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Competitiveness Drivers: A Comparison of Panama, Singapore and Rotterdam Maritime Clusters

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Panama has great potential to become the main gateway for the region's commerce and logistics operations. However, as international trade increases, so does competition and the bar of performance. Reliability, time and cost of service, the key performance drivers of logistics, call for increasingly leaner supply chains and a synchronization of their components. To attain such levels of efficiency, companies cannot work in isolation - they need a nurturing but demanding business context where all actors are aligned and collaborate with each other as to produce synergistic effects in their results. We can call this kind of business context an effective *cluster*.

Michael Porter (1998)[1] defines a *cluster* as interconnected companies from a given industry concentrated in a geographic location, supported by entities from complementary fields and identifies it as a key source of competitive advantage. More recently, Sheffi (2012) describes successful clusters as industries that benefit from a favorable location, available infrastructure, and an efficient government, among other features.[2] His book describes at length five world known logistics clusters: The Netherlands - Rotterdam, Panama, Singapore, Spain-Zaragoza, and United States-Memphis.

This paper identifies key initiatives in Singapore and Netherlands, and uses them as a background of best practices for Panama. We also developed a tool for evaluating industries, and analyzed the clusters of Panama, Singapore and Netherlands. The tool's structure is based on Porter's determinants of competitive advantage[3] and Sheffi's (2012)[4] findings on clusters characteristics. The tool also considers attributes from the Global Competitiveness Index[5] developed by the World Economic Forum.

Panama

Panama's logistics cluster is leveraged by its geographic position which drives its air, sea and land connectivity. The greatest asset in the cluster is the Panama Canal which has gathered near its entryways: ports, logistics parks and special zones. Complementary industries have also risen to meet the needs of the cluster, such as auxiliary services, associations, and education and research entities. Other assets that add multimodality to Panama are the Panama Canal Railway (which connects ports in the Pacific and the Atlantic), the Tocumen Airport and the trucking business. Sea is used mainly as a hub for containerized mass-manufactured products, while air is known as a hub for regional passengers and for transporting more expensive and/or highly perishable products.

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[1] Porter, Michael (1998). Clusters and the New Economics of Competition (p.78). Harvard Business Review

[2] Sheffi, Yossi (2012-09-14). Logistics Clusters: Delivering Value and Driving Growth (p. 289). The MIT Press. Kindle Edition.

[3] Porter, Michael (1990). The Competitive Advantage of Nations (p.78). Harvard Business Review.

[4] Yossi Sheffi. Logistics Clusters

[5] World Economic Forum (2014). The Global Competitiveness Report. Full Data Edition.

We have found that Panama's Cluster is highly attractive to international markets due to its strategic location, availability of financial resources and physical infrastructure. One of the greatest opportunities today, is that the international market is growing (especially in the emerging markets such as Brazil and China) and Panama could be considered as a key connecting point to reach them. Nevertheless, there are also other countries in the region with initiatives to increase their competitiveness. Although they lack Panama's strategic location, the concern in the quality of their products and services, and willingness to improve them are a potential threat to Panama's attractiveness.

Panama's level of competitiveness is still at a midpoint. Main strengths such as location, finances and infrastructure are strongly counteracted due to the need of specialized human resources (specially technical), greater collaboration and integration between companies and complementary industries (academic, research and government entities), and process standardization and innovation.

Though the Government has highly invested on infrastructure, there are still other issues that need to be addressed: lack of balance between urban and logistics projects, cumbersome and inflexible government processes, and lack of policies that promote high quality services in the industry. Still, the Government has ongoing initiatives where it seeks to streamline logistics services such as: the Economic Authorized Operator Program (OEA)[6], the revision and issue of new customs and cargo laws (currently been discussed by all key sectors to ensure that Panama's logistics multimodality is enhanced, rather than hindered). The Government has also created the Secretary of Competitiveness and Logistics, which is now in the process of reviewing the National Logistics Plan (NLP)[7] for its implementation.

Still, greater public-private efforts should be developed in order for Panama to reach the level of competitiveness that other clusters in the world have achieved. Looking at the actions that drove their logistics progress could help Panama in creating its pathway for improvement.

Identifying best practices

According to Sheffi (2012)[8], a successful cluster has the following characteristics: favorable location, available infrastructure (physical, robust fuel systems, sophisticated financial and information technology services), supply chain mindset across all stakeholders, an efficient and collaborative government, a stable political and social environment, academic and technical institutions aligned with the industry's labor needs, and the presence of value added activities.

