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Port Land Management: A Review of Factors Affecting Port Competitiveness

ABSTRACT

Due to the growth rate in world trade and the need for improvements in port performance, governments and port authorities need to identify and invest in maritime sectors where their countries may have a comparative advantage. The principle challenge is the identification of value adding opportunities for the local, regional, and national economies available to each port they wish to develop, including possible synergies and spillover effects into other sectors. This paper reviews current and potential avenues for conducting this type of assessment.

KEYWORDS: Port Management, Land Management, Regionalization, Transport

INTRODUCTION

David Anderson (2013) said that the most important issues maritime ports are facing is dealing with the substantial increase in port activities, while retaining a competitive edge. In this interview with GHD, Anderson noted that the level of growth was challenging, especially in terms of increased pressure on ports and supply infrastructure. He believed that part of the solution involved coordinated investments in the supply chains to optimize port throughput, and that this would require planning better landside access to get goods in and out of ports more efficiently. In addition, Goldsmith (2017) contends achieving maximum optimization and financial returns requires improving the linkage, coordination and actual real-time management across the entire global supply chain.

The current logistics environment has a high degree of uncertainty due to the maturing and rationalization of containerization, an ever changing commercial environment, and extensive business networks within complex logistics systems (Notteboom and Rodrigue, 2006). United Nations Conference on Trade and Development (UNCTAD, 2016) recognizes that due to the growth rate of world trade, there was a need for improvements in port performance. These dynamics are forcing Port Authorities and Port Managers to reassess both their role and the specific competences of their respective ports and regions that could lead to competitive advantages; thus positioning their ports for growth. The UNCTAD even recommended that policymakers identify and invest in maritime sectors where their countries had a comparative advantage.

Country, Regional, and Local policymakers can no longer just support their respective maritime sectors. Their challenge is in identifying and supporting selected maritime businesses where the value-add of a sector to a local, state, or regional economy, including possible synergies and spillover effects into other sectors and beyond, is significant. Information technology (IT), transport, and other infrastructure must also be considered as it is important that traders are ensured of access to fast, reliable and cost-effective port and shipping services, no matter who is the provider.

Maritime trade flows continue to be largely determined by developments in the macroeconomic landscape. Because of macroeconomic uncertainty and shifting trade relationship, UNCTAD (2016) identified the following factors as affecting both challenges and opportunities; transport infrastructure investments, development, and expansion; trade policy and liberalization developments, population growth and urbanization, growing cross-border e-commerce trade, and the digitization and leveraging of innovation, technology, data and the internet.

Due to the increased levels of economic competitiveness, the degree of organization within the maritime transport sector, and other associated costs, it is increasingly crucial that ports adapt to the growing complexities of modern port management. This paper reviews the issues affecting the maritime ports with respect to their usage of land and their land interface with their

respective hinterlands. A model is presented for identifying and testing the strength of the relationships affecting this port land usage and the land interface.

LITERATURE REVIEW

Maritime shipping and port industries have traditionally played an important role in the integration of local and national economies into the global economy. Geographic, spatial, and economic influences have incentivized the locating of ports near industrial complexes and urban areas; establishing mutual dependence. Given the vast amounts of cargo moving along maritime corridors (approximatively ninety percent of the world's goods), ports have become the engine of economic development for the urban areas near them. Recent advances in transportations technologies along with shifting economic structures and ever increasing urbanization, are changing these traditional relationships.

The changing dynamics between ports and their surrounding communities has stimulated a growing interest in studying the changing role and function of ports (Hoyle and Hilling, 1984; Lawton and Lee, 2002; Broeze, 1989 and 1997; Notteboom and Rodrigue, 2005). Jung (2011) notes two factors driving the changing relationship between ports and the urban/industrial communities near them. First, the relatively low cost of land transportation along with increasing urbanization is reducing the cost benefits associated with proximity near a port (also discussed by Lee and Ducruet (2009)). Second, the capital intensity of cargo transport is reducing the employment and economic benefits associated with ports. Goss (1990), Stern and Hayuth (2004), and Fugita and Mori (1996) all question the benefits of port investments on local and regional development. Innovations in ship designs, along with changing cargo consolidation and transshipment requirements, are also having significant impact on ports and port selection. Hoyle (1988) discusses four stages in the evolution of ports and their urban areas: the primitive city-port, the expanding city-port, the retreat from the waterfront, and the redevelopment of the waterfront.

