction Economics and Building*, *4*(2), 43-56.
52. World Economic Forum, Global Competitiveness Report 2016 / 2017
53. Wright, P. M., McMahan, G. C., & McWilliams, A. (1994). Human resources and sustained competitive advantage: a resource-based perspective. *International journal of human resource management*, *5*(2), 301-326.

Acknowledgments

First and foremost, I would like to dedicate the greatest gratitude to my supervisor, Professor Shin Yong John for all of his guidance and support throughout my Master's Degree in KMOU. Without his patience towards my shallow knowledge pertaining to the field and concerted effort in enhancing my knowledge from the very beginning, I would not be able to accomplish this thesis and successfully, come to graduation. On top of that, I would like to sincerely thank the thesis committees, specifically the Chairman Professor Ryoo Dong Keun and the member Professor Shin Young Ran for their constructive comments which have incented me to widen my thoughts from more perspectives so as to add quality and depth to this paper. Certainly, I want to bid thank you to Professor Pyo Hyun Young who recommended me to apply to KMOU and supported me from various aspects to facilitate my study life in Korea. And not forgetting to mention, I would like to deliver my deepest appreciation to all the professors, particularly Professor Park Sang Gab, Professor Pai Hoo Seok, Professor Shin Han Won who have devoted time and effort in advising and coaching me during my study period too. Apart from that, my heartfelt gratitude also goes to the assistant of Shipping Management, Miss Kang Da Young, other university staffs, seniors and lab mates who have been very kind to me with their warm assistance.

Other than that, I owe very big thank you to Dato' Hj. Abdullah Yusuff Basiron, the Under Secretary from Maritime Division of Ministry of Transportation of Malaysia (MOT) and Miss Hawa Othman, the Assistant Secretary (Port) from Maritime Division of MOT for their helping hands in trying to retrieve more recent data for my thesis writing.

Last but not least, I would like to convey special thanks to my family in Malaysia, my love and all dear friends who have been staying by me to give me encouragement and emotional support throughout my study. No words can express, no act of gratitude can relay, no gift can represent what your love and support have meant to me. Special gratitude goes to Han, Min Soo who is also an attending student of Master's Degree of Shipping Management in KMOU. His great help in Korean abstract of this thesis is much appreciated.

Here is the end of my thank you note. Thank you to KMOU for rendering me a chance to study abroad. I am grateful to be offered a scholarship in order to pursue my dreams of furthering study. It is indeed an enriching experience to join KMOU.