MARITIME GREEN SUPPLY CHAIN MANAGEMENT (MGSCM): AN EXAMINATION OF ANTECEDENT AND OUTCOME VARIABLES

BY

MUHAMAD FAIRUZ BIN AHMAD JASMI

Research report in partial fulfilment of the requirements for the Degree of Master of Business Administration (Sustainable Development)

Universiti Sains Malaysia
2014

ACKNOWLEDGEMENT

Alhamdulillah, all praises to Allah the Almighty, this research has finally been completed with his love and blessing from him. I am feeling grateful to be able to finish this research on time and in perfectly manner.

First I would like to express my highest gratitude to my dedicated supervisor, Dr Yudi Fernando for his systematic support and insightful comments given during his time supervising me. His trust and faith upon me pushes me forward with his positive attitude and commitment throughout the entire process of finishing up this research. I honestly enjoyed and learned new things from each meeting and very thankful for his endless guidance and mentoring has encouraged me to embark this adventurous journey successfully.

For always staying by my side, guiding me closely, comforting as well as forever motivating, I really appreciate assistance and companionship from my fellow MBA peers, Alia, Fadzlina, Annati, Jamil, Shabir, Aisyah, Anas and others that I would never be able to repay the dedication and kindness of these wonderful people. May Allah reward them with far more rewarding gifts, Insya Allah.

Finally to my greatest and most lovely parents in the whole wide world, Ahmad Jasmi and, Rohani Hassan this thesis is a gift for both of you and thank you very much for encouraging and giving me morale support and loved at the same time that much needed by me. I also would like to thank my family members especially to both my sisters Siti Zulaiha and Siti Zubaidah and not to forget my beloved brother Mohamad Nasri and Emme Eryanie for their morale support and help.

Last but not least, thank you to all research respondents, especially to all Maritime port suppliers that have given their honest input direct or indirectly, Universiti Sains Malaysia, and everyone who has involved in the completion of my research. It is well hoped that this particular research would benefit everyone who reads it and subsequently contribute to the academic world as well as increase the motivation for sustainable practices in the maritime industry especially in Malaysia.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ABSTRAK

Atas kesedaran mengenai kesan negatif ekologi yang dibawa oleh industri maritim kepada alam sekitar yang semakin meningkat, lebih banyak organisasi maritim di seluruh dunia telah termotivasi dalam mewujudkan operasi yang mampan termasuklah sektor maritim di Malaysia. Pengurusan rantaian bekalan hijau maritim (MGSCM) adalah satu gerakan yang penting dan telah memupuk minat terhadap penerimaan dan sokongan di dalam industri – industri maritim di seluruh dunia di samping memerlukan banyak komitmen dan integrasi dalam kalangan pihak yang berkepentingan. Oleh itu, MGSCM telah membuka ruang dalam meningkatkan pelaksanaannya dalam kalangan industri perkhidmatan, khususnya sektor maritim Malaysia. Menyedari pentingnya mengintegrasikan MGSCM dalam rantaian bekalan maritim, industri maritim harus diyakinkan bahawa mengamalkan MGSCM akan memberi pelbagai manfaat terhadap operasi dan juga prestasi perniagaan yang mampan. Oleh yang demikian, kajian ini adalah amat penting di mana ia cuba untuk melihat hubungan di antara pembolehubah *antecedent* dan amalan MGSCM dan juga hasilnya dari sudut prestasi perniagaan yang mampan dalam rantaian bekalan maritim Malaysia. Satu kaji selidik dalam talian telah diedarkan kepada pelbagai syarikat rantaian bekalan maritim di Malaysia. 144 set soal selidik telah dianalisis melalui pemodelan persamaan struktur (SEM) dengan Smart PLS dan IBMSPSS. Dapatan kajian juga telah mengesahkan bahawa dari sudut rantaian bekalan maritim perspektif, amalan MGSCM memang dapat mempengaruhi prestasi perniagaan yang mampan. Hasil analisis juga menunjukkan pembolehubah *antecedent* merupakan pendorong penting ke arah pengurusan rantaian bekalan hijau maritim. Lebih daripada itu, hasil kajian juga mengesahkan keteguhan model teori mengenai pembolehubah *antecedent* dalam mempengaruhi MGSCM berdasarkan Teori Institusi. Kajian ini juga membentangkan cadangan praktikal untuk pengamal profesional yang menyoroti keperluan untuk mengamalkan elemen hijau dalam rantaian bekalan maritim di masa depan. Penyelidikan yang lebih lanjut perlu dijalankan untuk menyiasat kesan MGSCM dengan mengenal pasti elemen-elemen lain berkenaan pembolehubah *antecedent* dan amalan hijau lain yang boleh diperluaskan kepada pelbagai jenis organisasi lain.

