

## THE IMPORTANCE OF PORTS IN THE CURRENT GLOBAL ECONOMY

MIGUEL CÓRDOVA

DEPARTAMENTO ACADÉMICO DE CIENCIAS DE LA GESTIÓN  
PUCP

JULIA PAHL

UNIVERSITY OF SOUTHERN DENMARK

### Abstract

*Logistics is a central part of our every day's life. We consume products and services that have been created in other countries and are delivered to us even from very far away at the lowest possible costs in the shortest time at the required quality. This note provides an insight into key areas of the global transportation network with ports being a crucial part connecting the waterside with the hinterland. It outlines major elements that need to be taken care of to maintain and enhance a smooth flow of goods and accompanying services able to fulfil our expectations.*

**Key Words:** Maritime supply chain, blockchain, ports, logistics, infrastructure.

### Resumen

*La logística representa una parte central de nuestra vida diaria. Consumimos productos y servicios que ha sido elaborados en otros países y son entregados desde muy lejos, a precios competitivos, en corto tiempo y con la calidad requerida. Esta nota brinda una visión en temas clave acerca de la red de transporte global, considerando a los puertos como una parte crucial que conecta los océanos con los territorios. Además, se esbozan elementos principales que deben cuidarse con el objetivo de mejorar el flujo de bienes y servicios orientado a cumplir con nuestras expectativas.*

**Palabras clave:** Cadena de suministro marítima, blockchain, puertos, logística, infraestructura.

### Introduction

Global logistics involve strategic and operational activities such as transportation, warehousing, brokerage, delivery, terminal management, information management, international commerce, infrastructure strategy, and beyond (World Bank, 2018). Almost every activity in peoples' and organizations' daily life is embedded in logistics.

According to Ballou (2004), logistic activities naturally represent a bridge to properly connect two or more points that are globally separated by distance and time. However, these activities need the daily support of

# NOTAS ACADÉMICAS

**technology-advanced and robust infrastructure** to achieve not just efficacy in the transaction, but efficiency in terms of low(er) costs and smooth performance at the same time. High-technological new features and changes in sales and distribution processes are just one part of the picture to achieve efficiency goals. The other part is the physical infrastructure that needs to be in place and maintained to allow for the movement of goods between companies and consumers.

Ports are a vital element of the overall transportation network representing nodes connecting maritime transportation and the hinterland of countries (De Langen et al., 2018; Wilsmeier & Monios, 2016). They significantly extended their role from the classical reception of ships and their loading-unloading, maybe including some storage, to comprehensive entities of functional activity clusters (De Langen et al., 2018) providing extensive services (Wilsmeier et al., 2006). The **physical logistics infrastructure** including, e.g., ports, airports, and roads, has an important role in supply chain activities creating the basis for the formation of distribution networks. The managerial part includes dealing with several factors such as taxes, overload, and congestion (Chopra & Meindl, 2013) that may delimit efficiency (see also Wilsmeier & Monios, 2016).

The physical logistics infrastructure is often controlled by entities pertaining to the State which could put at risk logistics performance in countries with inefficient governments or several institutional voids to deal with (Tongzon & Heng, 2005, Trujillo & Nombela, 2002). In addition to this, the correct placement of logistics infrastructure is a major issue to improve services and cost reduction (Coyle, Langley, Novack & Gibson, 2013).

Besides the physical infrastructure, **information and communication technology (ICT)** is equally important to ensure that the right information gets to the right person at the right time to ensure smooth operations. This is also reflected in the logistics performance index provided by the World Bank

# NOTAS ACADÉMICAS

(World Bank, 2018).

## Ports as key infrastructure for enhancing logistics networks

Since the 1960s, the physical distribution of goods is a topic of research and discussion in both academia and managerial practice (Southern, 2011). Logistic concepts evolved from warehouse and transport to supply chain distribution systems including logistics infrastructure and operations planning. By 2018, the global turnover of logistics activities was approximately US\$ 4.3 trillion (World Bank, 2018) and world merchandise trade volume grew 4.7% in 2017 after it only climbed 1.8% in 2016 (WTO, 2018). Growth is foreseen in 2019 to be 4.0% (World Bank news, 2018).

The evolution of complex logistics systems, the globalization phenomenon, and the pursuit of economic growth of each country result in a huge global distribution network of goods and services, profitable and resourceful, capable of enhancing worldwide progress and improving peoples' lives; see Figure 1. The World Bank (2018) highlights the importance of the sea (see Figure 1 for an impressive view on the overall maritime network with blue lines giving the maritime routes) for logistically well-performing countries.



