

Overview of Purchasing and Procurement Strategies Adoption in Global Shipping and Maritime Sectors

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Abstract: - Purchasing and procurement many times are viewed as add-on activities related to issuing purchase orders and conducting procurement contracts with any direct involvement in implementing any strategic plans within the firms. With the advancement of international trade and globalisation, logistics services are now viewed more importantly through the global network of partnerships and collaborations within the changing market space. The paper is a theoretical study of purchasing strategy in maritime industry in Malaysia, mainly for ship management firm. Research relates to identify the appropriate purchasing and procurement strategies used to improve businesses competitive advantages over its competitor. Purchasing categories identified through its impacts are studied for research, including categories spending, total spending, and impact of each categories towards customers. This research is customer-based research whereby customers feedback on current procurement practices and customer expectation are collected to ensure that research addressed to customer's needs. Kraljic's matrix analysis tool is used to infer the information collected from business environment and strategy is created based upon the findings and results with objective to improve competitive advantage within the selected case environment examined within this research.

Keywords: - Procurement Management, Maritime and Shipping, Strategic Procurement, Supply Chain Management, Portfolio Matrix

1 Introduction

Maritime industry is part of service industry, whereby it is demand driven and its businesses are propelled following the direction of world trading pattern [1]. There is a positive relation between world economy with global trades and global trades with global transport [2]. When world economy is at its peak, global trading will reach its peak resulting that global logistic to be at their peak as well due to trading involves movement of goods and services from supplier to customers globally [2]. The international maritime and shipping trade saw huge setback during early 2018 with global port and cargo handling services impacted. Further impacts that highly impacts were the decision by United Kingdom to leave the European Union, and the ongoing escalation of tariffs between China and US effecting the global trade and maritime services [3].

Movement of goods and services in global freight transportation include different mode of transport such as by sea, roads, railway, air freight and pipelines. Depending on off how origin and destination of product and services different mode can be used to connect between the two points, movement scale varies from small to very large.

Depending on scale of movement, ocean shipping is vital and can act as a complement or substitute to other freight modes. Ocean shipping act as a complement mode in goods movements between continents whereby other mode are restricted from such movement such as rail and roads [4]. Ocean shipping will be an alternative when movement of is at a smaller scale whereby shipper have other alternative mode which can deliver to the same point of destination from origin [4]. Ocean shipping is common mode of transport for international shipping which connect with other more restrictive modes road, rails, pipes, and inland waterways. Sea shipping can transport a wide range of cargoes ranging from dry cargoes to wet cargoes as well passenger transfer. Examples of cargo's that can be transported such as gas cargo, liquid bulk cargo, dry bulk cargo, refrigerated cargo, special purpose cargo, passenger, and unitized cargo [5]. Different types of cargo's are transported using specialised ship such as unitized cargo is transported commonly using a container ship. From 2018, as paper study from Malaysia global trades have slow down and recession are sighted in market in new future [6]. This has shown business entity will have to be more

competitive in the market to survive though these tough times. Competitions are high as industry required skilled and qualified personnel and lacking an industry leader to lead the industries [7]. Research from Lloyds society registry indicates, more than 5000 ship management companies worldwide managing vessels [8]. Listed ship management company are to cater management to more than 50,000 merchant vessels at sea, resulting an average of only 10 vessels per management company only [9]. This have shown that although maritime industry is a niche industry where specific and technical skills are much needed to operate in the industry, it is very competitive. Following law of supply and demand, business in marine industry is classified under pure competition whereby the industry has plenty of business offering similar services [10]. Prices and other additional values that are offered is the main competitive advance a firm will need to have over its competitor.

There are several key activities that make up the maritime industry such as shipyard segment, passenger segment, marine merchant fleet, national defense, fishing and extraction, navigational and support services [4]. One of the key activities in maritime industry support segment is ship management [7]. Ship management companies are part of support services in maritime industry. A management company enables ship owners to manage their vessels for smooth sailing and trading [11]. Managing companies provide technical support on managing the vessel and act as an agent on behalf of owner in return for management fees [11]. Technical services are encompassed of sections including management of technical, crew, quality services and security, vessel accounting and procurement services [12]. Technical management are the focal point in ship management whereby technical managers are responsible on activities such as maintenance, repair and operation of equipment and machineries on-board, arranging sufficient crew on-board to manage ships, arranging loading and discharging of cargos, protecting the vessel from harm and etcetera that relates to operating a vessel. Other services such as Procurement Services will be as support to technical management following vessel management plans from technical managements. Procurement services are responsible to source, procure and arrange timely delivery of supplies and services on-board vessels [12]. To meet research purpose, procurement activities of a ship management company focused area used for studies and strategising thus leading to following research questions.

- RQ1. What are the gaps and drawbacks in the current purchasing practices?
- RQ2. What strategies be used to improve drawbacks and gaps to streamline purchasing process?
- RQ3. What are the benefits of implementing purchasing strategies on procurement?

2 Theoretical Background

The objective of this research paper is to study and examine the purchasing strategies to improve competitive advantage of shipping management firms within the maritime sector. To identify studies, pre-select and evaluate the key contributions from the existing studies while able to synthesize and analyse, the paper focusses on existing literature and relevant works while contributing to the understanding and development of knowledge base, addressing any research challenges and gaps.

2.1. Background to Global Supply Chain Management

Supply chain management (SCM) is viewed as the management of forward and reverse relationship between the key suppliers and customers for the key purpose on delivering strategic value to customer for the fractional cost efficiency to the overall supply chain [13, 14]. Studies conclude with earlier findings that in-depth description where supply chain management is utilization of approaches to efficiently integrate suppliers, warehouse, and stores to provide the logistical 7R's to meet service level requirement while keeping cost minimal [14]. In modern context, supply chain is referred to networks from end to end linking suppliers to supplier, suppliers to customers and customers to customers.

The importance of supply chain management has increased over the years and continues to evolve through development of technological advancements and industry 4.0 technologies [15, 14]. Supply chain management is a combination of different parts in a supply chain originating from supplier to the final customer [15]. Ultimatum of supply chain management is to reduce cost and improve service level in in different level of supply chain network and thus leading to gaining competitive advantage [14]. In context of this studies for a ship management firms, company will be the intermediary between suppliers and customer whereby supplier will be provider for products and services and to the customers will be vessels and the ship owners.

2.2 Competitive Advantage

Competitive advantage has been referred to be a condition which allow an organization to offer better goods and services of same value compare to competitors and strategy is derived to achieve competitive advantage [16]. Achievement in managing supply chain management will lead to competitive advantage over competitors in same market or industry [13]. Having higher competitive advantage will differentiate an organization over its competitors thus be more attractive to customers. Fundamental of competitive advantage as ‘Three Cs’ showing the relationship of competitive advantage between an organization, competitors and customers [13]. Competitive advantage is deemed to be sustainable and lasts for longer period but require constant innovation over time to achieve higher level of competitive advantage [17]. An organisation should not be fixated on their current competitive advantage and that have failed to innovate and keep pace with trading market such as Nokia and IBM [17].

2.3 Procurement

Michael Potter have identified a model to help analyze a set of activities which will help a firm to create value and competitive advantage (Porter, 2004). The model is split into 2 segments, primary activities, and support activities. Primary activities are essential activities in supply chain that will add value and competitive advantages [18]. Support activities refers to activities to support the primary activities in achieving more value and higher competitive advantage [18]. Figure 1 shows the relation between primary activity and support activity in the model [19]. Procurement is a part of the support activity that will aid an organization to achieving a higher competitive advantage.