ABSTRACT

As awareness and consciousness regarding the negative ecological impacts that maritime industry brings to the environment increases, more organizations in maritime around the globe have motivated in establishing sustainable operations including Malaysia's maritime sectors. Maritime green supply chain management (MGSCM) is a significant movement and interest towards sustainability adoption in many maritime industries around the world and requires major commitment and integration among stakeholders. Similarly, MGSCM has established increasing implementation among service industries especially the Malaysia's maritime sectors. Recognizing the impeccable importance of integrating the MGSCM in maritime supply chain, the maritime industries have to be persuaded that practicing MGSCM would endow with various benefits on their operation in sustainable business performance. Consequently, this study is important in which it attempted to examine the relationship between antecedent's variables and MGSCM practice as well as the outcomes of sustainable business performance in Malaysia's maritime supply chain. An online survey was administrated to various maritime supply chain companies in Malaysia. 144 sets of questionnaires were analysed through structural equation modelling (SEM) with Smart PLS and IBMSPSS. The findings have also confirmed that from the maritime supply chain perspective, MGSCM practices facilitate sustainable business performance. Analytical results also demonstrated the antecedent variables become an important driver towards maritime green supply chain management. To a certain extent, the findings of study validate the robustness of theoretical model of MGSCM's antecedent variables based on Institutional Theory. Nevertheless, this study also presents practical suggestion for practitioners which highlighted a need to emerge green elements in the maritime supply chain in the future. Further research should be carried out to investigate the impact of MGSCM by identifying other elements of antecedent variables and green practices as well as extended to different types of organizations.

CHAPTER ONE

INTRODUCTION

1.1 Introduction

Worldwide economic growth and industrial development is facilitated by the commercial and trade activities in maritime sectors. The growth of global trade operation is much depended on shipping operations to carry intercontinental cargoes (Lun & Browne 2009). Seaborne trade activities have matured in the preceding decades and have contributed about 90 percent of world's trade to population and communities all over the globe (Khalid, Tang & Rajamanickam, 2010). Additionally, maritime industry becomes the most prominent player in logistic industry provided a more reliable and cost-effectiveness means of transportation. As a part of life-line trade for many manufacturing companies all over the world, the whole supply chains in maritime industry includes the operation from shipyards and main system providers to the manufacturer of the smallest components. The maritime supply chain comprises of complex system and support service that ranging from constructing, designing, manufacturing, operating, supplying, maintaining vessels, managing shipping lines, shipyards, dry docks, marine railways, marine repair ships, shipping /freight forwarding agencies and other similar enterprises respectively.

Global trends in economy growth have established new opportunities as well as challenges in maritime sectors. The challenges dampened in increasing public concerns on ecological issues as depicted by pollution generation and resource exhaustion caused by maritime supply chain operations (Lai, Lun, Wong & Cheng, 2011). In this regards, environmental securities and conservation of resources have been extensively discussed by industry and political leaders globally (Revkin, 2009;

Rosenthal, 2009). The physical implication could be seen in term of surge in research dedicated to addressing this ecological issue (Ostrom, 2008). As maritime industry facilitating the role of a intermediary of global transportation supply chain (Wong et al., 2009a; Yang et al., 2009a), many maritime companies have begun to act in response to environmental concerns by embracing green practices in their operations (Lai et al. 2011). Conversely, green practices can be considered as being environmentally friendly in enhancing maritime supply chain performance. The nature of maritime industry that operate in complex chains where operators in the maritime sectors are interconnected to each other (Zhang et al. 2011), may encounter unforeseen challenges in the current competitive business environment.

Meanwhile, the increase pressure as depicted by global environmental trends is affecting Malaysia maritime sectors as well. There is mounting pressure on maritime industry in Malaysia to align their operational practices in environmental friendly manner following the global trend. As environmental pressure and the discourse of reducing carbon emission in the maritime sector expand, Malaysia's maritime sector needs to invest on environmental approach in its operation (Khalid et al., 2010). Involvement of stakeholders in maritime sectors is also a key factor in rising discourse of discussion among maritime's industry players. Malaysian approach even though slowly, gradually shows stakeholders commitment to achieve sustainability within the industries to accomplish the sustainable goals in the future. Despite the fact that sustainability is crucial for this sector, it is imperatively important to address the problem without sacrificing its commercial and economical values. In this respect, maritime industry as a vanguard sector of import-export activities and domestic trades in Malaysia, should balance its adoption of green element in its operation to ensure rational three bottom line business performance.