The book focuses on five world known clusters: The Netherlands – Rotterdam (Sea), Singapore (Sea), Spain-Zaragoza (Inland port), Panama (Sea), and United States-Memphis (Air). Singapore and Rotterdam were considered as benchmarks for this white paper because of their certain

[6] The Economic Authorized Operator Program (OEA for its initials in Spanish) is an initiative by the Panamanian Customs to reduce physical and document control of cargo operations, and ease Customs processing time.

[7] The National Logistics Plan (NLP) was created by the IDB (Interamerican Development Bank) in collaboration with key stakeholders from the industry and complementary fields. It details Panama's logistics vision, strategies and activities for becoming a Value-added logistics hub.

[8] Yossi Sheffi. Logistics Clusters

similarities to Panama. All three have developed as seaport clusters; have a strategic location, and act as logistics gateways for each of the regions they are located in.

In the next sections, we show a brief summary of the initiatives that Singapore and Netherlands developed in order to reach the level of efficiency that they have today.

Singapore

The cluster of Singapore is well known by Panamanians, and it is commonly used as role model when discussing the level of excellence that our country should strive for. The country has become a high end logistics cluster by investing early on education, technology and innovation, combined with a strong guidance from the central government[9]. Though criticized by many due to its strict mandate, the Government's active participation has allowed the Country to become highly competitive.

Singapore is known as one of the best maritime worldwide clusters. Though its land area is small (716 km^2), the Country is strategically located between key trade flows from Asia, Australia, Europe, Middle East and United States[10]. Its most important asset is the Port of Singapore.

The Port of Singapore is second in the world with a TEU volume of 32.6 million 2013[11], in which 85% of containers were transshipped to another port call[12]. The Port is operated by two commercial operators: Jurong Port (in charge of a multipurpose terminal) and Port of Singapore (which handles four container terminals: Pasir Panjang Phase1 and Phase2, Tanjong Pagar, Brani and Keppel)[13]. Together, these five terminals work as one single port.

Singapore's port cluster offers services such as pilotage, towage, and other value added activities such as water supply, garbage retrieval, and bunkering. The country is one of the top bunkering ports in the world (In 2014, it sold 42.4 million metric tons of bunker)[14]. The bunkering hub is known to be an efficient, quality and transparent service, highly regulated by the government.

Singapore's road to competitiveness began 50 years ago when the Government decided to become a destination of investment[15]. It decided to establish English as the main language to promote economic development. In the 1980's, it began a strong transformation from a

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[9] Sheffi, Yossi (2012-09-14). Logistics Clusters: Delivering Value and Driving Growth (p. 201). The MIT Press. Kindle Edition.

[10] http://www.iesingapore.gov.sg/Trade-From-Singapore/Overview

[11] World Shipping Industry. About the Industry: Top 50 World Container Ports. http://www.worldshipping.org/about-the-industry/global-trade/top-50-world-container-ports

[12] https://www.singaporepsa.com/about-us/core-business

[13] http://www.mpa.gov.sg/sites/pdf/sn21/sn21_rise-of-a-smart-port.pdf

[14] http://www.cambiasorissoagency.com/bunkering-operations-in-the-port-of-singapore/

[15] Hussain, Zarina (2015). How Lee Kuan Yew engineered Singapore's economic miracle. http://www.bbc.com/news/business-32028693

manufacturing to service-driven economy[16], investing on state of the art port infrastructure, technology, innovation and growth of its labor pool.

In 1985, Singapore launched PORTNET, the world's first port community system meant to reduce paperwork and clerical activities in port operations. PORTNET has been continuously updated throughout the years and currently provides: information services (port infrastructure and calls, and vessel schedules), document exchange services (cargo manifest submission, customs declarations, berth channel and pilot application), and e-commerce services (electronic invoices, and e-payments)[17]. In 1989, the Country launched TRADENET, an EDI-based system interconnected with PORTNET, still used today for exchanging trade documents between the shipping community, Customs and other government entities to obtain a rapid customs clearance. In 1996, it launched MARINET a community system to ease port and shipping document clearance, for dangerous goods. Finally in 2000, it launched the Singapore Maritime Portal. This portal includes the port community network composed of PORTNET, TRADENET AND MARINET.

In the 1990's, Singapore created more flexible migration policies to increase its labor force, especially professional and managerial workers[18]. In 1995, the Singapore Economic Development Board (EDB) began the initiative of developing local human talent in logistics and supply chain management. Three years later, the Logistics Institute-Asia Pacific was created, with the collaboration of the National University of Singapore (NUS) and Georgia Institute of Technology. As Singapore academic and research capabilities rose, the Institute decided to phase out their Dual Master Program in Supply Management (2014/2015 was their last batch of students), and decided that NUS would continue teaching the program locally[19].