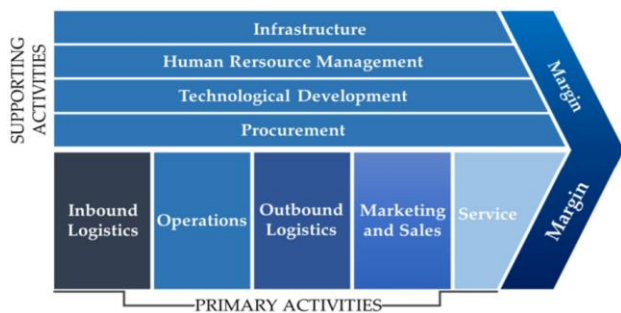


Figure 1: Porter’s Value Chain [19]

Procurement is defined as practical and strategic corporate activity that ensures the continuity supply of goods and services through management of risk within the supply chain such as effective

negotiation, costing, quality, and other essential characteristics [20]. Traditional procurement involves only few stages of purchasing process with the absence of strategic action and dimension such as achieving price agreement, placing of purchase order, chasing on delivery, handling stake holder enquiries and handling of orders acknowledgements [20]. Strategic Procurement is an action to reduce the supplier base, negotiation, communication and maintaining long term relations with suppliers [21]. Strategic procurement activity involves both operational and tactical role of procurement such that it includes strategic activities such as supplier management into traditional, operation activity of purchasing. There is different type of buyers depending on the functions or representation of buyers. Buyers for industrial organization have characteristic of purchasing goods and service for production and commercial purposes, intermediate organization have characteristic of purchasing for resale to consumer market, intermediate organization with characteristic to purchase for resale which is not commercially significant at various industry level and institution whereby purchase is for institution that buy independently on their own behalf [20]. A summary of typology of organizational buyer as shown in Figure 6. In the context of ship management will be at institution type whereby organization purchase goods and services on-behalf of customers and for their use.

2.4 Procurement Strategy

Recently, it is found that that traditional procurement strategies are lesser effective and are unable to meet current customer requirements, poor costing, and time uncertainty [22]. New procurement strategies are required for improve procurement process to an acceptable level meeting customers requirement. An organization should have a defined task or objective when developing a procurement strategy [23]. Many companies have implemented different strategies although not all are successful and different strategies will lead to a different set of outcomes. Example some companies have identified that different strategies will lead to a mixture of several desired outcome, example in Figure 7 such as single sourcing is able to achieve good price and performance whereas global sourcing can achieve good price, performance, low risk and better flexibility [24]. A single best universal strategy which fits to all business models and can achieve all objectives does not exist in procurement as there is no one size fits all approach [25]. Instead of a single best universal strategy, should be flexible and to adapt to business

environments and other organizations strategy can be used as a guide and reference and guide.

There is no precise definition of procurement strategy in academia and there is different interpretation of procurement strategy from researchers. It can be identified that procurement strategy is made of two parts. Firstly, is strategy formulation whereby it identifies the objectives and goals to achieves in purchasing [26]. Objective of procurement can be wide and anything that meets operation need and gaining more values from the current operations such as achieving the 7R's of supply chain. Other researcher has second that purchasing strategy objectives are wide, indefinite and undefine and can include any fittings objectives such as cost focused strategy and innovations [27]. Second part of procurement strategy is strategy implementation whereby it is the action plan and practices that is to be implemented to meet the objective identified in strategy formulation [26]. Basis on objective that have been set, different actions plan can be drafted to meet and achieve the objectives. Different researchers have researched on different approaches such as single against multiple sourcing and local against global sourcing [28, 29].

Procurement defined as a function to ensure continuity supply of resources that an organisation requires fulfilling its strategic objectives [23]. Following researchers understanding that procurement strategy is development of a joint strategic approach in procurement to gain competitive advantage meeting customers requirement such as cost reductions, mitigating supply risks, and finding new opportunity. To develop an effective strategy, it is essential to identify the aim/objectives of the operation, asses it and develop an approach to meet these objectives though activities involved in procurement [30]. Through successful strategy, competitive advantage is attained that enhances organisation market position; one that not necessarily has minimum cost and maximum efficiency but a strategy that fits within the operations of the firm [31].

3 Research Framework

The purpose of this research is to study and identify the purchasing strategies to improve competitive advantage of a ship management business in the maritime sectors. Based on research questions, objective of research is derived to be used as guides to justify research questions shown in table 1. From the different steps and available styles in conducting and writing a research, a pragmatism approach will be selected because it is found to be more compatible with the research environment.

Pragmatism will adopt both qualitative and quantitative in researching, where sets of data and information will be used to identify research objectives RO1 and from there research will be able to progress further to RO2 and RO3 though analytical interpretations.

<i>Research Framework and Objectives</i>		
Research Objectives	Aims	Activities
R01	To classify the main categories in purchasing	This will be identified using resources from business environment
R02	To identify the flaws, gaps, and opportunity of purchasing categories in current procurement	This will be done by carrying out primary and secondary research from information collected from business sample environment
RO3	To understand needs and requirement of customers in procurement	A questionnaire will be carried out to identify customers' needs and requirements.
RO4	To explore methods and strategy to gain competitive advantage in procurement process	Understanding current procurement practices and it's implication based on finding from RO2 and RO3 for formulating of appropriate strategy that meet customer's needs.

Table 1: Research Objectives

Also, a pragmatist assumes the process of the world, which relates to research will be on assumptions and research findings will be generalized to the business operating in similar environment and industry. A matching approach to selected philosophies will be induction approach where research goals is to find new and appropriate purchasing strategy which can be adopted into the maritime industry to improve procurement process and it will start from observing of the business environment as a start and will be refined through the research to achieve the research goal.

Singular case study strategy is adopted into the research where a maritime ship management company will be used in the research as the research environment. Information and data will be extracted from the organization for further research development. Mixed method research is appropriate following a case study research strategy where multiple styles of data collection method is used, and the end-result be quantifiable into statistical findings such as questionnaire and raw data of actual operation spending of the research environment. A cross-sectional study is adopted, research duration over a specific period, following

business financial period over a period of 12 months due to complete business operating cycle within full account period. To ensure credible in-depth research, different data collection techniques and data analysis style is adopted within the research to ensure research findings are rigorous and reliable.

Firstly, the use of both primary and secondary data collection methods is implemented. Primary data used includes quantifiable type questionnaires to collect sample information from stakeholders, technical managers who are participant authorized to manage the expenses and spending, on behalf of ship owner. Other resources such as secondary resources used such as extractions of study and data from business archive as well as other reliable journals and articles published. The data collected from various levels of sources collected, analyzed, and interpreted. Research design adopts singular case study, an in-depth information collected from two different methods resulting to information gained from different point of views [32].

Coherently, use of case study strategy reflects actual environment as well which lead to consistent findings [33]. Both the techniques are complimentary techniques because singular strategy provides researcher, an actual environment to investigate and is done through different methods to achieve findings from different viewpoints resulting an increase in reliability [32, 33]. Finding of different viewpoints ensures generalized finding to be more accurate and objective. Studies supports using case studies to generalized findings are compatible technique for a research where it involves in-dept investigation of a topic which often make use of a wider range of data sources [34]. In line with chosen methodology, two different data collection technique is used to collect data. Firstly, a structured questionnaire is drafted and tested before it is sent out to targeted respondents for data collection. Questionnaires are sent through internet and answer facilitated electronically though the internet. Accordingly, questionnaires completed through electronically, mail hard copy questionnaire or online means with the respondents [33].

The method is suited to quantitative research method because it comprises of closed ended questions, answers are scaled, and information deducted statistically. Additionally, for a firmer research, few open-ended questions are added to understand customers need for a better overview of business functions. Open-ended questions are supportive questions for a quantitative questionnaire by providing assurance on the quantitative questionnaires validity and benefit of making the statistical study to be more interesting [35]. Open-

ended question is compatible to be used with closed ended questions and is proven to bring positive result on the research.