Figure 1: The global transportation system; Source: <https://imgur.com/gallery/MltUKcO>, last call 11.02.2019

# NOTAS ACADÉMICAS

These results drive us to think about a global challenge on logistics infrastructure comprising both the physical infrastructure as well as ICT and their integration. There may be the need for a total or partial intervention from States to guarantee that they can unfold their potential, which is not sufficiently supported regarding ICT infrastructure. In many Southern American countries, this is mostly done by the private sector (see, e.g., World Bank, 2018). On the other hand, in Europe, we can see that investment projects mostly concern basic (physical) infrastructure. ICT and digital infrastructure account only for 4%. See Figure 2.

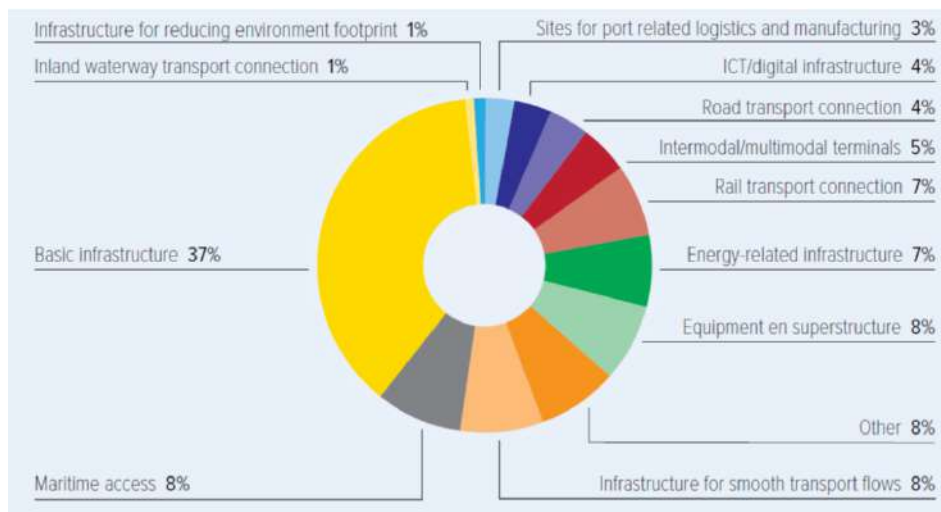


Figure 2: Percentage of projects submitted per port infrastructure category; Source: de Langen et al. (2018)

Although ports have a high societal value in Europe, investment projects mostly do not create enough returns on investments for the investing port authority which makes it hard to attract private financing (De Langen et al., 2018). This is somewhat different in, e.g., Southern American countries where structural reforms have led to increased involvement of private-owned capital in terminal operations through the landlord scheme, so that an increase of international port terminal operators can be seen in Southern American countries (Wilsmeier & Monios, 2016).

# NOTAS ACADÉMICAS

Maritime trade growth implies the growing of maritime shipping lines with larger vessels to capitalize economies of scale in size and cost. However, bigger vessels require changes in ports infrastructure for them to be able to deal with greater required water depths and higher efficiency of operations (Zhang & Lam, 2014; De Langen et al., 2018), but available space may impose restrictions for expansions (Pahl & Voss, 2017).

According to Zhang and Lam (2014), ports and terminals are extremely important to boost maritime supply chain integration and maintain its competitive position in the market. Supply chains consolidate as community assets with relevant functions of uniting logistics centers or clusters that build up alongside cities' economic performance (Cheung & Yip, 2011). Accordingly, ports must adjust themselves to shipping lines' needs and innovate their ground operations to follow the pace of maritime trade growth. However, their evolution must be gradual, considering local and regional factors to find a proper balance between the city urban plans and the water forefront representing the globalization effort (Ducruet & Lee, 2006).

## **Maritime supply chain integration efforts around the world**

According to Sanchez, Ng and Garcia-Alonso (2011), the factors that affect the attractiveness of ports are i) time efficiency, ii) cases of delay and iii) accessibility, from the perspective of port services providers. We consider the latter as the most important, regarding strategic location and connectivity performance as key considerations of this attractiveness. The presence or absence of these factors affects ports' competition, as they are capable of solving the same commerce routes or integrating similar maritime supply chains. Uncertainties of, e.g., ships arrival times are challenging to handle for terminals (Pahl & Voss, 2017) and may decrease their attractiveness if they are not capable of handling acceptable operating times, even though the delay is generated by the shipping line. Terminals bear these additional costs decreasing its competitiveness in the global economy (Rodríguez-Álvarez, Tovar & Wall, 2011). For instance, an important shipping line such as Maersk in alliance with Burlington Northern Santa Fe (BNSF) Railway invested in

# NOTAS ACADÉMICAS

improving the load capacity of the port of Los Angeles and in enhancing their offer for inland distribution to cities like Chicago, Houston, Dallas and Memphis (Zhang & Lam, 2014). Similar State-private initiatives are happening in South America, e.g., where Cosco Shipping Ports in alliance with Volcan Mining Company build a new port/terminal in Peru, north of Lima, considering an investment of US\$ 3,000 million (Gestión, 2019).