Hence, maritime green supply chain management (MGSCM) is becoming an imperative solution for maritime companies to enhance their operations. MGSCM affect all the functional and practical areas of maritime supply chain that encompasses economic, environmental, operational and social dimension. The study of MGSCM has been much more focused on measuring the capability of maritime companies and simultaneously improving their operational efficiency and reducing the negative ecological impacts of their supply chain activities (Lun, Lai, and Cheng 2013). According to Collis (1994), major elements in organizational capability consist of two. The first is rooted in organization business operation. In this study MGSCM consists of five dimensions, that is, green financial flow (GFF), green information and communication system (GICS), green supply chain integration practice (GSIP), green value added logistic service (GVALS) and shipping design and compliance (SDC). The second element is about organization's ability in converting inputs into outputs. MGSCM can be considered as inputs while sustainable business performance measures as outputs. Thus to evaluate organizational capability in greening maritime supply operations, this study utilizes the input–output approach respectively. Upon conducting review from prior literature, this study found a lack of theoretical thought regarding why and why not maritime companies undertake green practice (Lun et al., 2011). The majority of the research focused on examining the environmental and economical implication of adopting green technology as well as their links with financial performance (Viana et al., 2009). They have mostly restricted their research to certain extent only; to which greening operations affect organizational performance dimension (Lai et al., 2011). Consequently, this study also focuses on finding the antecedent variables that acted

as drivers in influencing MGSCM adoption using Institutional Theory as a basis foundation.

1.2 Background Study

Maritime supply chain generally refers to the movement of cargoes and related support service involving two substantial locations (Lun, Pang, and Panayides 2010). From logistical perspective, maritime supply chain includes all the actions that shift cargoes to, from, and between key actors of maritime supply chains (Lun et al. 2008). Thus, operators in the maritime supply chain can be categorized into the subsequent categories: (1) first-party user that physically owns the freight and cargo for transshipment, for example, traders; (2) second-party users that own the infrastructures or means of transport to provide shipment services, for example, carriers; and (3) third-party users that supply freight and logistical services, for example, freight forwarders and value-added logistics service providers (Lun et al.2013). Maritime industry also has played an essential role in facilitating economic growth that contributed towards Malaysian import-export activities. Furthermore, the significance of this maritime sector to Malaysia has contributed as much as 3.3% of growth in total GDP in 2012 (Malaysia Shipping Report Q3, 2012).

According to EUMCCI Trades Issues and Recommendations (2012), Malaysia seaports have claimed a generous and substantial market share of transshipment passage for the South East Asia Region. Further studies by EUMCCI (2012) has pointed out that this encouraging sign of economic growth was made possible through Malaysia's strategic location in Asia, its comparatively advanced logistic road and rail network as well as excellent operational maritime port

performance. In 2011 alone, Malaysia's total cargo volumes attained at estimated 495.29 million tones with additional more than 90% of total freight traffic. In this regards, EUMCCI (2012) also stated that Port Kelang as the busiest container port contributed as 39.2 % of total sea throughput in 2011 while Port Tanjung Pelepas contributed 22.7%. Maritime supply chain activities in Malaysia has showed sturdy growth as it is anticipate to grow 10.3% to RM 129.93 billion in 2012 from an estimated RM 117.8 billion in 2011 due to unparallel support by government and foreign investment in Malaysia. These comprise on superior reliance on intra-Asian and local import-export trade, which have performed better than global long-haul trade routes resulted from fairly aggressive capacity expansion programmes; and comparative success in attracting and preserving the custom of major maritime companies. As a result of these countervailing forces, the maritime supply chain remained as the most progressive sector in Malaysia. At both ports the bulk cargo and container traffic staying up in the high single digits in percentage growth terms (Malaysia Shipping Report Q3, 2012).

A summary about container port sector in Malaysia is outline in Table 1.1. According to Ministry of Transport Malaysia container traffic at the 11 major ports have rose to 15.3 million TEUs (20-foot equivalent units) from 13.1 million in the phase of the year 2009 – 2010. The Table 1.1 illustrates that Port Klang, consisting of Northport and Westports, as the busiest container maritime port in the Malaysia, with nearly half or 48.5 per cent share of the whole number of containers handled by the entire Malaysian ports respectively. The importance of Port Klang as a main hub in logistic sector has contributed as much as 24.8 percent growth in container throughput in the period of 2010 measured up to 2009 with generated 4.58 million TEUs from 5.95 TEUs previously. In this regard, Malaysia logistic sectors have

expanded considerable improvement over the time because of its efficiency in assisting import –export operations. The Table 1.1 also shows that more than half of Port Klang's container amount was from Westports (61.75%), While Northport contributed 38.3 per of container volume. Meanwhile Port Tanjung Pelepas (PTP) in Johor remained to be second major container port after Port Klang with 35.2% of container throughput in the given period.

