

Functionality of Dry Port to Determine Seaport Quality : A Framework from Malaysian Seaport System

N. A Noralam^{1*}, J. Jeevan², M.S.I Saadon³, M.R Othman⁴

^{1,2,3,4}School of Maritime Business and Management, University Malaysia Terengganu

*Corresponding author: gsk2814@pps.umt.edu.my

Abstract

The development of the seaport industry is progressing vigorously either in the national or global level. Due to the development, improvements in Malaysian seaport system is required to be stressed. It is for enable the Malaysian seaport to compete excellently amongst others seaport. The functionality of Dry Port will contribute the seaport for less congestion and increase the capacity on the volume of cargoes. The purpose of this research is to determine the functionality of the Dry Port in Malaysian seaport system through seaport quality. The seaport quality has been defined from the Systematic Literature Review (SLR) method . The seaport quality has been classified into three main categories including the seaport effectiveness, seaport reliability and seaport governance. The functionality of dry port can be utilised to enhance the seaport quality and this research can reveal the holistic view of dry port functions in Malaysian seaport systems.

Keywords: Seaport, dry port, seaport quality, effectiveness, reliability, governance

Introduction

Currently, at the global level, sea roads is the one of the important links to carry out the commercial activities. Due to the important links, the seaport industry plays the importance roles to develop the world economic growth. For stabilizing the economy growth especially in seaport industry, the seaport quality must be emphasized in order to ensure the sustainability of seaport industry. By improving the seaport quality, in this research, it can be related with the functionality of the dry port as the one of contributing element to improvise the seaport quality in Malaysian Seaport systems.

The functionality of dry ports is based on seaport directly connected by rails to inland intermodal terminals where shippers can leave and collect the standardized units as if directly at the seaport (Roso, 2009). Besides that, other researcher find that the dry ports as a part of logistics centers have become

fundamental elements of local, national and international transportation systems in regions with a high volume of trade (Rodrigue et al., 2010). Hence, the relationship between the seaport and the dry ports is closely linked to seaport operations. This matter can be enhanced by raising awareness in improving the seaport's quality system furthers as well as enhancing quality functionality in dry ports.

Nowadays, in the changes of Malaysian Seaport evolution, Malaysian Seaport are more concentrating on seaport infrastructure and enhancement the multimodal transport infrastructure, especially road and rails. However, these were given the priority in order to increase the strength of dry port connectivity with the seaport (Valautham, 2007) and Othman et. al (2016).

The connectivity of the seaport and dry port is playing the importance role towards the development of the economic growth, the infrastructure such as the roads, seaports, airports, railways and maritime transports must be in the high quality to influence the effectiveness of the supporting processes (Othman et al., 2016). Due to the importance of connectivity of seaport and dry port, it can be determined the seaport quality in the functionality of the dry port.

Malaysian Seaport Systems

Malaysia country has a strategic location which is surrounded by sea and locates in major shipping trade lanes namely Straits of the Malacca and South China Sea. In year 2016, Malaysia carried 569,120,000tonnes involving the import, export and transshipment activities. While the container throughput at Malaysian Seaports is 24,847,833 TEU's with 57,587 numbers of ships called by seaports in year 2016 (Ministry of Transport, 2016). According to this statistic, this place up the Malaysian Seaports in 11th rank for Port Klang and 19th rank for Port TanjungPelepas in world seaport ranking. (Ministry of Transport, 2017)

In general, a container seaport system is not complete without inland freight facilities to close the gap with the stakeholders' network in order to amplify

the existing resources to support efficiency in the supply chain, strengthen seaport competitiveness and promote regional growth. In line with this strategy, Malaysian container seaports are equipped with four dry ports which are located perpendicularly connecting Thailand-Malaysia-Singapore. Padang Besar Cargo Terminal (PBCT), Ipoh Cargo Terminal (ICT), Nilai Inland Port (NIP) and Segamat Inland Port (SIP), which actively operate dry ports in Malaysia (Jeevan et al., 2015b). PBCT, which is a mid-range dry port for Penang Port and a long-distance dry port for Port Klang is well connected to the seaports via road and rail transport networks (Jeevan et al., 2014)

