



Original article

The Evolution of Seaport Competitiveness in Malaysia Seaport System[☆]

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Abstract

Competitiveness of seaport is determined by a range of advantages that was earned by the seaport to attract their respective customers. Competitiveness is essential for seaport to make tactical plans, to maintain and improve their attractiveness among the clients. The imbalance of hinterland connectivity in Malaysian seaports between road and rail affects the efficiency of Malaysian seaports to be at the optimum level of competitiveness. Besides, the increasing of vessel capacity in the world affects the efficiency of seaport operations to accommodate larger container ships. However, nowadays the trends of seaport competitiveness are changing due to the dynamic nature of maritime business. Hence, analysis on the trend on seaport competitiveness is very crucial to plan and execute the operational strategy to achieve optimum benefits from the trade activities. Nevertheless, most of the researches focused on competitiveness trend in the world but no specific research has been conducted at Malaysian seaports in particular. Therefore, this paper aims to analyse the evolution of seaport competitiveness in Malaysian seaport from 1970 to 2019 and propose a competitiveness cluster for Malaysian seaport to ease the policy revisiting procedure for future development. Systematic Literature Review (SLR) has been employed in this paper to develop a comprehensive competitiveness cluster for Malaysian seaports to understand the current trend of competitiveness among Malaysian seaports in comparison to the global trend as a key preparation for future demand. IT application, seaport services, supply chain, government policy, connectivity, availability, hinterland accessibility, inland terminal cost, transportation network, operation efficiency and seaport cost are the key components of competitiveness in Malaysian seaports from 1970 until 2019. Findings revealed that there are three clusters in Malaysian seaport competitiveness which are shipping services, seaport and terminal, and government policy.

Keywords: Competitiveness, Malaysia, Seaports

1.0 Introduction

Seaports are divergent because of their roles, assets, functions and institutional organizations (Bichou and Gray 2005). The competitive position of a container seaport is restricted by the competitive contribution to the host of shippers and shipping lines for specific trade routes, geographical regions, and other seaports which are connected. However, at the voluminous dimension, the competitiveness of a container seaport is defined by the range of competitive advantages that are gained or created by the seaport over time (Haezendonck and Notteboom 2002).

1.1 Background of Study

The Malaysian maritime industry has developed since the 1970s after the first official government announcement in the Third Malaysia Plan to transform Malaysia towards becoming a well-known maritime nation (Third Malaysia Plan, 1976). For example, Malaysian International Shipping Corporation (MISC) were established in 1968 which is an important starting point for the development of the modern commercial shipping in Malaysia. In 1993, there were 780 ships registered in Malaysia which recorded 8.4 million gross tons (Abdul Aziz Abdul Rahman and Jamali Janib, 1995).

In addition, the Fourth Malaysia Plan introduced the development and expansion of seaport facilities and interrelated maritime services. Fourth Malaysia Plan includes the establishment of new shipping lines to cope with the growth in freight traffic and trade development. In Malaysia, the extraordinary growth of seaports throughput has been significantly contributing to government decisions on seaport capacity expansion. Furthermore, the container throughput in major Malaysian seaports expected to face increasing growth in the year 2020 which stated 35 million TEU's in this forecasting (see Figure 1). Therefore, the seaport must take an action to increase their efficiency to improve their competitiveness. This is because competitiveness of seaport is determined by a range of advantages..

Figure 1: Total Port Capacity in TEU (PCTEU) of major Malaysian ports and total container throughput (TEUs) growth for period 1990-2020

Sources: Jeevan et al. (2015)

1.2 Current issues in Malaysian seaports

Chen et al., (2016) revealed that although Malaysian major container seaports are connected to the hinterlands through road and rail transport, there are highly dependent on road. Therefore, this study is conducted to explore the component of hinterland connectivity as one of the component that lead Malaysia to achieve attractiveness in seaport. The hinterland connectivity through rail must be effective and efficient road freight network. It will assist hinterland connectivity to be the one of component to seaport to achieve competitiveness.