Second, retrieving information from business sample for spend analysis and to be used as support to questionnaire findings though contradiction or complimentary between the data. Raw data from actual business environment will be extracted to support the research as well as to achieve research objectives. Above two methods are targeted at customers feedback and customers actual purchasing behavior. Different types of ships are managed by different ship managers. A questionnaire is targeted to the customers using procurement services for feedback and result of findings. In relations to the questionnaire, spending study of different types of ship managed by ship managers is extracted from the organizational study to understand on spending behavior. A wide range of types of ships are selected to achieve generalisation which can represent Malaysian ship management industries. Customers are selected as audience for data mining as proven by other business organizations from different industries.

Questions	Objectives	Aims
1. Priority of vessels order category	To identify the importance of each categories for customer through ratings	This question is to identify the background and importance of each categories perceived by customer through ratings.
2. Risk towards vessel operation if not supplied	To identify the risk level associated to customers following categories through ratings	This question is to identify the risk level towards ships operations if the categories identified is not supplied to customer
3. Challenges faces with purchasing	To identify the challenges faced by customer with procurement services through ratings	This is to identify the possible challenges and weaknesses in purchasing, possible problem faced by the customer for not meeting their expectations in different categories of purchasing. This will lead to identification of the weaknesses and flaws in current procurement processes. Procurement strategy will be build using challenges identified as a guide. Identifying and overcoming challenges with appropriate strategy will lead to gaining of competitive advantage
4. Expectation on purchasing processes	To identify customers' expectations in procurements services through ratings	This question is to identify customers current requirements and expectations towards procurement. Identifying customers expectation and requirement as a goal in building a strategy to achieving it
5. Suggested area of improvement on purchasing	To identify customers future expectation and requirement in purchasing	Result from customer will highlight areas of improvement and needs perceived by customers in the future. Question 5 is customer-based improvement and used to identify customers future expectation and needs on procurement. Findings will be target perceived and provided by customer, achieving it will lead to strengthening of organization competitive advantage
6. What is the most important aspect in purchasing to retain existing customer and gain new customers?	To identify the important aspect in procurement activity with the objective to keep customer and to gain new customer	Question 6 is to identify customer to advise and give feedback on their perceived requirement to keep business relation. Same question to identify customers requirement to gain new customer
7. What other factors in purchasing not discussed that could improve purchasing activity?	To identify other factors in purchasing that is not discussed in earlier questions	Question 7 is to identify other possible factors that is not identified by researcher. Question 7 to identify aspects in purchasing that can be research and study together with above found aspects.

Table 2: Research Study Questionnaire

Other organizations collect feedbacks from customer and propel the business by meeting the requirements along with strengthening a business function achieving a competitive advantage [36]. Information collected though above two techniques

will be compared and analyzed following the categories, current problems and customers need. Multiple data analysis method will be used such as spend analysis from the spending study, ranking and scoring technique using tables and graphs tabulated from questionnaire findings. Ranking and scoring technique will be simple analysis to quantify results from questionnaire into graphs and tables to identify the trends [37]. Targeted audience group for questionnaire will be the technical ship managers.

Ship managers that are responsible of different types of ships in the organization which includes car-carrier, bulk-carrier, container-carrier, liquified petroleum gas and liquified natural gas. The questionnaires participant sent to ten technical ship managers who are responsible in managing vessels in the same organization and business environment for their feedback and opinions on the current purchasing practices and processes. Selected participants are ship managers because they are the customer the procurement department are serving too. Ship managers act as representative of owner in managing the ships to ensure smooth sailing; and are budget controller who have authority over a ship spending and are technically verse on the impact of the categories towards ships business activity.

Ship managers that are handed with questionnaires are managers that manages different types of ships. Questions in questionnaire are subjective based on work environment and discussion with other people related in the same industry such as higher managements of procurement, other support services and technical managers who is working in the same field. The overall objective of the questionnaire is to collect data on customer's needs, understanding it and using it as the guide in building a purchasing strategy for it. Participants personal details such as names, contact and mailing details are not included in questionnaire due to the data protection reason.

4 Data Analysis and Findings

Following method of data of questionnaire and past historical actual data from business operation, a case study is carried out identify the findings and result from the data collected for understanding, reviewing, analyses and interpreted to meet research objectives. A case study research is carried out to collect and actual and in-depth data from actual business operation to support the research. As identified through earlier adopted research method, the analysis and findings are discussed here.

4.1 Case Study

The objective of the case study is to study the maritime industry, ship management procurement practices with appropriate purchasing strategy. A ship management business is responsible of managing the technical aspects of an operational ship ensuring that it is seaworthy to sail and operates. In recent years, maritime business is on a slop with global shipping rate continuing to slump along with poor global economics resulting to ship management business to be on a slump, difficult to sustain and facing fierce competition with competitors [38]. Research will be focused on procurement activity in ship management industry. Procurement activity involves an operation that have high spending which is above millions of dollars for owner in managing the ships.

Company selected for this research study is "ABC Ship Management". ABC is a subsidiary of large shipping and maritime group. Headquarters are based in Singapore due to center of growth and digitisation [39]. ABC is one of the top ten ship managing companies for Singapore listed by Lloyds List, managing 396 ships under its management including different types of trading ships and expanding its business in offshore energy sector [8]. ABC is third-party ship management business that includes multiple services to its customer in ship management, with core services as procurement. ABC has strong portfolio of managing more than 450 ships of different types and classes since business start-up, that included container vessels, cruise vessels, bulk vessels, liquified natural gas vessels, liquified petroleum gas vessels, offshores vessels, car carrier and other new types of vessels ship being taken over into ABC management. Ship managers are the center point of management of a vessel whereby they are responsible in managing ships spending and are budget controllers while managing the ships technically ensuring smooth operations in sailing. In ABC, a ship/vessel manager usually manages an average of five ships. Focus of research will be on the procurement section in ABC where business focus supports customers in timely supply and services, value for money while complying to regulatory and international shipping requirement [12]. Procurement services includes purchasing of all items related in operating ships which includes machineries spare parts, maintenance, repair services, general supplier and consumables for sea farers and others.

4.2 Current Market Trends

In current business environment, competition is ever fiercer from a slow growing shipping sector. As

findings from KMPG Transport Tracker, it is reported that economic growth is slow and thus resulting higher competition rates [40]. Business model are required to change to catch up to current business environment changes. Shipping business slump continues as reported by one of world's biggest cargo carriers, AP Moeller Maersk have reported that earnings will be lower in coming years due to increases in fuel prices, soft freight rates and escalating trade tensions [41]. Maersk is one of the major leaders in the shipping industry and are recognized to be one of joint organizations have hold a high percentage of worldwide shipping capacity [40]. With market leader Maersk facing a slump in business, other related business in shipping is facing similar issues which includes ABC.

Although shipping services and businesses are down, some sectors in shipping are picking up slowly such as car carriers and ferry market remain strong, improvement in bulk, container, and LNG segment while LPG and offshore markers are still at low below market trends. Procurement in maritime industry plays an important role, involved in procuring goods and services and arranging timely delivery of order to ensure ships trading and operations are not hindered and delayed. Right product must be delivered at right quality, at right time and at right place. Interruption in ships operation might cause off-hire of ships, with ship owners suffering losses in earnings.

4.3 Questionnaire Data Analysis

4.3.1. Purchasing Category

In above mentioned data analysis methods, closed ended questions in questionnaire are basis few main categories of spending for a vessel. ABC splits the expenditures into different account coding to capture individual categories cost in the accounting systems. These categories are used to identified areas spending's are made to be reported to owner and different owner will have different styles of reporting. There is a total of approximate 365 categories breakdown used by all ships by different owners in ABC. In cases existing categories does not matches owner requirement, new categories will be added accordingly to ensure correct reporting of ships expenditure to owner. In this research different small categories used in the organization are simplified and generalized into eight common main categories as representation. The eight common categories can be found and used in each ship within ABC management. These categories are constructed and included into questionnaire survey to collect the

rating based on customers feedback for measurement.