Table 1.1: *Container Throughput (TEUS) from the Year 2009- 2010*

CONTAINER THROUGHPUT (TEUS)			
PORT	JAN-OCT 2009	JAN-OCT 2010	GROWTH (%)
Port Klang	5,951,958	7,426,327	24.8%
PTP	4,948,592	5,384,096	8.8%
Johor	699,653	734,845	5.0%
Penang	782,704	925,624	18.3%
Kuantan	110,945	116,010	4.6%
Bintulu	201,784	205,535	1.9%
Sepangar	152,870	185,370	21.3%
Sabah	71,132	81,718	14.9%
Kuching	131,888	156,127	18.4%
Rajang	53,994	66,467	23.1%
Miri	20,461	23,930	17.0%
TOTAL	13,125,981	15,306,048	16.6%

Source: Ministry of Transport Malaysia

Under 10th Malaysia Plan And Economic Transformation Program (ETP), the logistic industry in Malaysia maritime port has foreseen a compound annual growth rate (CAGR) of 11.6% to achieve RM196.5 billion in 2015 and RM203.71 billion in 2016. The elevated growth yearly and the importance of this maritime supply chain industry is a positive sign from the economic standpoint due to import-export activities and trading operations with shipping and airfreights related businesses, advanced technology and capital intensive project. However this indicator may also

reflects the negative implication considering from environmental point of view as it would contribute substantial implication on ecological impact. Nonetheless, the greenhouse gasses crisis regarding CO2 emission related to shipping activities is a sign that initiatives and precautious step should be measured and executed accordingly to reduce its harmful impact to environment. In this sense, through proper sustainable control measure and encouraging input from stakeholder, maritime supply chain could enhance its performance in term three bottom-lines context (Khalid et al.2010). However with low mitigation efforts and action added with weak policies in Malaysia's maritime context, it is hard to forecast the future prospect of maritime industry in dealing with these rising environmental problem. Even though the pessimistic impact to the environment caused by maritime supply chain activities are slightly lesser than any of other method of transportation, shipping industries have constantly characterized by elongated history of tackling environmental problems (European Commission, 2003).To take the edge off this exacting problem, many business organizations should voluntarily look for better resolution to gain economic and environmental solution at the same time.

If acquisition of economic and environmental performance is easier said than done, the hardest part of it is to incorporate the green practice and initiative within complex business routine and supply chain. For business entity, it is tough to hit upon environmental balanced while at the same time upholding profitable and advantageous operation. In this sense, Zhu, Sarkis, and Lai (2008) recent study of green supply chain management (GSCM) designated that generally business organizations have cynical view with this "win-win" rhetoric. In this regards, if MGSCM in maritime supply chain could potentially elevated the sustainable business performance and received unconceivable benefit, why there is less action

taken from businesses to adopt this kind of cause? Conceivably the rationalization of this predicament on green management practice is “a perceived lack of confirmation and proof that the payback exceed the costs of pursuing these initiatives at the first place” (Montabon, Sroufe, & Narasimhan 2007) that discourage “this green paradigm” adoption amongst business organization. Therefore, this study attempts to overcome the gap by investigating the relationship between MGSM capability and the organizational performance in maritime context .This study would also provide the relevance proof in identifying the key MGSM capability factors extended from existing model of GSCM and examine their influences on adoption of MGSCM among the antecedent variables and its business outcome in the context of maritime supply chain.

1.3 Problem Statement

As global economies become ever more connected and expended, maritime industries are facing challenges as well as benefiting from better business opportunities. Maritime supply chain, as the primary catalyst of transporting goods on a global scale, has lately attracted growing interest from the academicians. In an attempt to expand better perception and understanding of maritime supply chain, it might be valuable to think the principal scope and characteristics of the overlapping terms of maritime supply chain. In this sense, maritime supply chain generally associated to the coordinated of operation and management of the various functions responsible for the smooth flow of materials from suppliers into an organization through a variety of operations within the organization context, and subsequently reaching out to its clients. Hence, it is a series of activities along the supply chain concerned, which in many cases will involve maritime operation activities. There has

been some convergence of maritime transport and maritime logistics, and this can be attributed to the substantial combination of transport modes driven by containerization, cargoes handling as well as the evolving demands of end-users that require the relevance of logistics concepts to the employ of these modes and the accomplishment of logistical sustainable goals.