Articles about the competitiveness of seaports are numerous. However, most of these studies focused on competitiveness among main seaports of nations along the Strait of Malacca especially Singapore (Notteboom and Yap, 2012; Rimmer, 2014) and not specific to Malaysian seaport. This study is conducted to explore what the key component of competitiveness of Malaysia seaport. The initial findings of this paper will used to compare the competitiveness in Malaysian seaports with other seaports around the global.

The substantial trend of vessel enlargement has caused the changes in the seaport attractiveness (Peters, 2016). For example, on May 2017, Orient Overseas Container Line (OOCL) launched OOCL Hong Kong which is the largest containership in the world carrying capacity at 21,413TEU (OOCL, 2017). Therefore, this study is conducted to detect the changes that happened in the composition of competitiveness due to the vessel enlargement especially in Malaysian seaport. Not all seaports are able to accommodate very large container vessel at their seaport because many measurements have to consider such as the additional services and depth of the berth. Based on these issues, two main questions have been generated to meet the aim of this paper. Firstly, what is the trend of seaport competitiveness among the Malaysian seaport compared to world trend? Secondly, what is the competitiveness cluster can be developed from current trend for Malaysia seaport? These two main questions have been generated to analyse the evolution of seaport competitiveness in Malaysian seaport and second to propose a competitiveness cluster for Malaysia seaports.

2.0 Global Trend of Seaport Competitiveness

Fleisher and Bensoussan (2007) defined the competitive position of an organisation compared to its competitors in the same market or industry. Besides, knowledge of competitive positions allows enterprises to make tactical plans to maintain and improve their current positions or possibly withdraw from the market to avoid losses for their enterprises.

Hence, in order to apply strategies for retaining or enhancing the competitiveness of a seaport, seaport authorities need to understand their current competitive position and the factors that influence their business environment (Scaramelli, 2010; Ri et al., 2017). However, Basta and Morchio (2008) stated that the competitive of the seaport are measures heavily on the seaport objectives as well as on the quality and the availability of data (Ri et al., 2017) (see Table 1).

The major factors that influence seaport competitiveness are the change of seaport environments, service quality and hinterland condition, landside accessibility, a strategy differentiation, seaport (terminal) operational efficiency level, reliability, cargo handling charges, and port selection preference of carriers and shippers (Notteboom and Rodrigue, 2008; Yeo et al., 2008; Tongzon, 2009; Yeo, 2010; Li and Oh, 2010; Cho et al., 2010; Yeo et al., 2011; Ahn et al., 2014; Kim et al., 2016). Reviews on seaport competitiveness indicate that attention to seaport competitiveness has moved to how to create and sustain it whilst accommodating customers' expectations (Kim et al., 2016).

Literature indicates that seaport competitiveness is determined by considering diverse factors including port availability, economic size, efficiency, productivity, cost factors (e.g. total transport costs per container and inland logistics costs), soft factors such as reliability, service differentiation, and professional and workforce development, and supportive factors including market niche, incentives and IT application (Yap et al., 2006; Notteboom and Rodrigue, 2008; Tongzon, 2009; Yeo et al., 2008, 2011, Wang and Cheng, 2010; Imai et al., 2013). As suggested by Yeo et al. (2008), after eliminating overlapping and interrelated elements, this study carefully selected components of port competitiveness (Kim et al., 2016). Besides, seaport dues became a controversial issue for commercial seaports in need of both competitiveness and recovery of

investment costs (Haralambides, 2002; Lavissiere, 2018) (see table 1). Seaport dues, as in any pricing system, are composed of a pricing basis, with factors related to service provided, and a pricing level that represents the balancing of cost recovery and market price (Lavissiere, 2018). Table 1 shows the summary of all the components of seaport competitiveness that have been collect from 1980 until 2018 in the world.

Table 1: Literature review of components of port competitiveness from 1980 to 2018.