REGIONALIZATION

The Organization for Economic Co-operation and Development (OECD) stated that it was no longer evident that well-functioning ports automatically have a net-positive impact on port-cities (Merk and Dang, 2013). This report further notes that there is little known about the effectiveness of policies promoting port performance and the economics of their host cities. Based upon their survey and case study analysis, there were six policy areas identified by Merk and Dang, (2013) based upon their scored effectiveness towards outcomes. These policies area are; port development, port-city development, transportation, environment, research and development, spatial development, and communications. In addition, outcome indicators of policy effectiveness where identified. Both of these findings are shown in Table 1.

Table 1: Main Port-City Policies and Outcome Indicators
Source: (Merk & Dang, 2013)

Policy Areas	Outcome Indicators
Port Development	Port Throughput; Throughput Growth; Value-added port areas; Efficiency Index; Maritime Connectivity (degree of centrality, clustering coefficient); Diversity of Maritime Connections.
Port-City Development	Metropolitan GDP per capita; Metropolitan Annual Average Growth; Port Related Employment; Port-Related Labor Productivity; Unemployment Rate
Communication	Hits on ports website; NSW & Port Community System (PCS) Activity Logs
Transport	Motorway Network Density; Railroad Network Density
Research & Innovation	Total Patent Application in Region; Patent Applications in Shipping Sector; Number of Articles in Port Research Journals
Spatial Development	Land Surface Area of Port; Urbanized Area
Environment	CO_2 Emissions per Capita; Population Exposure to PM

Port Development

Maritime ports are both a logistic and an industrial node in the global transport system; providing both functional and special clusters of activities facilitating transportation and transformational processes within and across supply chains. Bichou and Gray (2004, p. 75) noted that, "Seaports are complex and dynamic entities, often dissimilar from each other, where various activities are carried out by and for the account of different actors and organizations, Such a multifaceted situation has led to a variety of operational, organizational, and strategic management approaches to port systems."

As flows increase, many ports face an array of problems related to infrastructure. Ports along rivers periodically face dredging problems, where the width of the river constraints their capacity. Urbanization and environmental issues commonly constrain the growth and spread of ports as well as limit access. The complex relationships within a port community will sometimes cause conflicts. These conflicts often affect the Port's ability to effectively and efficiently transfer cargo from land transport modes to maritime transport and vice-verse.

Land management deals with those activities and policies affecting the efficient utilization of a port's static space, which directly influences dynamic space. Master planning is a critical tool for effecting the efficient utilization of space. For example, placing the Customs inspection facility in the wrong spot can slow cargo inspections thereby reducing dynamic space output. Along with ensuring that planning teams understand every aspect of the port community across the entire global supply chain, master planning can increase the effectiveness of integrating offsite storage, preclearance facilities, and/or just-in-time logistics management, etc. With every approach to effecting land management improvement, CAPEX requirements can be significant, so are many of the risks associated with the return on those investments.

Economic and Social Commission for Asia and the Pacific (ESCAP, 2003, p. 20) noted that the "commercial success of a port could stem from a productivity advantage in traditional cargo-handling service, or from value-added services, or a combination of the two." They also noted that the primary sources of productivity advantages come from economies of scale and economies of scope. This suggests that ports will either develop their cargo-handling capacities to handle a significant amount of trade, or significantly reduce their unit costs through improved management effectiveness. One of the primary elements affecting a port's development is its ability to attract shipping (i.e., competitiveness). The following is a list of factors affecting vessel port calls;

- Trade flow.
- Demand-supply
- Value-adding processes of raw materials
- Commodities / products.
- Costs.
- Tariff structure / incentives offered.
- Socio-political influences
- Overall transit cost.
- Weather / natural conditions and
- Physical features.
- Origin & destination of cargo.
- Type & quantity of cargo.
- Quality of port services.
- Availability of facilities & spare capacity.
- Availability of ancillary services.