In this operational process dimension, a quantity of issues still require further elaboration and debate from an academic perspective especially on efficiency context and ecological concerns. Many prior researches generally focusing on competitive and operational efficiency of maritime supply chain rather than sustainability issue of its operation. Cheon (2008) for examples evaluates how diverse types of international terminal operators (such as global stevedores, global hybrids and global carriers) influence efficiency of the maritime supply chain system. While Cullinane and Wang (2006) expand the operational accessibility issue from the perspective of maritime supply chain competitiveness. The paper by Panayides and Song (2008) attempts to classify and extend measurement of the integration and collaboration of maritime supply chain system into more comprehensive global supply chain systems.

From the Malaysian context, there is a number of studies on GSCM relating to the manufacturing and other industrial sector, however studies on MGSCM in the maritime industry is still limited and still in its infancy state. Thus the relationship between sustainability and supply chains is the essential subsequent step from recent examinations of operations and the environment (Corbett and Kleindorfer, 2003) and operations and sustainability (Kleindorfer et al., 2005) in Malaysian context. Within the maritime supply chain, transportation is the contributor of largest source of environmental impact (Wu and Dunn, 1995) and on an cumulative level, freight emissions may accounted for roughly 8 per cent of worldwide energy-related CO2

emissions (McKinnon, 2010). Conversely, although many papers have focused on the idea of sustainability within the supply chain context (Seuring and Mu¨ller, 2008; Srivastava, 2007), there is very little work done to understand the role and importance of maritime logistics sector in an organization's quest towards sustainability. This is predominantly so with regard to the maritime industry in the Malaysian scenario (Khalid et al., 2010).

As maritime industry is regarded as service industry, Karmilia (2012) in his paper signified that GSCM execution in the service industry is still vague because of its intangible nature. Ever since the research on GSCM in the maritime industry is inadequate, additional research should be conceded in this particular area especially in Malaysian maritime context. It is agreeable that even though, maritime sector in Malaysia shows affirmative indicator of growth and continues to expand exponentially to cater global trade demand, it faces with upward pressure and dispute to operate in sustainable friendly manner. In this manner, Khalid et al. (2010) deposited that amongst the problem maritime sectors faces comprise the expenditure and cost of conforming to green regulations, deficiency of green technology to be adopted and appeasing opposite interests and priorities in their daily business, industry as well as society. Nonetheless, according to Mathiyazhagan et al. (2013) for green practices to effectively functioning in any organization, it could only be achieved through dedicated stakeholder involvement and governmental policy. For that reason, it is absolutely critical for stakeholders in the industry to "fine-tune" the actions and efforts for ensuring impending low carbon future and to measure existing industrial practices in this sector to curb carbon production from their routine activities and along the way contributed to address the bigger issue of climate change. In addition, as Rostamy et el. (2013) indicated in his study, he revealed that

even though with various policies developed, the Malaysian government and corporate administration has not situate much highlight and stress on monitoring environmental issues accordingly. In this regard, as proposed by Khalid et al. (2010) the effort to this green effort in maritime sector should also take into account of its limitation, national interest and at the same time not compromising related maritime activities that could affect its productivity.

The paper identifies five keys of sustainable parameters from the literature and hypothesizes them to be part of the integrated MGSCM construct of maritime supply chain to attain sustainable outcome in maritime's operation. Data for operationalising the conceptualized variables were obtained via a survey conducted in maritime industry evolving many supply chain player in the Malaysian industry context. A theoretical model of MGSCM was developed and validated using the green supply chain management (GSCM) context gather from prior research. By focusing on such sustainable MGSCM parameters as determination of green supply chain integration practice (GSIP), green information and communication system (GICS), green financial flow (GFF), green value added logistic service (GVALS), shipping design and compliance (SDC) as well as sustainable business performance for international maritime supply chains, important implications and antecedent variables constructs for maritime supply chain have been drawn. Hence, this study has attempted to look into the operation of Malaysia maritime supply chain which included shipping port, cargo handling, land transport service, maintenance service, warehousing, water transport, containers as well as other operational system in its supply chain in a quest to expand a deeper understanding on how the MGSCM practiced in the business organization could affect its performance as well as its driver that propel this green initiatives at the first place. This study would be

conducted from the perspective of stakeholders instead of the focal point company, and the sustainable business performance would be measured in relation to their MGSCM practices.

1.4 Research Objectives

1. To examine the antecedents of maritime green supply chain management (MGSCM) industry in Malaysia
2. To investigate the effect of maritime green supply chain management (MGSCM) on its business outcomes in Maritime industry in Malaysia
3. To investigate the different type of environmental certifications on sustainability maritime supply chain.