Author (Date)	Components in seaport competitiveness
Pearson (1980)	Confidence in seaport schedules, frequency of calling vessels, variety of shipping routes, accessibility of seaport, seaport reliability
Willingale (1981)	Navigation distance, hinterland nearness, connectivity to seaports, seaport facilities, availability of seaport, seaport tariffs, seaport cost
Collison (1984)	Average waiting time in seaport, confidence in seaport schedules, seaport service capacity
Slack (1985)	Calling frequency, seaport tariffs, accessibility to the seaport, seaport congestion, inter-linked transportation networks, seaport equipment
Brooks (1984, 1985)	Seaport costs, frequency of calling vessels, seaport reputation and/or loyalty, ship direct calling, experience of cargo damage, seaport equipment
Murphy et al. (1988, 1989, 1991, 1992)	Has loading and unloading facilities for large and/or odd-sized freight, allows for large volume shipments, low freight handling shipments, provides a low frequency of loss and damage, equipment availability offers convenient pickup and delivery times, provides information concerning handling, offers assistance in claims handling, offers flexibility in meeting special handling requirements, seaport facilities
Peters (1990)	Internal factors: service level,

	available facility capacity, status of the facility, port operation policy External factors: international politics, change of social environment, trade market, economic factors, features of competitive seaports, functional changes of transportation and materials handling, seaport service capacity	Rodrigue (2006)	
UNCTAD (1992)	Geographical location, hinterland networks, availability and efficiency of transportation, port tariffs, stability of seaport, seaport information system	Hall (2007), De Langen (2007)	Safety and security, hinterland development, seaport physical capacity to accommodate additional volumes, proximity (to the import/export area, market and host city), seaport facilities utilisation (business infrastructure)
Kim (1993)	Distance between origin and destination	Notteboom and Rodrigue (2008), Yeo et al. (2008), Song & Panayides (2008), Wiegmans (2008)	Local cargo volume (economic size), Seaport facilities utilisation (business infrastructure), preference of shipping liners and the relevant industries, seaport physical capacity to accommodate additional volumes, hinterland development, cargo handling speed, total transport costs per container, cargo handling charges, seaport service costs, application of IT, low congestion in a seaport, value adding services, value adding logistic services, seaport reliability, government and economic policy
Jeon et al. (1993)	Seaport productivity	(Yeo et al., 2008)	Updating services and promoting seaport marketing in order to achieve competitiveness (Ha and Zhang, 2000).
McCalla (1994)	Seaport facilities, inland transportation networks, container transport routes	Tongzon (2009), Low et al. (2009), Stopord (2009), Wong (2009)	Service differentiation, quick response to seaport user's needs, reliability of service performance, seaport service costs, total transport costs per container, simplification of procedure, supply chain cooperation, cargo handling speed, terminal productivity, preference of shipping liners and the relevant industries, it application
Starr (1994)	Geographic location of seaports, inland railway transportation, investment of seaport facilities, stability of seaport labour	Cheon and Deakin (2010), Cho et al. (2010), Sanchez & Wilmsmeier (2010)	Supply chain cooperation, reliability of service performance, safety and security, quick response to seaport user's needs, service differentiation, accessibility to the hinterland, high geographical scope of freight distribution.
Tengku (1995)	Seaport tariffs, safety handling of cargoes, confidence in seaport schedules	Yeo et al. (2011), Van	Application of IT, cargo handling charges, hinterland development,
Chiu (1996)	Custom service, rapidness, simple documents in seaport, cargo damage and skills of seaport		
Stroper (1997),	location		
Song & Yoe (2004), Bichou (2004)	Value-adding services, safety and security		
Chiu (2000)	Documentation procedure, rapidness		
Hazendonck et al. (2001), Malchow and Kanafani (2001)	Value adding logistic services		
Rodrigue (2004)	Operational efficiency		
Notteboom & Rodrigue (2005), Bichou & Grey (2005)	Seaport operation, inland freight distribution, free trade zone		
Lam & Yim (2006), Notteboom and	Total seaport cost, operational efficiency		

Den Berg and De Langen (2011), Haralambides et al. (2011)	seaport physical capacity to accommodate additional volumes, proximity (to the import/export area, market and host city), seaport facilities utilisation (business infrastructure), local cargo volume (economic size), inland infrastructure
Notteboom & Yap (2012), Fraser & Notteboom (2012)	Preference of shipping liners and the relevant industries
Imai et al. (2013), Ishii (2013), Ducruet and Lugo (2013),	Low congestion in a seaport, trans-shipment costs, seaport charges, total transport costs per container, cargo handling speed, preference of shipping liners and the relevant industries, proximity (to the import/export area, market and host city), local cargo volume (economic size), seaport hinterland, intermodal transportation
Mueller et.al (2014), Yang et al. (2014), Douglas et al. (2014)	Inland waterway services, hinterland cost, seaport dwelling time, cost of inland transportation, hinterland cargo demand, inland infrastructure
Cho & Kim (2015), J. Jeevan et al., (2015)	Seaport infrastructure, connectivity and efficiency of seaport, seaport supply chain
Kim, Kang & Dinwoodie (2016), Chen et al. (2016), Debelic et al. (2016)	Availability of seaport, operational efficiency, seaport cost, quality services, connectivity of seaport, availability of transport corridors
Han (2018), A. Lavissiere (2018)	Seaport supply chain, seaport due