Given that shippers and carriers typically select a port based upon their cargo handling capabilities and the availability of other value-adding activities; ports must find ways to achieve value differentiation. All things being equal, cost matters; shippers and carriers have been known to bypass a port with better equipment and services if the overall cost justifies it. This is why optimization is so critical. For example, Singapore, a small country with no real exports or heavy import requirements, is considered one of the top ports in the world. One reason is that they are inexpensive (via optimization). Being one of the top ports in the world implies that shippers are bypassing other closer ports to access Singapore's cost savings. Thus, the planning of land use at ports most be a continuous process. Factors affecting land use planning are (The Port of Los Angeles, 2014):

- To maximize efficient utilization of land and minimize conflicts.
- To improve cargo handling efficiency at terminals.
- To maximize handling and storage efficiency for diverse cargos.
- To increase access to the waterways for both Public and Private usage.,
- The protection of resources.

In developing strategies for promoting greater utilization of land, Port Authorities need to balance their cargo handling capabilities and the needs of their maritime community with the needs and capabilities of their land-based community. For the most part, Port Managers have a good grasp of the needs of all of their stakeholders. However, there are two factors driving the changing relationship between ports and the urban and industrial communities near them (Jung, 2011): the relatively low cost of land transportation (Lee and Ducruet, 2009), and the increasing levels of urbanization (Hoyle, 1988; Goss, 1990; Fugita and Morit, 1996; Stern and Hayuth, 2004).

Port-City Development

As distribution systems grew to accommodate increases in freight flows, the requirements of additional infrastructure grew. Corporate strategies evolved, concentrating logistics functions at strategic locations. New gateways, hubs, and distribution clusters emerged. Large scale flows of goods were channeled through major gateways and hubs such as large ports and major airports. Hesse and Rodrigue (2004) noted that because of increased competition between distribution locations, these major gateways and hubs were committed to expanding their infrastructure. Unfortunately, most of these major distribution clusters, gateways, and hubs are located in or around large population centers. The ever increasing level of movement drives higher levels of congestion along urban corridors, which in turn hinder the flow of freight, generating delays and higher costs.

It's not just the increased quantity of traffic causing congestion. The significant issue is the flow of traffic, typically hindered by poor integration, coordination and real-time management with the port, and with PES in general. With respect to traffic flows to and from the port, congestion typically takes place very near the port itself, due to access / egress bottlenecks. As a result of being in populated urban locations, the expense of starting or expanding required infrastructure is high (Hesse (2002). Anderson (2013) said that ports would benefit greatly from developing stronger relationships with their local communities.

Notteboom and Rodrigue (2006) state that the external spill-over effects from port activities are expanding beyond local port systems into larger international economic systems. In addition to this spill-over, negative externalities remain spatially concentrated to the local systems, potentially causing major socio-economic conflicts related to the development of ports. With respect to local policies, Merk and Dang (2013) studied the effectiveness of port-city policies and their relative effectiveness. Among their findings were:

- Ports with high traffic volumes were highly centralized and diversely connected; but were not a source of port value-add.
- Ports with high value-add were characterized by relatively low traffic growth.
- Prosperity of port-city was highly correlated to high value-add of the port and high port employment, but less to port volume growth.
- High growth in port traffic was not associated with economic growth of in the port city.
- There was a general absence of policy priority dedicated to port or city development.
- Even though policy in transport and environment were closely related, they were often disconnected from policy priorities in other areas.
- In ports-cities with high numbers of performing policies, best practices did not necessarily apply to current environment and transport policies.

- In port-cities with low and average performing policies, the ports were faced with very heterogeneous situations between port traffic and city prosperity.

Leveraging of Innovation, Technology, Data and the Internet

IT innovation often provides the single, most cost-effective method for improvement as it is relatively simple, fast, and requires a minimal CAPEX investment while offering the highest return on the investment (ROI) in contrast to the other alternatives. In his interview with GHD, Anderson (2013) said that improving port efficiency in the movement of goods would require developing seamless links between ports, roads, and rail, while increasing political awareness and community understanding of the importance of freight with respect to trade. In this effort ports would benefit from greater adoption of smart technologies for freight and transparency. For example, in Europe, smart technologies are used to track the movement in freight at any point along the supply chain in real-time.

It needs to be noted, that when developing these above linkages for improving, coordination and actual real-time management across the supply chain, that success in one vertical link may actually produce a negative effect in a different vertical link(s) if not integrated properly at the point of design. A good example is the Port of Aqaba, Jordan, which implemented a fleet management system. This system proved successful in managing overland transport, reducing travel time and associated costs. However, it never took into consideration the remaining links in their global supply chain; mainly the port. As a result, all gains within the fleet management vertical were ultimately lost, and in reality the overall supply chain went backwards (e.g., more delays and cost): they just occurred at different points in the process. Had the movement of trucks been coordinated with the clearance and availability of cargo to be transported, this would not have occurred. But the fleet management project was instituted as a stand-alone vertical, which port administration had minimal participation in. Therefore, the port simply ignored the trucks arriving at the appropriate time as defined by the fleet management system. The trucks ultimately stacked up outside the port, which was not ready for their arrival, an aspect (i.e., data point) not incorporated into the FMS.