1.5 Research Questions

1. To what extend does antecedents effect maritime green supply chain management (MGSCM) in Maritime industry in Malaysia?
2. Is there any significant relationship between maritime green supply chain management (MGSCM) and its outcomes in Maritime industry in Malaysia?
3. Is there any different type of environmental certifications on sustainability maritime supply chain?
4. Is there any different type of company on sustainability maritime supply chain?

1.6 Significant of Study

There are three significant contribution of study which is theoretical contribution, practical contribution and society contribution.

1.6.1 Theoretical Contribution

Maritime shipping industry has transformed rapidly over the year thanks to dramatic expansion on global trade respectively. In this sense as pressure and challenge develop on the maritime sector, and the problem of reducing carbon emission in the industry expands, Malaysia need to do something about it to mitigate this concerning issue. The research on sustainability issues in supply chain has been conducted by numerous scholars in the past regarding the theory and practical contribution in various industrial backgrounds. The concept of sustainability in supply chain widely researched in various field such as manufacturing field (Zhu & Sarkis, 2004), product innovation (Lee & Kim, 2011), management (Alfred & Adam, 2009), automotive (Luthra et al., 2011) and other fields. However, there is no empirical survey based study available in literature to study the theoretical framework of sustainability maritime supply chain in maritime industry.

Since this is among the earliest studies in maritime supply chain, development model of antecedents and outcomes is needed for exploratory study. Despite the contribution to the country economic chart, the previous supply chain management scholars has given little attention toward theory and implementation of sustainability maritime supply chain in maritime industry. As there is no consensus determination of the antecedents and outcomes based on sustainability maritime

supply chain, the synthesizing previous literature which generated from green supply chain has been contributed for the development of the study's theoretical model. This theoretical model has extended the concept of green supply chain management (GSCM) in the literature to investigate and integrate the concept of sustainability within maritime supply chain. It is important for this research to look deeper from maritime's managerial perspective that might influence the sustainability maritime supply chain practices in the maritime industry. The impeccable impact of this study will further give insight of applicability of institutional theory to further supporting the basic foundation of this model development. This study in particular would contribute to the novel MGSCM model building based on extended institutional theory and GSCM theory to study sustainability issue from maritime supply chain perspective.

1.6.2 Practical Contribution

As sustainability issue in maritime supply chain is about reaching and managing resources that are produced in an ecological friendly manner, this study has offered an insight understanding for the maritime practitioners to aware and integrating the sustainability practices in managing their day-to-day supply chain operations. The strategic goal is to lessen its carbon footprint through compliance of government policies, stakeholders' supports as well as industrial collaboration effectively. This study has provided the sustainability practices and guidelines for managing effective supply chain system. Thus, the outcome for organization is the company's efficiency supported by international standards which have to be set, recognized and maintained.

This study provides variables needed in improving the efficiency and effectiveness of supply chain operation through the adoption of environmental based practises to achieve sustainable maritime supply chain. Thus in return, this study has formed the basic foundation and understanding as well as increasing necessary awareness of environmental based practises among companies supplying services or involved direct or in directly with maritime port operation in Malaysia, through the outline objectives involved. In addition, this study has allowed the business organizations to understand the relationship and impact of environmental based practices on sustainable business performance as outcomes which look into the four important aspects; such as financial, social, operational and environmental dimension respectively. In this case, not many studies which can provide four outcomes of business performance in supply chain literature. It would help the practitioner to understand better and guided them to achieve sustainable goal in the future. Furthermore this study helps the maritime sectors to evaluate its management performance through its suppliers and subsidiaries company under port system performance. On top of that, this study will be able to extend green practices implementation, knowledge as well as awareness to the stockholders and companies involved for improvisation of future businesses. Also, practical contribution will be in term of shaping and suggesting required policy to achieve sustainable maritime supply chain for policy makers as well as for the governmental and regulation bodies particularly.

1.6.3 Social Contribution

Sustainability issues have been a hot topic of discussion around the globe and in this regard, business organizations necessitate having a procedure and method to evaluate

and measure the successfulness of green aspect based from SCM performance (Olugu et al., 2010). Greening the maritime industry has been disputed in environmental policy studies and international energy resulted from poor execution and awareness to the govern bodies and stakeholders in general. In this respect from social perspective, this research anticipated to promote more companies across this maritime sector to adopt MGSCM or at least to support maritime green supply chain initiatives by the industry player. It is essential to look when more companies implement environmental friendly operation in their organization, harmful ecological impacts could be potentially decreased and with the aid of industrial collaboration and awareness, the impacts could be eliminated through technology advancement. Definitely, in a long run, good environmental welfare achieved resulting from these positive actions would benefit the society as a whole. According to Freestone (2009) even though there is misinterpretation and cynical view on sustainability practice, it is a precautious step that remain vital to do for the sake of broader benefit to sustainable communities and region in a long run. For that reason, this study has challenged to dismiss such perception in today's society and provide evidence that MGSCM would show the way to constructive and positive sustainable business performance.