2.1 Trend of Competitiveness in Malaysian seaports

In 1970, Malaysia started to develop as a maritime nation. By following the current trends during this period, seaport infrastructure was developed, and new shipping lines were started (Third Malaysia Plan, 1976). The priorities are given to the improvement of multimodal transport infrastructure in order to increase

the strength of hinterland connectivity with the seaport, especially using road and rails (Valautham, 2007).

Therefore, the volumes of containers handled as well as the establishment of new seaports to cater for these increased volumes have evolved simultaneously since the 1980s (Tenth Malaysia Plan, 2011 & 2013). Seaports have had critical roles in national economic development as well as in international trade (Hu and Zhu, 2009) since the majority of goods in transit between countries have been being transported via ocean vessels. Although the era of containerisation in trade started in 1956, it took almost 17 years to reach Malaysian waters, with the first container vessel berths were established at Port Klang in 1973 (Tenth Malaysia Plan, 2013).

Besides, the dramatic change in world trade as a consequence of the evolution in transport infrastructure has brought a substantial impact for Malaysian maritime business. Besides maximum land exposure to maritime waters, the strategic geographical location of Malaysia between the Pacific and Indian Oceans as well as owning the seventh longest coastline in the Asian region (WFB, 2015) have made this coastal country to become an important continent to influence the world economic trade.

Furthermore, economic liberalisation and globalisation have prompted Malaysia to aggressively participate in international trade. As a result, the proportion of container throughput in Malaysia has recorded as Asia's third largest container generator after China and Singapore (Lavigne, 2014). For example, Sabah seaport has received the highest number of ship call because of the increasing of the number of the ship calling from 1980 until 1990. So, port facilities in Sabah seaport should be increased in order to achieve efficiency (Aziz et al., 1995).

Port Klang and Tanjung Pelepas were capable to close the gap with Pacific Selatan Agency Corporation (PSAC) in Singapore when they increase their competitive operators cost between 1998 and 2002 although PSAC continued to enjoy a dominant share of the container-handling market in the region. Furthermore, the ability to provide quality service standards at competitive price levels by these terminal operators has been noticed by major container shipping lines such as Maersk Sealand, Evergreen and China

Shipping (Lam & Yim, 2006).

Intensified competition has been mainly driven by such factors as increases in globalization trends, containerisation, market integration, and global reallocation of capital and labour forces. As the result, these trends have profoundly changed the tactic seaports, particularly container ports, are governed, operated and compete (Ri et al., 2017). Besides, the real competitive advantage of the terminal extends beyond these considerations that include other determinants such as availability of related supporting services, presence and degree of inter- and intra-port competition and role of the government (Lam & Yim, 2006).

In addition, the real competitive advantage of the terminal extends beyond these considerations that include other determinants such as availability of related supporting services, presence and degree of inter- and intra-port competition and the role of the government. Despite aggressive price competition from Tanjung Pelepas, Westport and Northport, PSAC chose to focus on non-price competition especially in the area of customer service. While this strategy had served PSAC well in the past by allowing the terminal operator to exact relatively higher premiums from its customers vis-a-vis Tanjung Pelepas, Westport and Northport, the element of price, which translates directly into cost for the terminal's users, should not be underestimated (Lam & Yim, 2006). Furthermore, to achieve a competitive advantage, a maritime industry policy must be monitored adequately.