The internet and advanced telecommunication systems are motivating changes in virtually every industry. Port services are no exception to this trend. The increase in transport capacity is also driving requirements for immediate data on the exact location and status of cargo, as well as on all logistical and institutional aspects of port operations (Gallegos, 2009). Though port size has an effect on its ability and need to adjust to technological changes, every port will eventually need to adopt these technical changes in order to stay relevant in an ever increasingly competitive market. Information systems literature shows that information technology (IT) investments in a variety of industries can significantly impact the profitability of a firm through revenue growth and IT-enabled creativity.

The real benefit for improved IT capabilities can be realized in better financial performance, customer performance, human resource performance, and organizational effectiveness (Mathas *et al.,* 2001). Business processes are at the heart of how businesses operate. Intuitively, the development of early information systems was focused on supporting the functional processes, with the main goal of automating processes to reduce costs and improved efficiency.

To overcome the short comings associated with soloed information systems, firms started to implement enterprise systems such as:

- Enterprise Resource Planning (ERP) (Xue *et al.,* 2005; Jacobs and Weston, 2007).
- Customer Relationship Management (CRM) (Chen and Popovich, 2009).
- Supplier Relationship Management (SRM).

An ERP system is typically utilized within the boundary of a firm (or Port) and is then extended to the supply chain through the use of CRM and SRM. In the Maritime Industry an IT platform called the “Port Community System” has been developed to provide this type of functionality.

However, in an inter-firm business processes environment such as ports, different players often have different enterprise systems. Connecting those different enterprise systems presents a tremendous challenge. The connection usually includes inter-firm data integration, inter-firm data synchronization, and inter-firm data transparency (Zhou *et al.,* 2011). It is worth noting that ensuring data exchange and integration is not just an information technology initiative, it is a fundamental change in the approach to managing data. It needs all players' effort to address the strategy of data management and integrate the existing enterprise information systems.

Progress has been made in the maritime industry with respect to integrative IT, but with a lower level of adoption across the industry. A collaborative logistics framework for port logistics chains was proposed and has been validated with respect to a real port logistics process in Chile (Ascencio *et al.,* 2014). The United Nations Economic and Social Commission for Asia and the Pacific (ESCAP, 2016) also proposed to use logistics information systems for increased efficiency and effectiveness. One of the main challenges is for the industry to expand its definition of stakeholders. As noted earlier, in the maritime industry the PCS provides the infrastructure for said interactions.

The International Port Community System Association (IPCSA, 2014) defines a 'port community system' (PCS) as an IT platform enabling the intelligent and secure exchange of information between the various public and private stakeholders in order to improve the competitive position of port communities. This definition limits understanding and decision-making with respect to socio-technical interactions between stakeholders, focusing it solely on the IT. The maritime community would benefit from a broader, more encompassing, conceptualization that focuses on the people and institutions with a vested interest in the performance of the port.

In ecology, a community is defined as an assemblage of populations of two or more different species occupying the same geographical area during the same time period. The study of a community's ecology is focused on the interactions between species in a community on a spatial and temporal scale (e.g., distribution, structure, abundance, demography, and interactions between coexisting populations). When designing policies, communications, and processes affecting maritime, land, aviation, and other transport systems; all stakeholders, institutions, networks, and infrastructure, both directly and indirectly affiliated with the operations and/or its benefits must be considered as a community. Thus, we are describing this community of port stakeholders as the "Port Eco-System" (PES). The goal of the PES is to improve the overall competitiveness of the whole port community served.