In the beginnings of the 2000s, the Maritime and Port Authority of Singapore (MPA) in collaboration with the Singapore Polytechnic developed the Integrated Simulation Center (ISC), with the objective of boosting the quality and efficiency of maritime training[20]. The center has simulators for ship handling, crisis management, engine room simulator, and others.

The government actively promotes the country as a logistics hub. The EDB recruits companies looking to set up logistics facilities. It also offers lower corporate taxes for companies that establish headquarters in the region, and other labor, research, and innovation benefits. Singapore is the regional headquarters for Proctor & Gamble, DHL and DELL, as well as a strategic hub for Unilever and IBM[21].

Nevertheless, Singapore's focus on economic growth has caused stressed on certain demographic aspects. The Country's economic growth has been highly dependent on imported

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[16] Yeoh, Brenda. Singapore: Hungry for Foreign Workers at all Skill Levels (2007). http://www.migrationpolicy.org/article/singapore-hungry-foreign-workers-all-skill-levels

[17] http://www.redvuce.org/docs/Singapore_Port_Community_Experience_Peru2014.pdf

[18] Yeoh, Brenda. Singapore: Hungry for Foreign Workers at all Skill Levels

[19] http://www.tliap.nus.edu.sg/mscm/dmp.html

[20] http://www.mpa.gov.sg/sites/education_and_careers/maritime_education/isc.page

[21] https://www.edb.gov.sg/content/edb/en/case-studies.html?start=0

labor (30% of the population in Singapore is foreign) [22] which has increased public infrastructure and housing costs. Additionally, it faces an ageing population and low fertility rate facing the risk of a shrinking population and workforce in 2025 without migration[23]. Currently, the Government seeks to balance these issues without affecting the Country's competitiveness. As a result, the Country is once again changing its economic model to become the world's first Smart Nation. This vision is focused on three main areas: smart nation logistics, tech challenges and health care. It is based on using technologies such as internet of things and video analytics to provide near real-time visibility and improve decision making capabilities for businesses, and personalized and ease government healthcare services due to high population density[24].

Netherlands: Rotterdam

The Port of Rotterdam is the largest seaport cluster in Europe. It is ranked first in Europe and eleventh in the world with a TEU volume of 11.62 million in 2013[25] . Rotterdam has played an important role in European commerce since the 1800's. As the volume of cargo grew, the port expanded. It largest extension was developed between the decades of the 1960's and 1970's; followed by expansions in the 1970's and then 2000's. The port and industrial complex is now 10,500 hectares and 40 km long[26]. Located on the North Sea at the mouth of the Rhine River it is a key location for local imports, exports and transshipment for Europe's inland markets[27].

The cluster is characterized by its high investment on infrastructure, technology and development of value added activities surrounding the port. It is also world known for its perishable, petrochemical and pharmaceutical industrial clusters.

Rotterdam as a City also offers Research & Development benefit programs, and offers business development and networking services to high tech companies, to encourage an innovation driven commerce and culture. Companies with operations or headquarters at Rotterdam are Unilever, Shell, Pfizer, and Maersk, among others. [28]

Similar to Singapore, Rotterdam has also made great innovations in port infrastructure and processes. In 2004, Rotterdam Port launched Port Infolink a PCS for port and supply chain coordination. In 2005, it developed Synchron8 a barge synchronization system for barge planning and coordination[29]. In 2009, it launched Portbase, a merger between Rotterdam's Port Infolink and Port of Amsterdam's PortNet. Portbase[30] is now a one stop-shop for exchanging port and logistics information.

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[22] Vietor, Richard (et al.) Singapore's "Midlife Crisis"? (P. 100). Harvard Business Review

[23] Issues Paper 2012 – Our Demographic Challenger an What these Mean to Us. http://population.sg/key-challenges/#.VYA1VPlVhBc

[24] http://www.channelnewsasia.com/news/singapore/singapore-s-smart-nation/1886696.html

[25] World Shipping Industry. About the Industry: Top 50 World Container Ports.

[26] Kippenberger, Tony (2012). The Port of Rotterdam and Maasvlakte 2 (P.3).
https://www.axelos.com/CMSPages/GetFile.aspx?guid=19aef1c7-0f80-483a-a26c-ac29bac2b706

[27] Port of Rotterdam. Why Rotterdam. http://www.portofrotterdam.com/en/Business/whyRotterdam/Pages/rotterdam.aspx

[28] Penetrating the European Market by establishing a presence in Rotterdam. http://www.kurtzmarketing.com /images/Rotterdam _ overview.pdf

[29] Srour, F. Jordan (et al.) (2007). Port Community System Implementation: Lessons Learned from an International Scan (P.13).