Maritime sectors could effectively translate the general institution's goal into practice aligned with accepted Malaysian social values through MGSCM. In other words, social dimension in MGSCM could potentially provide the foundation in making an organization's social mission a reality through sustainability efforts. The social value through MGSCM translated into providing financial and institutional benefit of its employees; improving the overall quality of service offered, building society trust and commitment, alleviating the community poverty as well as

employee empowerment. Finally it is worth to note that, in Malaysian context, the mentality and adoption of the new things are different from developed countries and require time to shift to a new paradigm. This is because awareness level especially involving with the adoption sustainability and green practices in Malaysia is still very low. In this sense, green adoption in Malaysia is frequently the consequence of firm conformity to fulfil certain policies. This study generally will encourage new paradigm thinking among corporate leader, stakeholder and industrial player within maritime sector that greening their operation could actually enhance their sustainable business performance in a long term.

1.7 Definition of Key Terms

The definitions of key terms used as the foundation to this study were adapted from previous literature and further improved to ensemble this study relevance. Key terms used are defined as follows:

1. **Green supply chain management (GSCM)** is about assurance to all usual and traditional supply chain deliveries while integrating the social and environmental concern in every phase of supply chain system to ultimately diminish or lessen product's ecological footprint (Lee, Kim & Choi, 2012).

2. **Maritime green supply chain management (MGSCM)** is the extension of traditional green supply chain management (GSCM) which is concerning four bottom lines that are about integrating social, environmental, economic as well as operational concern in every phase of maritime supply chain system to lessen the environmental footprint.

3. **Sustainable development** is a means for any organizations in general to build up a sustainability business process and action as it suggests that businesses should nurture and meet the need of the present without exceeding the capacity or capability of the future generations to meet their own needs (The United Nations, 1987).

4. **Top management (TM)** is the strongest enabler in sustainability in regard to driving factors which dampened in aspect of personal dedication, informational knowledge and leadership in managing and enabling the green initiatives (Pillora, Blackburn & Artist, 2009).

5. **Regulations (RG)** refer the most critical set of law for the supply chain actors to comply in accordance to both customer and legal requirement circumstances (Laosirihongthong, Adebanjo, & Tan, 2013).

6. **Green initiatives (GI)** refer to the influence of environmental activities to reduce ecological and social impact as well as enhancing business performance that drive the company to adopt MGSCM. Thus, green initiatives could be defined as environmentally conscious practices of "green" organizations. (Haden, Oyler & Humphreys, 2009)

7. **Securities (SE)** refer to any activities which comply with maritime process and procedures that drive the company to adopt MGSCM. This arrangement

of interconnected functional and institutional engagements policy throughout the supply chain makes operations transversely smooth in various different channels in this context of maritime supply chain (Bichou and Evans, 2006).

8. **Green information and communication systems (GICS)** defined as the systematic application of sustainability in various processes of IT and communication management in order to reduce related emissions and to improve energy efficiency (Kehoe and Boughton, 2001; Swaminathan and Tayur, 2003; Prajogo and Olhager, 2011).

9. **Green value added logistic service (GVALS)** defined as the systematic application of sustainability in various processes value added logistic in supply chain to reduce ecological impact and to improve energy efficiency that encompasses diverse dimensions of emotional element, social and functional value (Sweeney & Soutar, 2001) .

10. **Green supply chain integration practices (GSIP)** defined as the systematic approach of integrating sustainability in various processes of supply chain system in order to reduce impact to environment and gain efficiency to the extent of intra-organizationally or inter-organizationally processes to achieve significance value to the final customer demand with cost effectiveness (Frohlich and Westbrook, 2001; Stevens, 1989; Van Der Vaart and Van Donk, 2004).

11. **Shipping design and compliance (SDC)** defined as the systematic approach of sustainability in various processes of shipping design as well as conformity with sustainable compliance in order to reduce impact to environment and gain efficiency (Chang 2012).

12. **Green financial flow (GFF)** defined as the systematic approach of sustainability in various processes of financial management and accounting in order to reduce impact to environment and improve sustainability in a long term (Vincent, 2000).

13. **Sustainable business performance** is accomplished when green supply chain management practices were implanted in the business operation and process of an organization. Thus in this particular study, sustainable business performance could be clarified from social, financial, operational as well as environmental perspectives (Rao & Holt, 2005).