Introduction of Seaport quality

Integration of quality in seaport system

Quality can be defined as meeting the customer requirements and expectations (Suchanek et al., 2015). There are three main aspects of quality that need to be considered in the process of integrating quality into any organization. Those aspects are Quality Theory & Philosophies, Quality Improvement Tools & Methods and Quality Systems & Standards. The first step of the integration process is to make sure that all the personnel in the organization ecosystem are fully understand the meaning and definition of quality (Pryor et al., 2014). This can be done by introducing the quality theories and philosophies from the quality guru's or quality experts into the organization's working environments (Ueno, 2015).

The second step is to implement the Quality improvement tools and methods in the organizations. The quality improvements tools and method such as Service Quality (SERVQUAL), Quality Function Deployment (QFD), Failure Mode and Effect Analysis (FMEA) or Lean Six Sigma methodology can be used to increase the effectiveness and reliability of the organization (Salman et al., 2015). Finally, the last step is to validate the improvement that had been done in the second step by using the Quality System and Standards (Alcala et al., 2013; Zakuan & Mat Saman, 2014). The audit process in the standards like ISO 9001:

2015 or any other related standards may actually be the key process in the validation process thus improving the governance of the organization (El-Morsy et al., 2014).

This research will look at the integration of quality in a specific type of organization which is seaport. The integration of quality in seaport play an important part especially in the perspective of effectiveness, reliability and governance thus making quality as one of the key elements in seaport management systems.

Current issues on definition quality

Nowadays, the current issues for quality are often expressed from different opinions by experts and previous researcher on quality definition. However, in the seaport industry, seaport quality are not specified in details the definitions on what is seaport quality. In order to understand clearly about the seaport quality, the overview of the definition on quality has been studied in details from the quality experts. There are six pioneers on quality definition and mentioned as below (Gehani, 1993):

- (i) Shewhart (Since 1891 to 1967) :Quality is variability
- (ii) Demings (Since 1990 to 1993) : Quality is predictability
- (iii) Crosby (Since 1926 to 2001): Quality is a conformance to requirements
- (iv) Juran (Since 1904 to 2008) : Quality is a fitness for use
- (v) Ishikawa (Since 1915 to 1989):Instituted the quality control circles in 1962 in Japan
- (vi) Taguchi (Since 1924 to 2012) :Produced a concept refer to as the Taguchi Loss Function:the further away a product is, the greater the loss will be due to defects
- (vii) Feigenbaum (Since 1920 to 2014) :Stressed the importance of customer defining quality

From the overview perspective on quality, this research did the summary preliminary data on quality defined. Then, from the quality defined, this research studied on the seaport industry perspective which relates on the quality. The summary of the preliminary data is used from searching the Scopus engine and the data is from the year 1990 until 2016. The final result found that 110 journals is related on the definition of quality and journal that related on seaport in the perspective quality.

- (i) **Quality Perspectives** :Quality define as the expectation from the client after providing the services to client (Lopez& Poole, 1998). In order to understand the quality define, the other expertise states that five discrete values of quality have been defines in higher education and namely as exceptional, perfection or consistency, fitness for purpose, value and transformative (Harvey & Green, 1993). This quality defines can approach towards the seaports industry and related to the functionality of dry ports. Other than that, the expertise distributed the survey and found that the importance of the quality as the benchmark to be able to the last long in trading business to improve the performance of organizations.
- (ii) **Seaport Perspectives**: In order to define the definition of seaport Quality. It shows that there is no directly definition of seaport quality, however the related definition on seaport quality can be defined. As overview in the previous literature, quality is a relative concept and that it is socially and market driven and its relates in the stakeholders real needs implied and expressed in seaport operations and management actions (Thai, 2009).The performance and reliability is one of the characteristics on component of quality. With that, (Yeo et al., 2016) and (Chen et al., 2010) indicated that increasing the reliability can leads the higher trust among seaport cluster which can reduce the cargo processing time and improving the transport network capacity reliability. Then, other opinions find that seaport quality related on seaport service quality and it is

involved seven components which is efficiency in seaport services provision, environmental awareness, safety, security, seaport users satisfaction, timeliness and seaport infrastructure (Vaggelas, 2016). Besides that, the elements of effectiveness can contribute towards the definition of seaport quality which is service quality, cost, time and sustainability of performance (Ding, 2016). The element of effectiveness can contribute as a benchmark through increasing the level of seaport quality. With the different perspective and opinions, this research employs the Systematic Literature Review (SLR) to define the seaport quality in systematic matter.