Machineries spares includes different types of machineries used on-on-board a ship ranging from small machineries to big and heavy machineries. There are tens of different types of machine used and as per owners' requirements it is break down into different machine categories in reporting. There is a total of 8 identified categories for machineries used in ABC. Purchases of different spares parts of machineries such as main engine, auxiliary engine, pumps, galley equipment, cargo equipment, cranes, and etcetera varying between the different type of ships.

Consumables are ships supplies that are part of or accessories in the ship, assisting in the operation of the engines, machines, and other equipment on-board which includes general consumables [42]. Consumables in research context refer generally to daily general stores supply such as cabins stores, engine stores, deck stores, electrical stores, medicines, wires and ropes for different functions, paints and other less critical consumables that are required to be replenished frequently. Usually, replenishment will be monthly or quarterly depending on ships trading ports. Different stakeholders will have different requirements on supplies such that different specification, different quality, and different types of certification.

Lube and Fuel oils refers to lubricating agent used on machines on-board a ship, ensuring that equipment to be more durable and less strenuous, ensuring that equipment can runs smoothly with minimal breakdowns [43]. Fuel oils are fuels used on main machineries involved in moving the ships such as the main engine, propelling the ships movements as well as power source for generator to produce electric supply for operation of the whole ship. Due to there are different types and grades of lubes available for different categories of machineries, lubricating oil and fuel oil are classed together due categorization and importance of both oils are equally important.

Maintenance and repair services relates to sourcing for services from skilled and technical personnel to repair and maintain different equipment's and machines on a ship. Similarly, to the automotive and aviation industry, different complicated machines will require service repair assistance from specialist service provider when equipment are due to maintenance and repair.

Navigation relates to expenses on navigational tools used such as paper charts, publications, electronic charts, and navigational subscriptions such as yearly subscription for electronic producer, ocean monitoring service, weather forecast service, navigations equipment rental and global positioning systems.

Communication are cost related to communication charges of different types such as voice calls, internet subscriptions, mailing connections, and other different forms of communication service enrolled with the ship. Communication charges includes satellite communication of different types such as very-small-aperture terminal service where it is a type of lower cost services compared to other terminal services.

Provision are foods that are mandatory to be supplied. It is food sources required by ship crews. Due to ships are constantly moving, point of supply are not fixed. Main concern on provisions are qualities of supplies. Provision is important to crew due to a provision supply can last up to few months before next supply and it is the source of energy that will support a strong and healthy crew. Provision is an important category in maritime industry whereby failure on supplying adequate and appropriate provisions might result to detention of vessel in ports, disabling its ability to sail [44].

New Installation

Over the past years and in near future, more new rules and regulation are being implemented in the marine industries whereby ships will need to install new equipment to adhere to the new regulations. In maritime industry new installation is also known as retrofitting. Retrofitting is adaptation of new system on a ship by replacing or installing new system to a ship to meet the new regulations to ensure that ships can continue to sail when the regulation are enforced [45]. Retrofitting is a very costly project which will project to millions of dollars for an installation of a new system. In the nearest future, IMO 2020 have enforced that several new regulations that forces ships to install these systems such as ballast water management system and scrubber system which will cost up to \$1 million per project [46].

4.3.2 Priorities of Purchasing Categories

Priorities of purchasing categories is an area of survey in questionnaire with the aim to identify the importance of each purchasing categories. Feedback from questionnaire will provide guidance and

benchmark on the priorities. Priorities of purchasing categories will be used as a guide in building a procurement strategy such as strategy will be built around the highly important categories to ensure core competency. From questionnaire study summary, each category is rated by ship managers basis the priority and importance for a ship. Priority of order category are closed ended questions with ratings to quantify and identify the importance of it. Priority is rated with rating of 1-5, 1 rated for less important and 5 rated most important to a ship. An average rating is tabulated to represent the category by adding all ratings value and dividing by 10.

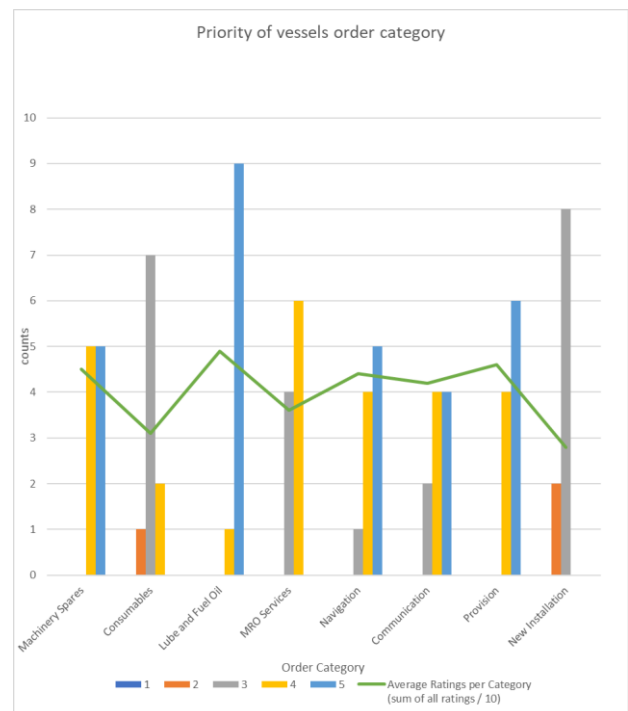


Figure 2. Priority of vessels order category (Q1)

Machineries spares importance are quite significant category for ships. It has received a score of 5 counts each of rating 4 and rating 5, receiving an average count of 4.5 rating. Machineries are found to be highly important category of supply for a ship. Consumable importance is rated averagely receiving 1 count for rating 2, 7 count for rating 3 and 2 counts of rating 4, receiving and average count of 3.1 rating. This category importance is average, normal importance. Lube oil and fuel oil receive a very high rating receiving 9 count of rating 5 and 1 count of rating 4, averaging rating of 4.9. Lube oil and fuel oil have received an extremely high rating with an average of near to rating 5 have shown that this category is perceived to be extremely an important category in purchasing. Maintenance and repair services scored an above average score

receiving 4 counts of rating 3 and 6 count of rating 4, achieving an average rating of 3.6. Importance is just above average. Maintenance and repair services importance are above average, also classified as normal importance. Navigations received a relative high score by receiving 1 count of rating 3, 4 count of rating 4 and 5 count of rating 5, achieving an average rating of 4.4. Navigations are rated to be highly important. Communications also received a relatively high score by receiving 2 count of rating 3, 4 count of rating 4 and 4 count of rating 5, achieving an average rating of 4.2. Communication is rated as highly important. Provision have also received a higher rating for getting 4 count of rating 4 and 6 count of rating 5. Provision has an average rating of 4.6 which is rated to be a highly important category. New installation gave received an average rating, scoring 2 count of rating 2 and 8 count of rating 3. Achieving an average rating of 2.8 only, which is below average. This is the least important category identified. Summary of importance representation of purchasing category by customer shows that lube oil and fuel oil are the most important category in ship management. Highly important category divided to 4 category which is provisions followed by machineries spares, then navigation and communication. Highly important category are categories with an average rating above 4 and margin of difference between these categories are minimal to 0.4 rating only. Maintenance and repair service, consumables and new installation are the lowest scoring category with a rating of 2 to 4. These 3 categories are identified to be normal importance category in customers perspectives.

4.3.3 Risk towards Operation / Supply Risk

Risk towards operation will be to identify the risk level associated to purchasing categories and its impact level toward a ships operation if it is not supply. Risk toward operation can be considered and have same implication as supply risk for ships whereby it is associated with the risk associated when there are supply failure, failure to deliver the order category on-board. High risk towards operation will relate to failure of delivery will result ships operation to be held up, delaying, or preventing ships to sail and result to financial loses by stakeholder. This area of survey is also to build up the procurement strategy where it will be used as part in analysis tool to identify area for improvement and to build a procurement strategy with it. Finding’s summary of tabulated graph on supply risk as shown in figure 3.