1.8 Organization of Dissertation

This dissertation thesis comprises of five definite chapters. The first chapter described the background of study, problem statement, research questions, research objectives, significant of study and definition of key terms. Next, the second chapter offers necessary review from related prior researches on overview of maritime industry, sustainability concept, green supply chain management (GSCM) and its components, the drivers of GSCM, sustainable business performance, GSCM impacts and available theories used in this research. Chapter three illustrates the methodology used in this research involving survey measures, sampling techniques

and research procedure used in conducting this research. The chapter four in this research will provide the relevance data analysed that were the result of descriptive statistics, confirmatory factor analysis, and structural equation modelling respectively. Ultimately, the conclusion drawn from research findings and data collection will be discussed further and the implications for the maritime industry are examined thoroughly in chapter 5.

1.9 Chapter Summary

This chapter in general has illustrated the background of study, problem statement, research objectives and research questions in order to provide brief introduction and understanding of the whole dissertation. Additionally, contribution involved in this study is elaborated briefly as well as the definition of terms used in this chapter. The next chapter would then discuss on preceding literature with regard of GSCM theory and sustainable business performance for further supporting this study.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

In the recent years, climate change and global warming have become a prominent topic discussed by international conventions that need urgent attention by global community in general. As the global population expands greatly and demands for earth's resources and space increased, mankind have unconsciously put a huge strain to the Mother Earth. The inevitable impact of this phenomenon resulting from irresponsible management of natural resources and failure to notice of the negative impact by business entities have made the problem worse every year. This growing concern of sustainability has resulted awareness among business organizations to mitigate the risk of this sustainability dilemma properly using green practices. The implementation of sustainability and green initiatives could reduce the ecological risk significantly if done properly by business entities as a whole. The predicament of sustainability within maritime industry has also gained much attention to stake holder that reacts as a driver in this sector and thus propel the required actions towards sustainability in shipping activities. Thus this chapter will give an overview of literature review on maritime shipping industry in Malaysia, the antecedent drivers of green initiatives, maritime green supply chain management (MGSCM) as well as theory behind green practices and its role in improving sustainability performance in this growing sector respectively.

2.2 Overview of Maritime Industry

Historically water transport has significantly propelled the international trade and contributed to the economic growth to its country. Maritime supply chain facilitated by maritime port has provided the linkage between water transport (ship transshipment) and surface transport (land transport). To such extend, maritime port has been an important entity that exist in between of these two different type of transportation to provide maritime supply chain service resulting from the chain of operations that deliver the output (goods) and movement of people. According to United Nation Conference on Trade and Development (2013) report, international seaborne trade has outperformed the world economy with the increasing volumes estimated at 4.3% in 2012 nearly the same rate as 2011 (Review of Maritime Transport, 2013). According to the report, this healthy trend is driven by the rise of China domestically demand as well as rapid growth of trade intra-Asia and South-South trade (Review of Maritime Transport, 2013). As table 2.1 shows the development in international seaborne trade from the year 1970 to 2012, total cargoes have significantly increased over the year except the declining trend in the year 2008 to 2009.

Table 2.1: *Development in International Seaborne Trade, Selected Years (Millions of Tons Loaded)*

Year	Oil and gas	Main bulks [a]	Other dry cargo	Total (all cargoes)
1970	1 440	448	717	2 605
1980	1 871	608	1 225	3 704
1990	1 755	988	1 265	4 008
2000	2 163	1 295	2 526	5 984
2005	2 422	1 709	2 978	7 109
2006	2 698	1 814	3 188	7 700
2007	2 747	1 953	3 334	8 034
2008	2 742	2 065	3 422	8 229
2009	2 642	2 085	3 131	7 858
2010	2 772	2 335	3 302	8 409
2011	2 794	2 486	3 505	8 784
2012	2 836	2 665	3 664	9 165

Source: UNCTAD (2013)

As environmental problem has become a growing concerns for organizational institution as well as the government around the world (Zucatto et al., 2008; Vanalle et al., 2011), the global maritime industry also faces increasing pressures from community and competitor to balance economy and environmental performance to stay competitive in global business environment (Guide and Van Wassenhove 2009). As a result of this, regulations have been imposed to business organization to embrace the needs to adapt sustainability strategies to improve economic, social and environmental performance (Vanelle et al., 2011). According to Lun et al. (2013), the pressure comes from policy makers in 1970s, with some advanced country like Germany and Netherlands started to employ strategic approach to address environmental issue. These environmental issues eventually have forced a momentous attention from organizations, to respond accordingly to strict government and environmental regulation by applying strategic management strategies (Commission of the European Communities, 2002). In addition, the rise of environmental awareness indirectly induce the maritime companies to embrace green