Seaport quality perspectives by Systematic Literature Review (SLR) Approach

Systematic literature review (SLR) methodology is used by (Tranfield et al., 2003). This research is using the SLR methodology to define the seaport quality. There are three steps following by planning for the stage 1, execute for stage 2 and reporting for the final stage.

Systematic Literature Review (SLR) methodology in this research, shows the systematic system to define the seaport quality definition. The stage 1 is the planning process to define the related journal on seaport or quality. Then, for the stage 2, is executes from the 110 journals and divide on the quality and seaport. The journal that related on stage 2 is 70 journals. The final stage is reporting which involving the 30 journals and its related on seaport and quality. The final stage is the category that consist of three elements they are seaport effectiveness, seaport reliability and seaport governance. This table defined on how seaport quality is categorized (refer Table 1)

Table 1. Summary of Systematic Literature Review (SLR) Methodology

PROCESS	DETAILS
Stage 1 : Planning (110 Journals)	Seaport
Stage 2: Execute (70 Journals)	Attributes of quality, seaport service quality, seaport management, seaport competitiveness, seaport safety and security, seaport environment, and seaport performance
Stage 2: Reporting (30 Journals)	Result : Seaport effectiveness, seaport reliability & seaport governance

Seaport effectiveness, seaport reliability and seaport governance on quality perspectives

Referring to they (Ding et al., 2016), there were seven criteria of seaport services quality, are service effectiveness, reliability of seaport services, totality of providing seaport services, increasing the efficiency of core logistics activities, seaport pricing, reducing the time of non-value-added activities respectively. From (Brooks &Schellinck, 2015), the research was closely similar to (Ding et al., 2016), however the former research categorized the five most important criteria, which are accessibility to seaport premises, overall reliability of the seaport, provision of adequate on-time information, incidence of delays and seaport security.

However, on the topic of seaport reliability is related with the resources used by the seaport, such as the reliability of the equipment and facilities, the reliability of using modern machinery and proper equipment, having stable and strong finances, and others (Tae et al., 2015). Other than that, the element of responsiveness in operations and the cooperation between the communities of seaports were also influencing the seaport reliability (Tae et al., 2015). Whereas on

the topic of seaport governance, Geiger et al. (2011) and Guilherme et al. (2014) state that there are three elements in seaport governance. Firstly is structure, which refers to the regulator framework, secondly is actions, which refers to the degree of coordination, and thirdly is elements, which refers to the degree of efficiency of management of flows and information. Referring to the three stages of the method systematic literature review (SLR), seaport quality can now be more clearly understood, and is easily available for other researchers to review as well as use this definition of seaport quality as a reference and guideline. The final results are accumulated by using Average of Percentage Majority Opinion (APMO), supported by (Heiko, 2012) who used this method to find the first calculative percentage of the

disagreement and agreements for every statement. From the APMO method, this research shows that 27 percent from 110 journals is related with the fields of seaport quality.

Implication Seaport Quality on Seaport Competitiveness

Seaport quality is giving the positive impact towards the seaport competitiveness. This matter is mentioned by the elements like advanced technology will contributed the seaport competitiveness. (Bichou, 2009) and (Lee, 2016). Besides that, the elements of e-transformation in seaport management also contribute the impact toward the seaport quality (Lee, 2016). With that, advanced technologies is one of the elements in seaport quality which needs to be improve for increasing the performance of seaport and also seaport competitiveness among the seaport clusters.