Supply risk are close end question in the form of rating from 1 to 5, rating 1 to be least risky and

rating 5 to be most risky. An average rating is tabulated to represent the category by adding all ratings value and dividing it by 10. Machinery spares have attained an average rating of 4.6 with 4 count of rating 4 and 6 count of rating 5. Machineries spares have shown to high supply risk category. Consumables have acquired average rating of 2.7 with 3 count of rating 2 and 7 count of rating 3. Risk associated with consumables are below average, not risky towards ships operations. Lube oil and fuel oil have achieved maximum average rating of 5 with 10 counts of rating 5. This indicates that lube oil and fuel oil supply impose an extremely high risk towards operations of a ship if not supplied. Maintenance and repair services have collected an average rating of 3.3 which is above average risk. Maintenance and repair service have received 1 count of rating, 5 count of rating 3 and 4 count of rating 4. Maintenance and repair have also received an average rating, slightly above average risk. Navigations have achieved a high average rating of 4.6, collecting 6 count of rating 5 and 4 count of rating 5. Rating of 4.6 is identified to be a high-risk category.

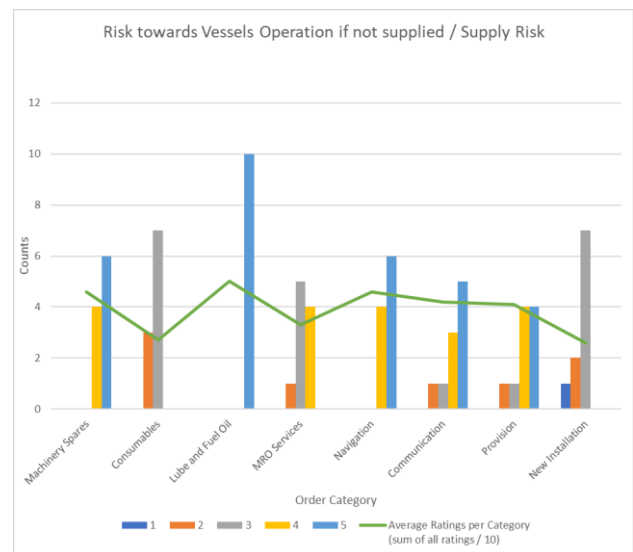


Figure 3. Risk Towards Ships Operations (Q2)

Communication have received an average rating of 4.2. count on ratings are evenly distributed on the ratings because 4 different rating are counted which include 1 count for rating 2, 1 count for rating 3, 3 count for rating 4 and 5 count on rating 5. Provision have received a relatively high average such as communication with rating of 4.1. Also have an even distribution of counts on ratings with 1 count for rating 2, 1 count for rating, 4 count for rating 4 and 4 count for rating 5. New installation has received a below average rating of 2.6 with 7 count

for rating 3, 2 count for rating 2 and 1 count for rating 1. Lube oil and fuel oil are recognized to be extremely risky category with an average of rating 5. Non-supply of this category will result to extreme risk and consequences as this category have received a unanimous vote of rating 5.

There are few purchasing categories that imposes a high risk toward a ship's operation with a rating of above 4, machineries spare and navigations are the second most risky categories identified by having same average rating of 4.6, followed by communication 4.2 and provisions 4.1. Remaining three categories are found to have average and below average risk, showing that non-supply of this categories imposes little impact on ships operation compared to other categories. The least important categories are consumables, maintenance and repair service and new installation with rating of 3 and below. From figure 4, relation between supply risk is closely related to priority of purchasing category. It is identified importance of categories is related to the supply risk of the category; higher importance relates to more risk associated with the purchasing category. Lube oil and fuel oil are the most important category and brings the most risk towards operations whereas new installation is the least important category as it brings the lowest risk.

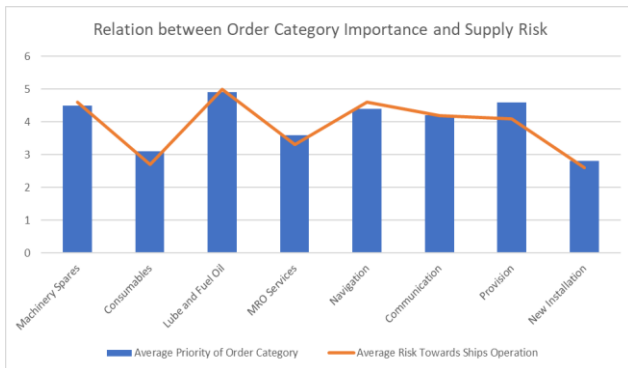


Figure 4. Relation between Order Category Importance and Supply Risk

4.3.4. Challenges with Current Purchasing

This area of survey is to identify challenged faced by customer towards current purchasing practices. Different customers might face with different challenges and survey is to identify area in purchasing that are not performing well and having a low rating. Difference strategy will be built to address the challenges as well as to strengthen the challenging areas or weakness. Challenges faced are derived from adaptation relevant factors from sever Rs of SC as Right Place, Right Product, Right Price, Right Customer, Right Condition, Right Time, and

Right Quantity [47]. Also, discussion is done earlier during questionnaire drafting and testing period with other business stakeholder to identify the right concern areas to be surveyed. Example is specification and quality are based delivery of the right products, cost is for delivery of procurement at the right prices and delivery lead time relation to right time. Other relevant area found through discussion that is related to business environment is last mile delivery and agility of the procurement processes.

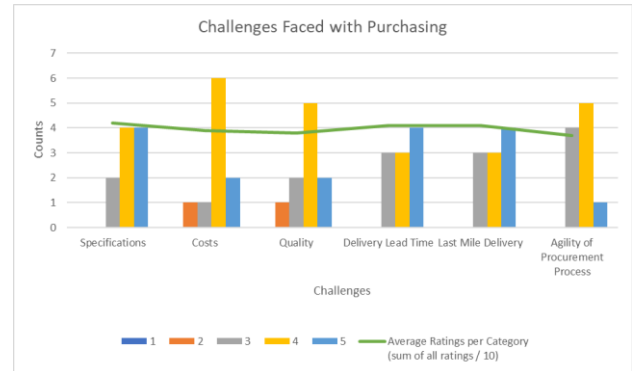


Figure 5. Challenges Faced with Purchasing (Q3)

First challenge listed in questionnaire is **Specification**. This challenge has received the highest average score of 4.2, which shows that participants face the most challenges in specification in procurement. Specification is rates as highly challenging for score above 4. This have shown that orders for ships are highly technical which imposes a great challenge in purchasing to procure the correct specification items for ships. This are of challenge have received 4 count of score 4 and 5 count of score 5. Second challenge is **Cost**. Cost has an average score of 3.9, above normal difficulty. Cost have received count 1 count each for score 2 and 3, 6 count of score 4 and 2 count of score 5. Cost are not the main challenges faced by participants. Third challenge is **Quality**. Quality refers to quality of service and products. Similarly, quality does not impose great challenges to ship managers as it received an above average score of 3.8. Quality is a concern less faced by ship managers as interpreted from figure 5 with the evenly distributed feedback of 1 count for score 2, 2 count for score 3, 5 score for count 4 and 2 count for score 5. Fourth challenge is **delivery lead time**.

This area is identified to be highly challenging with a score of 4.1. Delivery lead time have collected 3 count of score 3, 3 count of score 4 and 4 count of score 5. Delivery lead time have shown difficulty faced by ship managers in delivering order

timely to ships. Concerns arises from delivery lead time might include long delivery lead time of order due to products and services to be highly specifics and niche. Fifth challenge is **last mile delivery**. Last mile delivery is the last leg of the supply chain in delivering orders on-board a ship, which is the delivery arrangements to final destinations [48]. Different issues and challenges are faced in last mile delivery such as relation to the efficiency whereby will result to higher cost for delivery to destination and increase in lead time for order to be received. Last mile delivery is found to be highly challenging with an average score of 4.1. rereviewing 3 counts of score 3, 3 count of score 4 and 4 count of score 5. Consolidation and delivery with main modes from origin are simple but after order arrived at a warehouse, the final delivery arrangements are lesser efficient. It is identified that last mile delivery comprises of up to 28% percent of total delivery cost [48]. Last challenges of identified is **agility of purchasing process**, which relates to time take from an enquiry is raised till it is address and delivered to destination. This challenge has achieved an above average score of 3.7 from 4 count of score 3, 5 count of score 4 and 1 count of score 5. With an average score shows that procurement activity does not impose many challenges to ship managers but it's for further improvement in the process to be more efficient and effective. Apart from identified obvious challenges, participants are also given opportunity to raise other important challenges that have not be identified.