Within every PES, there are three types of stakeholders: residents, non-residents and the inter-dependents. Resident stakeholders are physically located within the boundary of the port: such as the port authority, terminal operators, other concessioners, etc. The non-resident stakeholders are physically located outside the port's boundary, but influence the port on a regular basis: such as customs and custom agents, port police, veterinary controls, municipal administration; transport companies, shipping agents, freight forwarders and, often, regional and national government. Interdependent stakeholders are rarely considered members of the PES, but their related activities take place deeper in the supply chain. Their actions inevitably impact port functionality: such as banks, insurance companies, and significant end-users like multinational distributors and manufacturers. It is these inter-dependents that alter the traditional PEC definition toward a broader application (collection and use of big data) maximizing depth of vision. For example, customs agencies often detain cargo due to a lack of critical information offered during import/export, or the inability to verify a piece of information provided by the shipper financing of a particular piece of cargo. If 3rd party data resources were made available like bank, insurance and other pertinent data, Customs could access this information directly and mitigated delays.

Given that competition in the global marketplace happens between supply chains, the degree of flexibility is often a result produced by the coordinated/integrated contributions of the

various stakeholders that constitute their respective supply chains (Pires, *et al,* 2012). One of the main issues preventing port management structures from achieving greater integration and coordination across their respective PES is the lack of cohesion and trust among the various public and private stakeholders (Tongzon, *et al,* 2009). It is not enough to just communicate transactional information between stakeholders; there must also be coordination and synchronization of activities that reduce non-value adding usage, or non-usage, of resources.

This latter goal can only be achieved when the correct information and decisions are being shared and supported by partners with common, or at least complimentary, objectives. The use of disruptive technologies that capture, transfer and use all documentation and activities across the PES, including process control networks, can improve overall supply chain efficiency and effectiveness. Traditional IT platforms typically manage less than 20% of the actual PES data available. By capturing all data across this global community, and connecting stakeholders (not just transactional information, redundancy is diminished, decision processing is enhanced, operations are streamlined, and more.

Transport Infrastructure Investments, Development, and Expansion

The two principle functions of logistics are: physical distribution and materials management (McKinnon, 1988). While materials management involves the management of material flows through the production stages of the supply chain, physical distribution includes the activities associated with the movement of goods from their production origins to the final points of sale and consumption. Activities in the physical distribution of goods are transport services, transshipment and warehousing services, trade, wholesale and retail. The relationship between the induced demands driving physical distribution and the derived demands driving materials management is reciprocal in nature. Due to this reciprocal relationship, the level of integration between these two functions will significantly affect a production system's overall capacity.

As management philosophies have evolved, supply chains have markedly changed in support of new practices. The introduction of lean concepts has forced distribution systems to accommodate the principles of flow, thus permitting the reductions in inventories in time-sensitive manufacturing activities (Hesse and Rodrigue, 2004). Innovation in computing and communications technologies has led to the organization of new production and distribution systems (Abernathy *et al.*, 2000). The improvement in the quality of services (i.e., greater dependability and just in time delivery) has led to the decease of inventory components in the overall cost of logistics.

As the volume of trade increases, the unit cost of transport has decreased, allowing for economies of scale which in turn create opportunities for different services in terms of speed, frequency, reliability and security (Sanchez *et al*., 2003). With the growing need for increased flexibility, firms started exploiting manufacturing opportunities presented in developing countries. As production systems became more fragmented, new materials flows between the various parts of the respective production systems developed. The introduction of containerization conferred additional flexibility to production systems, allowing smaller volumes to be shipped more frequently. This increase in freight movement coupled with improvements in information and communication technologies, has resulted in tighter integration of logistics activities (Abernathy *et al.*., 2000).

Litman (2013) found that for land-based transport, particularly in urban areas, there is a paradigm shift occurring. The old paradigm focused on transport system performance, primarily speed, convenience, and affordability. The goal of the old paradigm focused upon the maximization of distance traveled within a given time and fiancé constraint. In contrast, the new paradigm has a more comprehensive, multimodal focus which includes: range of modes, objectives, impacts, and improvement options. This new paradigm also recognizes that the goal of most transport activities is to increase access to services, and that mobility is seldom an end in itself.

Luo and Grigalunas (2003) found that international trade patterns, geographical location with respect to sources and markets, the availability of multi-modal transport networks, and general costs were major factors influencing container transport demand. Another finding showed that advances in rail service have stimulated markets being competitively served by ports from both East and West coast ports.

Research and Development

The competitiveness of maritime industries and their capacity to meet environmental, energy, safety, and human-factor challenges they face is significantly influenced by research and innovation. The results of research and development activities will continue to lead to new types of safer vessels, advanced propulsion systems, energy efficiency, environmental protection, surveillance systems taking full advantage of advanced information technologies or intelligent transport systems enhancing the integration of maritime transport in the logistic chain.