Numerous Southeast Asian ports are situated in strategic geographical positions for international shipping routes and are being influenced by business penetration of global shipping lines such as PTP, Port Klang and Penang port which is country major seaports along the coast of the Straits of Malacca. Along with global competition trends, Southeast Asian ports are also encountering inter-region rivalry. Port operators need to plan proper strategies and be able to identify their current competitive position in order to preserve and improve a port's competitiveness as well as the factors influencing their business environment (Ri et al., 2017). Besides, the major Malaysian seaports are undergoing exponential growth in container trade. By expansion of port capacity and effective strategies, the operational pressures of Malaysian seaports can be reduced (Jeevan

et al., 2015). Furthermore, seaports are a subsystem of the supply chain and contribute a critical link in the transportation chain that facilitates the cargo flow. Seaport is a key element in the value system that drives to supply chain by creating value-added services to enhance the competitive advantage of the transport chains (Jeevan et al., 2015).

Hence, in order to apply strategies for retaining or enhancing the competitiveness of a seaport, port authorities need to understand their current competitive position and the factors that influence their business environment (Scaramelli, 2010; Ri et al., 2017). Chen et al., (2016) stated that the seaport competitiveness lies in reaching regional accessibility in the distribution of goods and enhancing hinterland accessibility and inter-capital efficiency. Underutilized of intermodal terminals gave unbalanced proportions in the freight transport infrastructure and congestion of road and seaport. These issues prevent Malaysian seaports from achieving competitiveness in hinterlands accessibility (Othman et al., 2016). Besides, the seaport is heavily dependent on intermodal terminals to ensure the cargo flow to the hinterland by transportation gives benefits to the customers in terms of time and cost in order to improve their competitiveness. Furthermore, because of the gradual migration of containers, seaports have to rely on inland terminals to determine their competitiveness and offer a competitive freight price to the customer (Jeevan et al., 2017). Now, the maritime industry is one step ahead to green up their business activity because of pressure from customers, society, local and global regulatory agencies by using green technology and practicing sustainability strategies (Jasmi & Fernando, 2018). Chen et al., (2018) stated that improving seaport performance, expanding service variations for seaports, gaining seaport hinterland proximity and improving seaport capacity will increase dry port operation in order to achieve seaport competitiveness.

In 2019, PTP has upgrade Enterprise Resource Planning system (ERP). The merger of the current ERP system is part of PTP's ongoing efforts to strengthen digital strategy and improve operational efficiency to achieve seaport competitiveness. In addition, it also adds to customer demand and growing customer needs in the seaport (Ramco, 2019). Table 2 show the summary of all the components of seaport competitiveness that have been collect from 1980 until 2018 in the world from

various article and author.

Table 2: Summary Competitiveness of Malaysian Seaport]

Authors	Components
Aziz et al., (1995)	Seaport facilities
(Lam & Yim, 2006)	Seaport cost
(Lam & Yim, 2006)	Quality of seaport service, terminal cost
Lam & Yim, (2006)	Availability of related supporting services
Lam & Yim, (2006)	Operator cost
Valautham, (2007)	Hinterland connectivity,
(Rosni et al., 2011)	Government policy
Worldfactbook, (2015)	strategic geographical location
(J Jeevan et al., 2015)	Seaport capacity
(Jagan Jeevan et al., 2015); Robinson, (2002).	value added services, seaport supply chain
(Chen et al., 2016)	Hinterland accessibility
(Othman et al., 2016)	Accessibility to the hinterland
(Othman et al., 2016)	Intermodal transportation
Ri et al., (2017)	Seaport operator strategies
(J Jeevan et al., 2017)	Inland terminals cost
(Jasmi & Fernando, 2018)	Green supply chain
(Chen, Jeevan, & Cahoon, 2018)	Dry port operations
(Ramco, 2019)	Application of IT

3.0 Methodology

The method that has being employed in this research is Systematic Literature Review (SLR). According to Barbara Kitchenham (2004), SLR consisting of identifying, evaluating and interpreting all procurable research related to a certain research question, scope of topic, or interest of fact. SLR method uses three phases for performing literature review. Phase 1 is planning phase, phase 2 is conducting the review, and phase 3 is reporting the result.

Based on figure 2, the phase 1 in SLR is to know what the systematic planning by using Population, Intervention, Comparison, Outcomes and Context (PICOC) and what is research question for this research.