Managers C have raised concern on challenges in confirming the suitability of the parts ordered prior to delivery to the ships. This challenge has shown that manager C have faced issue with procuring and delivering the correct parts. Parts mentioned might be referring to machineries spares parts or other physical goods that have been identified in earlier text. Manager C concern relates closely to Specification challenges because it relates to procuring and supplying the correct specification product and service on-board. Failure in doing so might result to rejection of the order and resupplying it which will increase both time and cost. Manager H have identified that other concern related to availability of supplies at certain ports. This concern relates to availability of supply of physical products such as spare parts, consumables, and services in different ports because ship is a moving entity that travels the world and berthing at port for operation of loading and discharging cargos. Manager I have identified another challenge related to specifications, but concern is from the end user side, which is the ship side do not raise an enquiry

with wrong specification. Similarly, to Manager C challenge is related to specification. Summary of other challenges identified by questionnaire participants is mostly of areas that have been identified which is specification. This again highlights the importance of specification and the high difficulty in procuring the correct goods and services.

4.3.5 Customers' Expectations and Preferred Improvements

Survey is broken down to two questions in questionnaire, first to identify the expectation and second to identify customer preferred area of improvement. Procurement strategy build should be in-line with customers' needs and expectation. This part of questionnaire will identify areas in procurement that customers are looking forward to achieving, thus provide a guide to understand customer's needs. Improvement and the strategy build up will be based on it. Customer's expectation is questioned in two format, closed end question and open-end questions where close end question will be scored, and open-end questions will be open opinions from questionnaire participants. Scoring system is same as other closed ended question in the question with score 5 representing most important and score 1 representing least important. Customer expectations, there are 6 identified area on expectation on the closed end question and expectations are derived from earlier question on challenges.

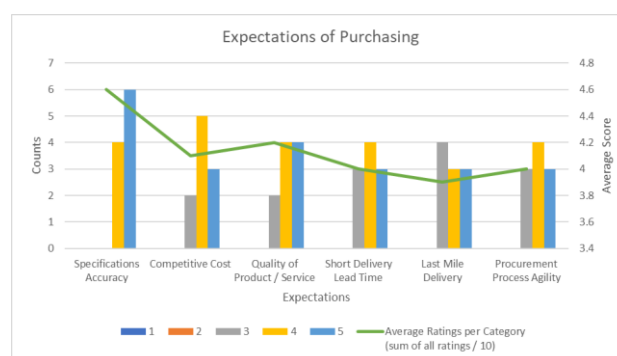


Figure 6. Ship Managers Expectations on Purchasing (Q5)

First expectation area is specification accuracy with a very high average score of 4.6 indicating that it is highly important are and having high expectation on delivering orders accurately. Specification's accuracy have received 6 count of score 5 and 4 count of score 4. Importance of specification accuracy related supply the right goods. Orders supply specification should be correct as required by

ship and when supply there should be minimal or no rejects and returns.

Second expectation area is competitive costing. Second area received and average score of 4.1 which represent highly important area with high expectations. Ship manager are expecting to be procure at the most competitive pricing for goods and services inclusive of other cost such as delivery cost. Costing in ship management business is difficult as ships travels between location quickly and cost of same items will be different at different location.

Third expectation is quality of products and services with an average score of 4.2 from 4 count of score 4 and 6 count of score 5. High expectations from ship manager are to ensure the quality of supplies and services to be good. High expectations relate to supplies f good to be longer lasting and do no cause harms on-board a ship. Same to service to ensure that service repair can be completed within shortest period and no re-attendance is required.

Fourth expectation is shorter delivery lead time. This expectation has also achieved a high average score of 4. Ship managers are expecting for supply order to be supplied at a shorter lead time. This can result to quicker replenishment of stock on-board ships as well as allowing order to be confirmed at shorter notice considering ships ports calls are not fixed and are sudden at times.

Fifth expectation is last mile delivery with an average score of above average of 3.9. Expectation towards last mile delivery not high because ship managers understand that the final leg of delivery are difficult to control due to the nature of business of the ships trading in different port in different regions around the world and original of spares and services might be from the other end of the world.

Sixth expectation identified towards procurement process agility. This expectation has received an average score of 4, which indicates ship managers have high expectation on a more agile purchasing process whereby it will be completed in a more effectively and efficiently ways. Other expectation is the open-end question to collect other areas that are not questioned in expectations.

Manager E have recorded that expectation of quick delivery on-board ships at the least transport cost to be incurred. Expectations is same as the 2 areas identified in above which is last mile delivery and competitive cost where last mile delivery involves the final delivery arrangements to deliver on-board and indirectly relating to the cost associated for the last mile delivery. We can also understand from here that last mile delivery is very

costly and at time might cost more than the product cost depending on the products nature and location of delivery.

Manager J on the other have other expectation of a quick and accurate processes. His concern can be understanding to be related to purchasing process agility whereby purchasing process efficiency and effectiveness does not meet expectation and there can be further improved. Manager K have identified other expectations which is not part of the close-end questions which expectation on the purchasing officer are pro-activeness, communication skills between purchaser with stakeholder as well as having an efficient system and processes. This expectation relates mostly to soft skills of purchaser on the purchasing. Summary is other expectation for questionnaire participants are closely related to identified areas, but Manager K have highlighted an area which can be researched further.

Preferred area of improvements are close end questions in the questionnaire with seven choices of area improvement derived and related to earlier questions. Participants are required to select up to 3 important areas that need to be address for improvement.

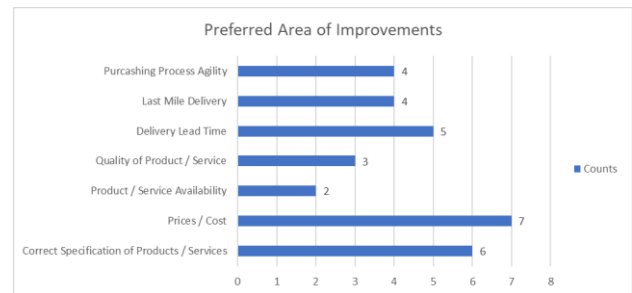


Figure 7. Preferred Area of Improvement (Q7)

It is identified that the most important are of improvement will be on prices and costs of purchases shown in figure 7. With a count of 7 of 10 participants. Although importance in earlier questions shows that price have a lesser significance but overall can be improved to achieve a more competitive pricing for purchases. Second highest rated area with a count of 6 of 10 participant is for purchasing with correct specification for both products and services. Same importance can be seen in earlier questions related to specifications. Third most preferred area for improvement will be delivery lead time which have count of 5 of 10. Other 4 areas have a lesser count with purchasing process agility and last mile delivery with 4 counts, quality of product and service at 3 count and product and service availability at 2 counts.

In requirement of improvements, ship managers are emphasizing more specifications, lead time and cost in purchasing and this area are identified to have rooms for further improvements to serve customer better. Other areas with lower rating shows indicated that a functional procurement process is in place, with minimum drawback resulting to lesser concern from ship managers.

4.3.6 Retaining and Gaining New Customers

This area of questionnaire is an open-ended question to understand business environment from stakeholder’s perception. Stakeholder will be able to raise their opinions on the procurement activity and share details that might not be addressed in earlier targeted questions. Questions is to identify which part of procurement can help to keep customers and gain more business in ship management from customer, who is the ship’s owner. This is additional supporting details to identified areas in the research. Same as earlier questions, findings will be taken into consideration when building purchasing strategy.