[30] Port of Rotterdam. Business. Portbase. http://www.portofrotterdam.com/EN/BUSINESS/SERVICE-PORT/Pages/Portbase.aspx

In April 2015, the Port of Rotterdam in its lastest extension (APM Terminals Maasvlakte II) become the first container terminal to use remotely-controlled STS gantry cranes. The terminal also is the first to have Lift-Automated Guided Vehicles (Lift-AGVs) that can actually lift and stack a container. Lift AGVs are used to move containers from the quay (where ships dock) to the container yards. After the container is taken to the yard, Automated Rail-Mounted Gantry Cranes (ARMGs) stack containers in a high density system[31].

Among the academic initiatives mentioned by Sheffi (2012) are the Master Shipping and Transport Program from the Netherlands Maritime University; the Dutch "Scheepvaart en Transport College" (STC) which provides basic professional certification in port operations; and collaboration between private companies (example: Maersk, APM Terminals, and APL) and the Erasmus University by providing statistics or case studies to students performing doctoral research.

The population has a good working knowledge of English, and most Dutch people speak a third language[32].Culturally wise, the City has the Port of Rotterdam Education Center and the Maritime Rotterdam Museum which support social integration between the port and the City, and create career awareness on younger generations. [33]

Though Rotterdam has a highly competitive logistics cluster, it also faces weather challenges and has lived with the effect of river and coastal floods for centuries (80% of the City is at or below sea-level). The City has developed flood and storm defense systems, but forecasts show that climate change will cause sea-level rise, extreme precipitation and droughts.

In 2007, the City released the Rotterdam Climate Initiative, which focuses on climate change mitigation and adaptation,[34] and set the target to make the City climate-proof by 2025. Examples of current actions towards this goal are: water barriers that can act as commercial platforms for roads, landscaping and building; dual-purpose water areas that act as children playgrounds during dry-spells but temporarily hold storm water during heavy rains; and rewiring of house electricity above flood levels basements can flood safely[35]. Rotterdam seeks to become the city and port leader in climate change adaptation.

Conclusions

It is clear that Singapore and Rotterdam have all the successful factors identified by Sheffi (2012): high investment on infrastructure (physical and technological), labor, efficient government, stable political and social environment, and aligned academic institutions.

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[31] Dutch King officially opens fully automated APM Terminals at Maasvlakte II, Rotterdam, Netherlands. http://www.dutchwatersector.com/news-events/news/14076-dutch-king-officially-opens-fully-automated-apm-terminals-at-maasvlakte-ii-rotterdam-the-netherlands.html

[32] Doing Business in the Netherlands. 2014. http://www.pwc.nl/nl_NL/nl/assets/documents/pwc-rapport-doing-business-in-the-netherlands.pdf

[33] Education and Information Center Mainport Rotterdam. http://www.eic-mainport.nl/xeng-home/

[34] Miller, Gavin (2015). ICE (Institution of Civil Engineers) https://www.ice.org.uk/disciplines-and-resources/case-studies/rotterdam-adapting-to-climate-change

[35] Hall, Jim (2015) The Guardian. http://www.theguardian.com/public-leaders-network/2015/feb/11/childrens-playground-rotterdam-flooding-climate-proof

Specific initiatives that can be learned from these two clusters are:

- Investment on technology to ease processing and documentation (One-stop portals that integrate all data exchange operations).
- Collaboration with complementary institutions to generate specialized human talent.
- Logistic added value activities promoted actively by government, and supported by attractive benefit policies.
- Clear and strong commitment by government to acknowledge the importance of the Logistics Cluster as a key component for the country's economic development.
- Awareness and visibility of future issues and establishment of on-time measures to overcome them.
- Importance of English as a universal language for services and doing business.

It is important for the government to promote cluster growth and reinforce them by providing support in the development of specialized infrastructure and human resources[36].

However, the private sector should also contribute to the cluster's growth by identifying its needs on labor training and education. It should work closely to educational entities to create fruitful academic programs (even at a high school level if necessary, to ensure that the needs of the cluster are being considered).

Though it is difficult to believe for many, governments do not control competitive advantage, they influence it. Together, the private sector, along with the government and complementary entities (such as associations, research centers and universities) can mold the business environment and policies necessary for competitiveness to grow.

[36] Porter, Michael (1990). The Competitive Advantage of Nations