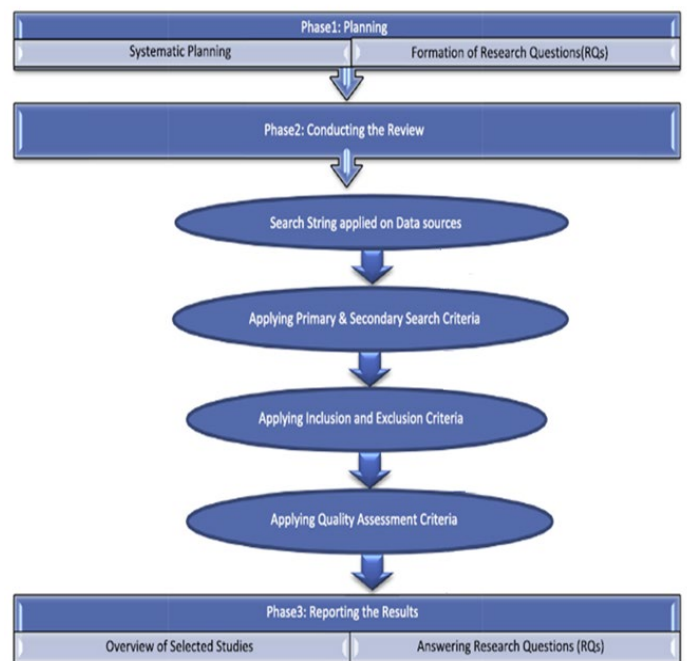


Figure 2: Systematic Literature Review (SLR)

Sources: Kaur and Kaur, (2018)

Phase 2 is about the conducting the review which is to know every synonyms of each words from the keywords before do the search string. The search string will be used to find the article in internet. The article that relate to this research will mark as ‘Included’ a ‘Excluded’ based on the research question. If the article answer the research question it will mark as included and if the article not help in answer the question it will mark as excluded. After that, each article that have been used in this research have to answer 7 question from SLR in quality assessment part. The researcher will give score to every article that they used in their research to know that

article is helping the researcher or not.

Next, phase 3 is about the reporting the result of research question by using Systematic Literature Review

4. Result and discussion

All components of competitiveness seaport in the world and Malaysian seaport from literature review have been categorised as sub-dimension in order to group and narrow it to get the final component. The seaport competitiveness in Malaysian seaport system is application of IT, seaport services, supply chain, government policy, connectivity, availability of seaport services, hinterland accessibility, inland cost, transportation network, operation efficiency and seaport cost (figure 3).

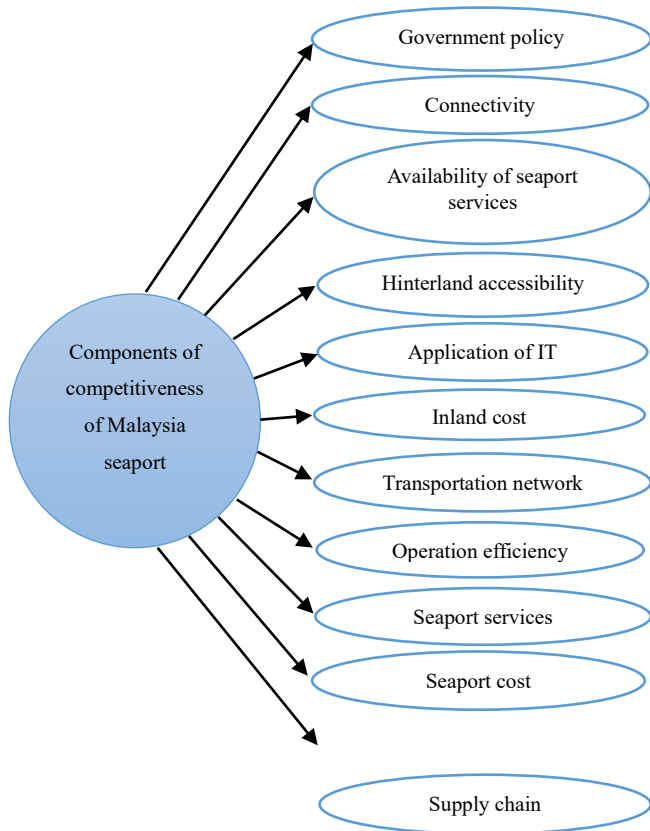


Figure 3: Component of competitiveness of Malaysian seaport.