Managers	RQ6: What is the most important aspect in purchasing to retain existing customer and gain new customers?
Manager A	Quick, reliable response
Manager B	Quicker response and correct understanding of the requirement.
Manager C	Prompt response on any query.
Manager D	Have a better understanding of the items being purchase and to develop a proper platform with easy reference and tracking.
Manager E	Cost/speed/accuracy of delivery
Manager F	No comment
Manager H	TIME & COST is very importance.
Manager I	No comment
Manager J	Ability to arrange fast delivery with reasonable cost
Manager K	excellent customer-service, competitive prices, consistently acceptable quality

Table 3. Aspect to Retain & Gain Customer though Purchasing (Q9)

As shown in feedback (table 3), there are few similar considerations from different managers which is speed and time related concerns which includes delivery lead time and purchasing response time and response. Total of 6 managers, Manager A, B, C, E, H and J are emphasising on time concerns. Time concern in purchasing is identified to be the most important aspect in purchasing in maintaining customers. Other few areas identified that can affect business to retain customer is cost which is spending for goods and services, arranging freight, and ensuring ships are able to sail and operate smoothly. Also, there are concerns relating to customer service and quality of supplies.

4.4 Kraljic Matrix (KM)

Following are the adoption done on the X-axis, supply risk in this research is identified through the questionnaire’s question, relating to risk associated to the ship’s operations if supplies for the research categories fails to be delivered. The average rating of the risk is use as data representation. Similarly, to Kraljic’s Matrix whereby it represents the supply risk, complexity of the supplies and risks from it [49]. Y-axis, instead of Kraljic original profit impact, a different financial value is used to represent the monetary impact. Actual spending by the 8 identified research categories of the ships are used as the representation of the Y-axis. Reason is because a ship management business is agent that manages the ships on behalf of ship owners and savings to customers though actual spending will indicate the company performance in delivering the best services to its customer. Details on the X-axis and Y-axis is as shown in figure 8 are modeled following the details and is the presentation of the integrated Kraljic model.

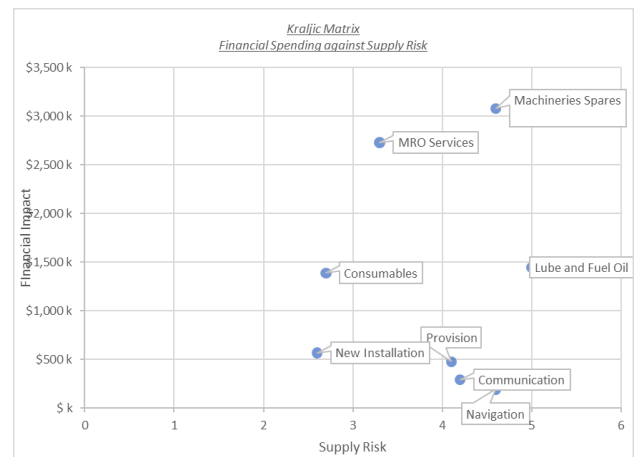


Figure 8. Kraljic Matrix, Financial Spending Against Supply Risk

Through figure 8, it is identified that the eight identified are scattered between three quadrants which is non-critical quadrant, strategic quadrant, and bottleneck quadrant. With each identified quadrant, an appropriate strategy is devised to improve procurement services.

4.4.1 Non-critical Quadrant

Two categories identified on this quadrant are consumable and new installations. It is identified these segments have a low-risk ratings and low monetary impact for ships and the priority of categories will be to ensure efficient processing [50]. One of a suitable strategy for categories on this

quadrant will be to arrange individual ordering of the item with objective to ensure smooth processing and supply on-board ship [50]. Categories identified here are items with many alternatives and have large pool of suppliers to supply [51]. Consumables significant on the procurement are describe correctly. New installation categories are not found description but have matching requirement in this quadrant which is pursuing an efficient procurement and supply process. New installation is a one-time purchase, only for selective vessel that requires it and requirement of supply are different for different ships.

Products standardisation for categories in non-critical quadrant is identified to be a good and strong strategy [52]. Focus of this strategy will be to standardize the items specification with an objective to increase the order volume to gain higher buying power over supplier for a better price purchase. One method of standardization will be through following the IMPA marine stores guide, which is the most used reference source in the maritime industry [53]. All purchases of consumable must be in accordance with the IMPA guide and same must be integrated to the ERP system to ensure that enquiries and purchase specs are standardize for all ships. This can prevent high variation of specification of supply between the different type of ships as well as consolidate order volume for business to achieve greater buying power as well as potential cost savings [52]. Product standardisation address weakness identified in SWOT analysis which is diversified spending. Through standardization of specifications, spending will be more focused to lesser supplier because items as now more specific and alternative products are filtered resulting procurement from a smaller pool of supplier leading to high spending on supplier and achieving high bargaining power over supplier to ensure best prices on purchases. Similar strategy can be used for new installation category, whereby new installation work for all ships is forecasted, standardize the specification of supply for all ships such as new installation of scrubber by year 2020 as required by the international maritime regulation [54].

Alternative strategy for consumables categories will be to be engage this category supply in a contract with a global supplier for global supply [55]. Alongside contracting with supplier, vendor managed inventory of consumables on-board ships can be introduced whereby contracted supplier will be responsible to manage the inventories of consumable on-board as well as resupplying when required. The introduction of VMI are found to

reduce logistical and administrative complexity and cost in procurement while ensuring standardization of products [56]. Contracting and vendor management inventory can overcome the weaknesses identified through analysis, whereby supplier to procure from will be reduced significantly to the few selected suppliers and purchased value with them will increase the bargaining power for customer to negotiate for a better offer. Vendor managed inventory addresses ships manager concern of supply lead time whereby supplier will be responsible in managing the stock of supplies on-board and plan for resupply before goods are finished consuming resulting the optimal environment of zero lead time [57].

Above two strategies for non-critical quadrant meets the customers requirement as identified though the questionnaires response. Two main areas concern for ship managers which is specifications accuracy of supplies as well as quality of supplies can be address through contracting and vendor managed inventory. Standardisation of supplies will lead to higher accuracy of supplying correct specification as well as maintaining high quality for supplies, all details of requirement such as quality and specification of the general supplies are to be listed in contracts terms. Other key concerns that are address is procurement process will be completed quicker where whereby processing time of enquiry, converting it to order and delivery arrangements are reduced for faster supply. Time saved from communication for getting the right specs and price comparison.

4.4.2 Strategic Quadrant

There are two purchasing categories to be identified to be strategic items, machinery spares and maintenance, repair, and overhaul (MRO) services. The two categories on this quadrant fits the requirements of being the product and services that are highly specific, supplier technology is being critical as well as there are few substitutes for the supply of product and services [51]. Categories in this quadrant indicated that supplier have a bargaining power over the customers due to high dependency of the supply from supplier and there are little substitutes for it [51]. Studies agrees to earlier statement on dependency between the buyer with the supplier and have proposed few strategies to improve the relations between buyer and supplier as well as leverage the dependency [50]. One of the strategies identified that is suitable for this research is to maintain a strategic partnership with supplier [50]. Though a business partnership with supplier, supply risk can be reduced to a minimum whereby

supplier will be able to maintain a certain level of inventory of spare parts for supply. Other benefits that can be reaped from a good business partnership is that over a long period of partnership will also lead to improvements of the quality, delivery reliability, better lead time as well as supporting supplier's product development [58]. Through above strategy, partnership is recommended for selected few major manufacturers brand used by the ships. Selected few manufacturers should hold ownerships to the many product designs of general main machinery such as main engine and auxiliary engines to ensure that partnering supplier are able to support customer ships efficiently and effectively in terms of spares supplies along MRO services.