The European Union's MUNIN (Maritime Unmanned Navigation through Intelligence in Networks) project is assessing the technical, economic, and legal feasibility of operating unmanned merchant vessel autonomously during an open-sea voyage. (Levander, 2017). Due to the advancements in electronic sensors, telecommunications, and computing, remotely controlled ships and possibly autonomous ships are a potential part of our future.

Rynne and von Ellenrieder (2009) believe that the usage of unmanned autonomous sailing vessels for sustained oceanographic observations could result in higher spatial and temporal resolution of sea surface measurements than contemporary methods such as Lagrangian floats, moored buoys, manned expeditions, and satellite observations. These types of mission-specific autonomous platforms could even provide sustainable mission-specific systems for forecasting environmental events and possibly tracing the distribution of meteorological and ocean conditions over a long-term period.

It is anticipated that these autonomous ships will have the ability to sense and communicate what is going on around them and be able to navigate to its destination, avoiding collisions along the way, and performing complex maneuvers such as docking upon finally arrives. Remote and autonomous operations could even facilitate the transfer of jobs from sea going vessels requiring high levels of education and skills to ports of call and/or land-based operations centers.

Environmental

With the increased awareness and acceptance on environmental issues, global warming, and sustainability, ports must continuously focus on how they manage their environment. Anderson (2013) suggested that ports needed to focus on minimizing their impact on the environment, particularly on lowering their dependence on energy and improving the management of their water resources. Though efficient ports are vital to the economic development of their local and regional areas, the related ship traffic, handling of cargo in port, and the distribution of cargo to and from the hinterland can cause a number of negative environmental impacts. The environmental impact of ports can be divided into three subcategories:

- Problems caused by port activity itself (OECD, 2016).
- Problems caused at sea by ships calling at the port.
- Emissions from inter-modal transport networks serving the port hinterland.

The effects of ports on their environment can be wide-ranging. These effects are often depending on factors such as; location and the activities themselves. Fortunately, there many options available that can provide remedies for these problems. The question is, how much of an impact do ports have on their immediate environments? How a port chooses to address environmental issues can have significant effects on the competitiveness of the port and the region it serves.

Spatial Development

The theory of comparative advantage states that if countries specialize in producing goods where they have a lower opportunity cost and import goods for which they did not, then between those countries there would be an increase in economic welfare (Maneschi, 1998). Dornbusch *et al.,* (1977) were the first to examine a continuum of goods in a Ricardian model. Eaton and Kortum (2002) incorporated geography into a Ricardian model. Melitz (2003) modeled heterogeneous firms based upon a Ricardian model.

There are two major macroeconomic policy issues affecting global transportation; free-trade (Cooper, 2014; Shaiken, 2015) and currency manipulation (Laffer, 2014). Free trade policies endorse nondiscrimination practices against imports from and exports to foreign jurisdictions. In this environment buyers and sellers from separate economies can voluntarily trade without governments applying tariffs, quotas, subsidies or prohibitions on the goods and services being traded. It is theorized that with free trade policies, both economies can experience faster growth rates, thus enabling both sides of the trade to concentrate on those goods and services where they have a distinct comparative advantage.

The globalization of trade has resulted in significant deregulation of the transport industries along with trade liberalization initiatives such as North American Free Trade Act (NAFTA), the European Union, and General Agreement on Tariffs and Trade (GATT). Another effect has been an increased awareness of the global nature of business and an increased appreciation of our environment. All of these changes have effected how freight is transported. Accompanying these actions there have been changes in transport modes; especially multimodal trades (Litman, 2013; Luo and Grigalunas, 2003; Rondinelli and Berry, 2000).

The practice of currency undervaluation benefits the manipulators at the expense of countries allowing the flexible adjustment of exchange rates. Currency manipulation has been a contributing factor to the lack luster recovery from the 2008 financial crisis (Laffer, 2014). The estimated impact of currency manipulation on the U.S. economy in 2012 is about 4% of GDP.