According to World Bank (2018), for emerging markets perspective, the Middle East and North Africa, and Sub-Saharan Africa were the highest rated regions regarding the quality of their ports, followed by East Asia and Pacific, and Latin America and Caribbean. However, other logistic infrastructure developments such as roads, rails, and warehouses are incipient, and in some cases, that delay could put under risk the full integration purposes of the maritime supply chain, especially when they play a complementary role.

Developments in maritime ICT and digitalization-driven innovations and technologies are expected to have a great influence in transforming the maritime supply chain (United Nations, 2018) which is especially interesting to countries in emerging markets as investments are less capital intensive as in, e.g., basic physical infrastructure and equipment. Digital innovations that are interesting regarding the maritime supply chain integration, especially concerning collaborative efforts, are the Internet of Things, automation, artificial intelligence, and blockchain approaches (see also United Nations, 2018). Collaborative systems for information sharing further include port community systems (PCS) that provide a digital platform for maritime stakeholders of ports to exchange information (Pahl & Voss, 2017; De Langen et al., 2018) by linking systems of private and public organizations together in a single window digital network (Nota, Bisogno & Saccomanno, 2018).

Efforts in this direction include, among others, the development of an Internet of Things pilot at the Port of Valencia, Spain done together with MSC and

# NOTAS ACADÉMICAS

Traxens – the latter being a company that provides global solutions for monitoring and coordinating multimodal transport (World Maritime News, 2019). Their aim is to improve operational efficiency via automated on-site road activity monitoring, improved fleet management as well as services such as pre- and post-carriage management. Moreover, A.P. Moller - Maersk and IBM plan to develop a global trade digitization platform using blockchain technology (World Maritime News, 2019; United Nations, 2018).

## Conclusions

As maritime commerce represents more than 90% of the global trade transactions (International Maritime Organization - IMO), ports emerge as a key player of logistics infrastructure to achieve logistics goals of performance such as a competitive lead time at reduced costs. Ports are the link between ocean transport and inland distribution. Despite recent years' crisis in the maritime trade sector, United Nations (2018) predict 4% of growth for global maritime trade in 2018, which represents 10,700 million of tons in 2017 and 3.8% between 2018 and 2023 compound annual growth (United Nations, 2018). As a result, ports and their performance are of major interest in the progress of countries and every bodies' lives. New information technology-driven trends are on their way to transform port processes and the interplay of maritime stakeholders to lift them to the next level of efficiency always keeping an eye on the importance of the physical infrastructure that makes logistics happen.

# NOTAS ACADÉMICAS

## References

- Ballou, R. (2004). *Logística, Administración de la Cadena de Suministro*, (5ta. ed.). México: Pearson Educación.
- Cheung, S. M. S. and Yip, T. L. (2011). Port City Factors and Port Production: Analysis of Chinese Ports. *Transportation Journal*, 50(2): 162-175. Doi: 10.5325/transportationj.50.2.0162
- Chopra, S. and Meindl, P. (2013). *Administración de la Cadena de Suministro, Estrategia Planeación y Operación*. (5ta. ed.). México: Pearson Educación.
- Coyle, J., Langley, J., Novack, R. and Gibson, B. (2013). *Administración de la Cadena de Suministro, Una Perspectiva Logística*. (9na. ed.). México: Cengage Learning Editores.
- Ducruet, C. and Lee, S. (2006). Frontline soldiers of globalization: Port-city evolution and regional competition. *Geo Journal*, 67(2): 107-122. Doi: 10.1007/s10708-006-9037-9
- De Langen, P., Turró, M., Fontanet, M., Caballé, J. (2018). The Infrastructure Investment Needs and Financing Challenge of European Ports, Report prepared for the European Seaports Organisation (ESPO). Retrieved from: <https://www.espo.be/publications/the-infrastructure-investment-needs-and-financing->. Last call: 14.02.2019
- Fruth, M., Teuteberg, F. (2017). Digitization in maritime logistics — What is there and what is missing? *Cogent Business & Management*, 4: 1-40, Doi: 10.1080/23311975.2017.1411066
- Gestión (January 23th, 2019). Primera fase del puerto de Chancay de Cosco Shipping y Volcan demandará US\$ 1,300 millones. Retrieved from: <https://gestion.pe/economia/empresas/primera-fase-puerto-chancay-cosco-shipping-volcan-demandara-us-1-300-millones-256546>. Last call: 14.02.2019
- International Maritime Organization (IMO). Introduction to IMO. Retrieved from: <http://www.imo.org/en/About/Pages/Default.aspx>. Last call: 13.02.2019
- Nota, G., Bisogno, M., Saccomanno, A. (2018). A Service-Oriented Approach to