Alternatively, a different strategy will be to source and procure from alternative suppliers for supply of same machineries spares [50]. Partnership's strategy address few of the ship's managers concern regards to specification accuracy as well as quality of products. Supplies and services will be from direct manufacturer who first produces the spares to ships when it is built and are party having the blueprints of the supplies. Also supplies quality from manufacturer will follow manufacturer grade which is substandard quality products. Alternative strategy of focus purchasing from alternative supplier or authorized traders and not purchase directly with manufacturer. This will provide advantage on other purchasing aspects such as attaining a more competitive prices with traders compared to partnership. Another advantage will be ABC will not be tied down with major manufacturers and supporting manufacturers development instead purchasing with alternative will offer more flexibility in procurement to have alternative to purchase from the best offer.

4.4.3 Bottleneck Quadrant

This quadrant indicated that there is high supply risk from supplies and value of supplies are low. There are 4 categories falling under this quadrant which is provisions, communications, navigations and lube and fuel oil. These categories are categories where actual spending and financial impact are less but poses high supply risks to ships. Suppliers supplying for these categories are found to have higher bargaining power over the buyers due to the highly technical specification, expertise and difficult to find substitute for the supply [50, 51]. It is found that items in bottleneck quadrant should be kept at minimal as this is the least ideal quadrant in purchasing [59]. Lube and fuel oil spend are high and are near to the borders between strategic quadrant and bottleneck quadrant, with a higher

spending lube and fuel oil can be converted to a strategic item. Earlier studies have identified there are two suitable strategy for categories in this quadrant. First strategy is accepting dependence towards supplier and prioritizes on reducing the negative consequences when supplying for these categories [50]. The strategy is to ensure that supplies are delivered timely and on the right place although prices of supplies will be high. Another strategy identifies is to reduce the dependence and risk with the main suppliers and look for another possible alternative [50]. Possible alternative would be to convert the different categories in this to other quadrants such as to strategic quadrant by increasing the financial spend through consolidation [59].

Conversion of some categories can be achieved through consolidation of order and standardize the requirements of all ships within the management of the business to achieve higher volume and higher spending, which will shift the categories up to strategic item when spending increases. Standardizing in bottleneck quadrant include reductions of variant in supplies specs to reduce the number of suppliers, resulting higher consolidated orders with the few suppliers. Lube and fuel oil are good representation of the categories of movement away from the bottleneck quadrants. Instead of buying same grade of oil from several oil supplier, orders can be consolidated with a single supplier to achieve a higher annual spending for this category, shifting it to a different quadrant and then a different strategy can be used to gain more benefit in procurement.

4.5 Summary of Results and Discussions

Based on the analysis of the data collected and interpreted, there are different types of strategies that can be applied to gain competitive advantage in the ship management sectors. Competitive advantages are built based on customers requirement, thus ensuring customer needs are met with added benefits. This would result to positive results of retaining existing customers as well as attracting new customers. From the questionnaire result, different tools are used to interpret and segregate the information for identification of action points. Though the questionnaire, it was found that customer's three main concern on procurement were pricing, accuracy of supplies in terms of specification and timely delivery.

Using Kraljic models in above discussion, limitation of each categories is identified, and strategy are proposed to address the limitations. Strategy identified for purchasing categories that are situated non-critical quadrant meets and address

customers' needs in cost, specification, and delivery time. Both strategies identified, product standardisation and vendor managed inventory is found to be suitable and applicable strategy for use in ABC. One strategy of the two identified strategies for purchasing categories in strategic quadrant is found to be suitable for use for ABC. Strategy to source and consolidate order with alternative suppliers or trading houses are identified to be a better strategy for ABC. ABC will be able to leverage business high spending to achieve higher bargaining power with supplier for better supplies offer, which addresses the cost requirement of customers. Over long period of procuring with trading houses, specification of supplies will improve as supplier will be able to supply based on historical specifications. Strategic partnerships are found to be less suitable for ABC business model as business are not able to leverage a higher bargaining power over supplier, reason is due to ABC does not have the purchasing volume to engage in a long-term strategic partnership and there is a wide variance in specifications between ships. Lastly for categories in bottleneck quadrant, recommended strategy will move the categories away from this quadrant and to other quadrant though consolidation of orders and centralisation specification. Objective will be to reduce the decency towards supplier. Methods will be to increase the buying volume and spending of ABC to attain a higher bargaining power against supplier to achieved lower pricing and higher accuracy in delivery of correct specification as discussed earlier. For item does not have alternative and highly unique in supply, business will have no option but to rely of that individual supplier for supplier even though cost will be higher. Otherwise, few items in this category are consolidated. Strategy in bottleneck quadrant will move the categories away from this quadrant and to another quadrant.

5 Conclusions and Future Research

Through the paper, total eight purchasing categories are identified and used as research attributes to represent the procurement. The categories are derived from actual business categorisation which is simplified for general representations. The eight categories are *machineries spares, consumables, lube and fuel oil, maintenance and repairs services, navigations, communications, provisions, and new installations*. Supply risk and importance are identified for studies. Ten different types of ships are selected as feeder of raw data.

Additional above procurement related concerns, customers feedback is also collected to identify the

needs whereby ten ship managers within ABC are selected to participate in the research to provide supporting details from actual business environment. A customer based researched is done to ensure that improvements are done in the right areas address the right needs of customer to prevent wastage of resources. From the final study, it is found that there lots of areas that needs to be improved but there is similarity on requirements. The top three identified key concern with highest majority counts is costs, specification, and delivery time. These three areas monetary concerns as wells as relating to smooth sailing and operation of ships. Most ideal procurement for customer is procuring at minimal cost and supply correctly and earlier possible. Two analysis tools are used to identify the financial impact and risk related to non-supply. Using Kraljic matric, categories are segregated to table to identify the purchasing characteristics such as its strength, weakness, bargaining power between buyer and supplier. Strength are exploited, and weaknesses are overcome using appropriate strategy. Different strategies are identified and discussed on strategy functionality and compatibility with business environment.

From discussion, different categories have different strategies and there is no universal strategy that can be used for all categories as all purchasing categories are independent. Strategies are focused to address the main area of concern which is to minimize cost, supplying the correct specifications at higher frequency and shorter lead time. For categories that are identified as non-critical items, it is recommended to engage in contact with global suppliers. Through contracting purchase with global supplier, specification of supply to all ships can be standardized because number of suppliers will reduce and will result to lesser variance in supply specifications. At the same time, buyers will be able to consolidate order to achieve a higher order volume for a more competitive pricing. Focus of categories in this category will be on cost and accuracy of supply specifications. Additional rewards gain from contracting towards purchasing will be time saving in communication from enquiry to supplies in getting the right product at the right price and arrange delivery at the right time and place. Recommended strategies for strategic items will be to consolidate orders to alternative suppliers or authorized traders. Instead of entering a long-term partnership with major suppliers which bonds businesses, business should capitalize its strength of high order volume and value of orders to attain a better purchase from alternative supplier. Focus of this strategy is to achieve cost savings for long term.

Lastly for categories that are identified to be bottleneck, due to low financial implication and high-risk items towards operations, it is recommended standardised and consolidate order to achieve higher volume and spending, using as a leverage to shift the categories to other segment such as strategic items to achieve higher bargain power for better purchasing offer. When categories are successfully shifted to a different segment, an appropriate strategy following the segment is applicable to address the issue on cost, specification, and delivery lead time. If categories are not shifted to a different segment, ABC will be required to accept the high dependency towards the supplier and accept the possible high cost that are charges.

This research can further improve for a more comprehensive finding. During drafting of questionnaires and identifying the main purchasing categories, it was found that an in-depth study be carried out on categories management whereby orders categorisation done in details. An improved purchasing category enables to provide the future research more accurate findings, analysis, and results. Additionally, an actual research and testing in the business environment can be carried out in future research to prove and support the future aspects of the research findings. Finally, different analysis tools other than the ones adopted within this research be adopted to similar shipping and maritime sector be explore for future research studies.

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