Another impact of trade and economic shifts is that previously poorly utilized transport corridors can become more important in the future. An example of this dynamic can be seen with the changing relationship between Russian markets and the European Union when it came into existence. There have been proposals put forth for reconnecting the land-bridge between Asia and North America, crossing the Bering Sea. The cost feasibility and perceived risk of many such ventures has stalled their implementation, but future innovations and technologies will eventually reduce these types of barriers. The redevelopment of the Panama Canal is another example of how the changing trade environment is causing revitalization of old trade routes. China's OBOR (One Belt, One Road) activity, also referred to as Silk Road, threatens to alter the dynamics across Asia by linking it with Africa and Europe; improving access between the three regions.

Notteboom and Rodrigue (2006, p. 22) noted that, "vertical integration strategies of the market players have blurred the traditional division of tasks within the logistics chain and as such created an environment in which ports are increasingly competing not as individual places that handle ships but as logistic chain directors within transport chains or supply chains. The logistics chain has become more than ever the relevant scope for analyzing port competitiveness…port's competitiveness becomes increasingly dependent on external co-ordination and control by outside actors."

FACTORS AFFECTING PORT COMPETITIVENESS

Eilts and Oxley (2011) identified two main competitive constraints facing ports: other modes of transport (inter-modal competition) and other ports (inter-port competition). They suggest that a port's competitiveness is rooted in the type of hinterlands they serve (captive or contestable) and their market power within those hinterlands. Another area where ports may compete for market power is with transshipment traffic. There are a number of factors the market power of

port ranging from the extent of existing competition, the threat of potential competition, to the degree of buyer power. The ability of a port to act independently of customers and competitors defines the extent of its market power.

From the seaport authorities and terminal operators' perspective, seaport facilities and equipment is the most important factor followed by channel depth, intermodal links, vessel turnaround time and proximity to import/export areas. Vessel turnaround time is considered by ocean carriers as the most influential factor to competitiveness, followed by intermodal links, seaport facilities and equipment, proximity to import/export areas and channel depth. (da Cruz *et al.,* 2013). In West Africa the most competitive port had their strongest links with efficiency and performance, infrastructure and political stability (Dyck and Ismael, 2015)

In addition to policy and regional factors discussed by Merk and Dand (2013), Aronietis *et al.* (2010) noted that most mentioned factors related to port competitiveness are: cost, location, port operations quality / reputation, speed / time, infrastructure / facilities availability, efficiency, frequency of sailings, port information systems, hinterland / intermodal links and congestion in port. These findings were related to interviews and a literature review.

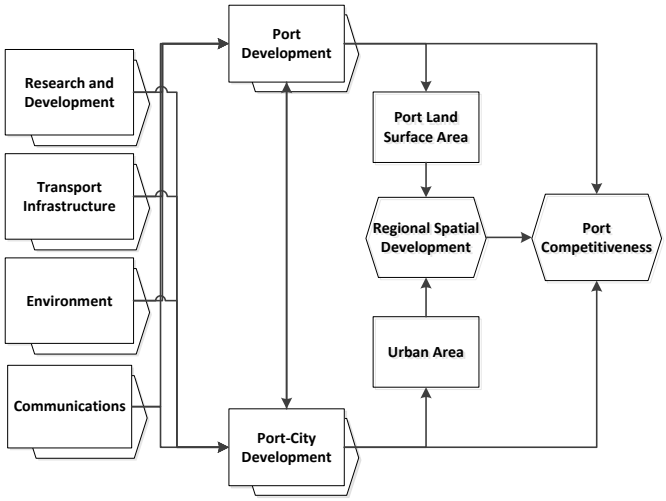

Figure 1: Factors affecting the Port-City Interface and Competiveness

CONCLUSION

Hinterlands are a fundamental part of the port and maritime industry and as such, its density and extent is a driving force in frieght distribution and port operations. Many of the issues Port Authorities must deal with are related to hinterland development. Issues include congestion, growing costs, limited freight handling capacity, and traffic. Rodrigue and Notteboom (2006) noted that the development of port systems is moving into a phase of "regionalization". They define regionalization as representing "a setting where inland distribution becomes of foremost importance in port competition" (p.1), arguing that more efficient access to the hinterlands will increase port competiveness. This raises the question of; how much affect do the factors of regionalization, shown in Figure 1, have on port competitiveness?

The only way for maritime ports to achieve maximum optimization and revenue growth is by looking at all aspects affecting the PES and understanding the interrelationships, and impacts of change to the various elements within the port community. To date there is no research establishing the strength and significance of the relationships discussed in this paper. It is the intent of the authors to collect the relevant data and test these relationships.

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