# NOTAS ACADÉMICAS

Modeling and Performance Analysis of Port Community Systems. *International Journal of Engineering Business Management*, 10: 1-17, Doi: 10.1177/1847979018767766

Pahl, J. and Voss, S. (2017). Maritime Load Dependent Lead Times – An Analysis. Conference paper. *International Conference on Computational Logistics*. Doi: 10.1007/978-3-319-68496-3\_20

Rodríguez-Álvarez, A., Tovar, B. and Wall, A. (2011). The Effect of Demand Uncertainty on Port Terminal Costs. *Journal of Transport Economics and Policy*, 45(2): 303-328. Retrieved from: <https://www.jstor.org/stable/23072179>

Sanchez, R. J., Ng, A. K. Y. and Garcia-Alonso, L. (2011). Port Selection Factors and Attractiveness: The Service Providers' Perspective. *Transportation Journal*, 50(2): 141-161. Doi: 10.5325/transportationj.50.2.0141

Southern, R. N. (2011). Historical Perspective of the Logistics and Supply Chain Management Discipline. *Transportation Journal*, 50(1): 53-64. Doi: 10.5325/transportationj.50.1.0053

Tongzon, J., Heng, W. (2005). Port Privatization, Efficiency, and Competitiveness: Some Empirical Evidence from Container Ports (Terminals). *Transportation Research Part A*. 39: 405-424. Doi: 10.1016/j.tra.2005.02.001

Trujillo, L., Nombela, G. (2002). Privatization and Regulation of the Seaport Industry. Universidad Las Palmas, Gran Canaria, Spain. Retrieved from: [https://www.researchgate.net/publication/23722216\\_Privatization\\_and\\_Regulation\\_of\\_the\\_Seaport\\_Industry](https://www.researchgate.net/publication/23722216_Privatization_and_Regulation_of_the_Seaport_Industry). Last call: 14.02.2019

United Nations (2018). Review of Maritime Transport 2018. Retrieved from: [https://unctad.org/en/PublicationsLibrary/rmt2018\\_en.pdf](https://unctad.org/en/PublicationsLibrary/rmt2018_en.pdf). Last call: 13.02.2019

United Nations. Review of Maritime Transport 2018, CNUCYD. Retrieved from: <https://www.mundomaritimo.cl/noticias/comercio-maritimo-global-crecera-4-en-2018>. Last call: 14.02.2019

Wilsmeier, G., Hoffmann, J., Sanchez, R.J. (2006). The Impact of Port Characteristics on International Maritime Transport Costs. *Port Economics Research in Transportation Economics*, 16: 117-140. Retrieved from:

# NOTAS ACADÉMICAS

<https://www.sciencedirect.com/science/article/abs/pii/S0739885906160060>.  
Last call: 13.02.2019

Wilsmeier, G., Monios, J. (2016). Container Ports in Latin America - Challenges in a Changing Global Economy. In: Dynamic Shipping and Port Development in the Globalized Economy. Ed: P. T-W. Lee, K. Cullinane. Palgrave Macmillan: Basingstoke. pp.11-52.

World Bank (2018). Connecting to Compete 2018: Logistics Performance Index (LPI). Retrieved from: <https://lpi.worldbank.org/>. Last call: 14.02.2019

World Bank News (2018). Strong trade growth in 2018 rests on policy choices. Retrieved from: [https://www.wto.org/english/news\\_e/pres18\\_e/pr820\\_e.htm](https://www.wto.org/english/news_e/pres18_e/pr820_e.htm). Last call: 09.02.2019

World Maritime News (2019). Digitization. Retrieved from: <https://worldmaritimeneeds.com/archives/tag/digitalization/>. Last call: 13.02.2019

World Trade Organization – WTO (2018). Annual Report 2018. Retrieved from: [https://www.wto.org/english/res\\_e/publications\\_e/anrep18\\_e.htm](https://www.wto.org/english/res_e/publications_e/anrep18_e.htm). Last call: 14.02.2019

Zhang, A. and Lam, J. S. L. (2014). Impacts of Schedule Reliability and Sailing Frequency on the Liner Shipping and Port Industry: A Study of Daily Maersk. *Transportation Journal*, 53(2): 235-253. Doi: 10.5325/transportationj.53.2.0235