Figure 4 shows that supply chain, operational efficiency, seaport reliability, accessibility, hinterland network, connectivity, inland services, seaport services, availability of seaport services, seaport cost, inland cost, seaport congestion, transportation network, application of IT, safety and security, seaport policy, politics,

government policy, seaport productivity, hinterland productivity, and terminal productivity are the component of seaport competitiveness in the world.

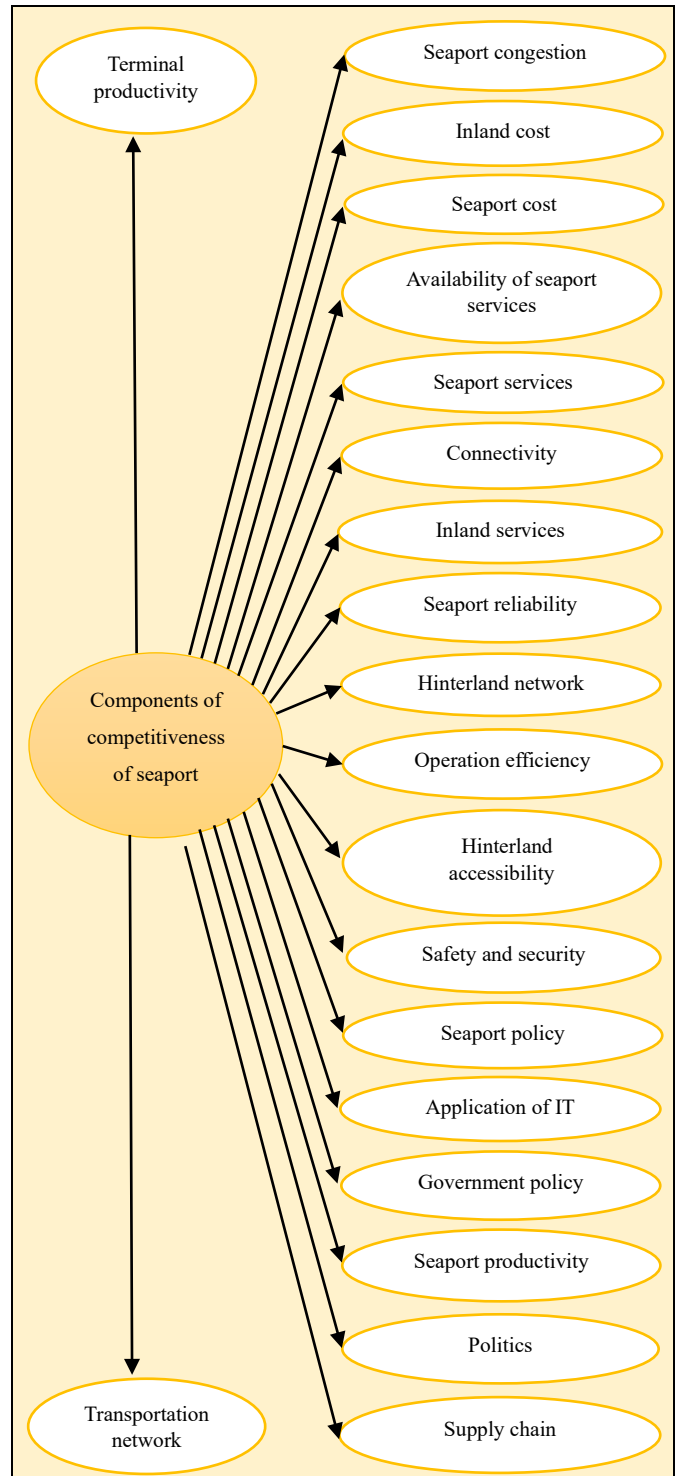


Figure 3: Component of competitiveness of seaport in world wide.