Other than that, the ten key drivers of elements critical view on the seaport competitiveness. It is a seaport costs, hinterland proximity, hinterland connectivity, port geographical location, seaport infrastructures, operational efficiency, seaport service quality, maritime connectivity, nautical accessibility and seaport site (Parola et al., 2016). This is the new paradigm which can contribute on improving the seaport quality which must be related on the supply

chain of seaport operation. Through that, the improvement of both elements of seaport quality and seaport competitiveness is important, and it also will increase the degree of performance of the seaport.

Integration of dry port in seaport operations

In general, there are four main functions for dry ports in Malaysia which including transportation function, administration function, logistics function and value adding function (Jeevan et al., 2015). Those function of dry ports are crucial to assist seaport in the daily operation to improve their competitiveness. Playing a role in a transportation function, most Malaysian dry ports play a critical role in connecting seaports and manufacturing inlands. They facilitate door-to-door services for containers delivered to or picked up from seaports. For example, ICT dry port connects to Port Klang by rail and road. It provides 6 train trips per week to Port Klang with a capacity of 480 TEUs per week, while road transport is via North-South Highway to Port Klang. It reduces container dwelling time in terminals, decreases inland transportation costs, and increases shippers' connectivity to the seaports.

Secondly, administration function of dry ports includes customs clearance, immigration and police inspection for domestic and international containers distribution. The following statement from a dry port participant shows the importance of administration as a function of a dry port. In addition to that, four Malaysian dry ports provide a customs clearance service to their clients to assist seaports in managing container movement. By doing so congestion and capacity constraints at seaports can be overcome.

Thirdly, dry ports in Malaysia are also familiar in logistic functions by providing warehousing function, storage function and de/consolidation function. It will be necessary to optimise the use of space and increase the capacity of the seaport because it will enhance container throughputs at this node.

Finally, dry ports perform value adding functions. Value adding functions

that are undertaken by dry ports include assorting, mixing, blending, packaging and repackaging, labelling and relabeling, offering tailored services beyond the standard offer, exporting packaging for transport requirements, offering disposal services, container weighing and services, and giving product advice to consignees and distriparks.

The assimilation of dry ports in the seaport system is a must to improve the quality of the seaport. Therefore, the core function of dry ports including transportation, administration, logistics and value-added function need to be utilized to improve the quality of seaports. This symbiotic relationship between these nodes is depicts diagrammatically in Figure 1.

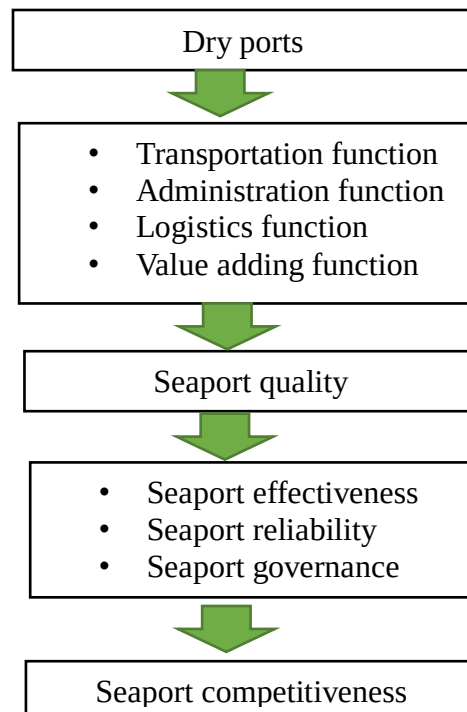


Figure 1: The symbiotic relationship between dry ports and seaports.

Conclusion

The outcome of this research indicated that seaport quality can be consisted of three major component including seaport effectiveness, seaport reliability and seaport governance. The sole character of seaports is not suitable to improve its

quality due to the nature of this node which is rigid and impossible to change and adapt to the new environment. Therefore, the introduction of dry ports is required to assimilate the functionalities of this intermodal terminals in the seaport system. For example, the function of dry ports including transportation function, administration function, logistics function and value adding function are compatible to improve the quality of seaports. The symbiotic relationship between dry port and seaport are crucial to determine the performance of these both nodes in the complex system.

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