Competitiveness cluster in Malaysian seaport can be divided into three main area which are shipping services, seaport and terminal, and maritime policy. Connectivity, availability of seaport services, hinterland accessibility, application of it, transportation, operation efficiency and

seaport services are under shipping services. Besides, for inland terminal cost, seaport cost, and supply chain are under seaport and terminal. Furthermore, government policy is under policy of government (see Table 4).

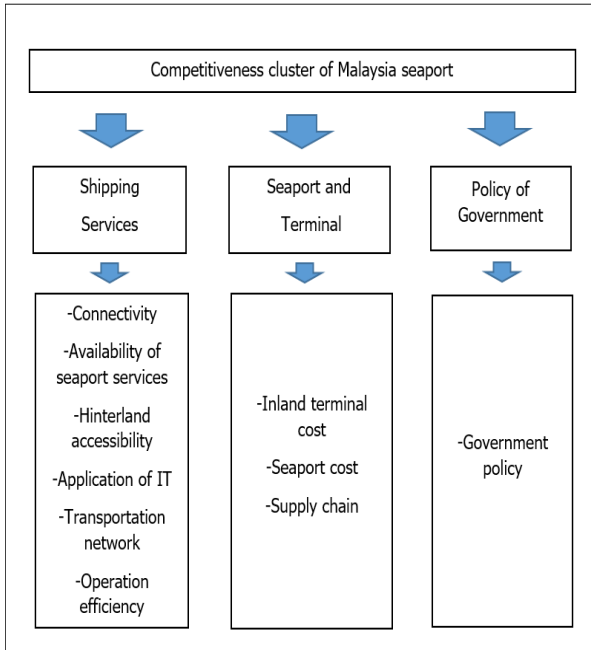


Figure 4: Competitiveness cluster of Malaysia seaports

The competitiveness of seaport have been analysed based on SLR method. The result shown that 11 component of Malaysia seaport system is same with world component which are government policy, connectivity, availability of seaport services, hinterland accessibility, application of IT, inland cost, transportation network, operation efficiency, seaport services, seaport cost and supply chain. Meanwhile, the others component of competitiveness seaport are seaport congestion, inland services, seaport reliability, hinterland network, safety and security, seaport policy, seaport productivity, politics, transportation network and terminal productivity. Currently these components are not available in Malaysian seaports to achieve competitiveness. From this result, some of the component of competitiveness in Malaysia seaport parallel with the trend of world competitiveness and some of the component is not parallel (table 3).

The stable of politics will assist seaport to improve their competitiveness. Malaysia have to change their culture in politics ethics so that they can help others industry to develop others nations in South East Asian (SEA).

Table 3: The comparison of the component of competitiveness in Malaysia seaport with the world trend

competitiveness in Malaysia seaport and the world trend	
The component of competitiveness in Malaysia seaport that parallel with the world trend	The component of competitiveness in Malaysia seaport that not parallel with the world trend
-Government Policy -Connectivity -Availability of Seaport Services -Hinterland Accessibility -Application of IT -Inland Cost -Transportation Network -Operation Efficiency -Seaport Services -Seaport Cost -Supply Chain	-Seaport Congestion -Inland Services -Seaport Reliability -Hinterland Network -Safety and Security -Seaport Policy -Seaport Productivity -Politics -Terminal Productivity

6. 0 Recommendation and Conclusion

Seaport competitiveness in Malaysia is not significantly parallel with global scenario. Some of the components of competitiveness in Malaysia seaport are well align with the world trend. For example, seaport congestion, inland services, seaport reliability, hinterland network, safety and security, seaport policy, seaport productivity, politics, terminal productivity are not aligned with the global trend. On the other hand, government policy, connectivity, availability of seaport services, hinterland accessibility, application of IT, inland cost, transportation network, operation efficiency, seaport services, supply chain and seaport cost were some of the key similarities that have been detected in Malaysian seaports and other seaport around the globe.

Hence, Malaysian seaport can revisit their seaport policy to improve the attractiveness of these important nodes to ensure the attractiveness of these seaports can be enhance which align to world trade requirement.

This paper contributes to the development of the literature in the competitiveness from the perspective of Malaysian seaports. This could be an added advantage for Malaysian seaports to prepare for the future trade system. For a further understanding, the seaport life cycle need to be explored to generate a significant model for Malaysia seaport competitiveness according to their current performance and this is worth to be explored.

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