

Container ports in Latin America - challenges in a changing global economy

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Introduction

"The only way to change one's relative location on the network is to change the geographic area covered by the network."(Black 2001, p1). Consequently, analysing how ports work and interact with their environment and identifying the determinants of its performance are key to understanding the challenges currently faced by the port system in a globalized economy.

Economic development has traditionally come with a transformation of material mobility. Mobility constitutes an ontological absolute in today's society, which "exploded" in the wake of containerisation in the second half of the twentieth century. The globalisation of trade grew exponentially, facilitated by the container that revolutionized the global maritime logistics system. Economic development in emerging economies changed the geography and structure of international trade and has shifted the relations of industrial production and regional integration.

The very *raison d'être* of ports is to provide and facilitate intermodal interlinkages in terms of transport and trade. Thus fundamental questions surrounding ports concern relative accessibility, transport system characteristics (Taffee and Gauthier, 1973), operational efficiency and institutional environments. A port is thus a dynamic phenomenon, changing its morphology, functions and organisation, and its role within the port system over time. As the container has been a key element in globalisation, container ports as interfaces between the shipping (maritime) and economic systems (Cullinane and Wilmsmeier, 2011) have been fully exposed to the growth of container trade over the last decades.

Latin America and the Caribbean (LAC) can still be considered an emerging region on the global container trade map. From a global perspective the 7.2 per cent share (2013) of world container trade seems like a relatively small portion, however from a regional viewpoint the three-fold growth of container traffic since the turn of the millennium has posed significant challenges to the ports and governments in the region in terms of infrastructure development, institutional frameworks and

policy strategies and has significantly transformed the port sector (ECLAC, 2012; Perrotti and Sánchez, 2011, Rozas and Sánchez 2004, OECD 2011).

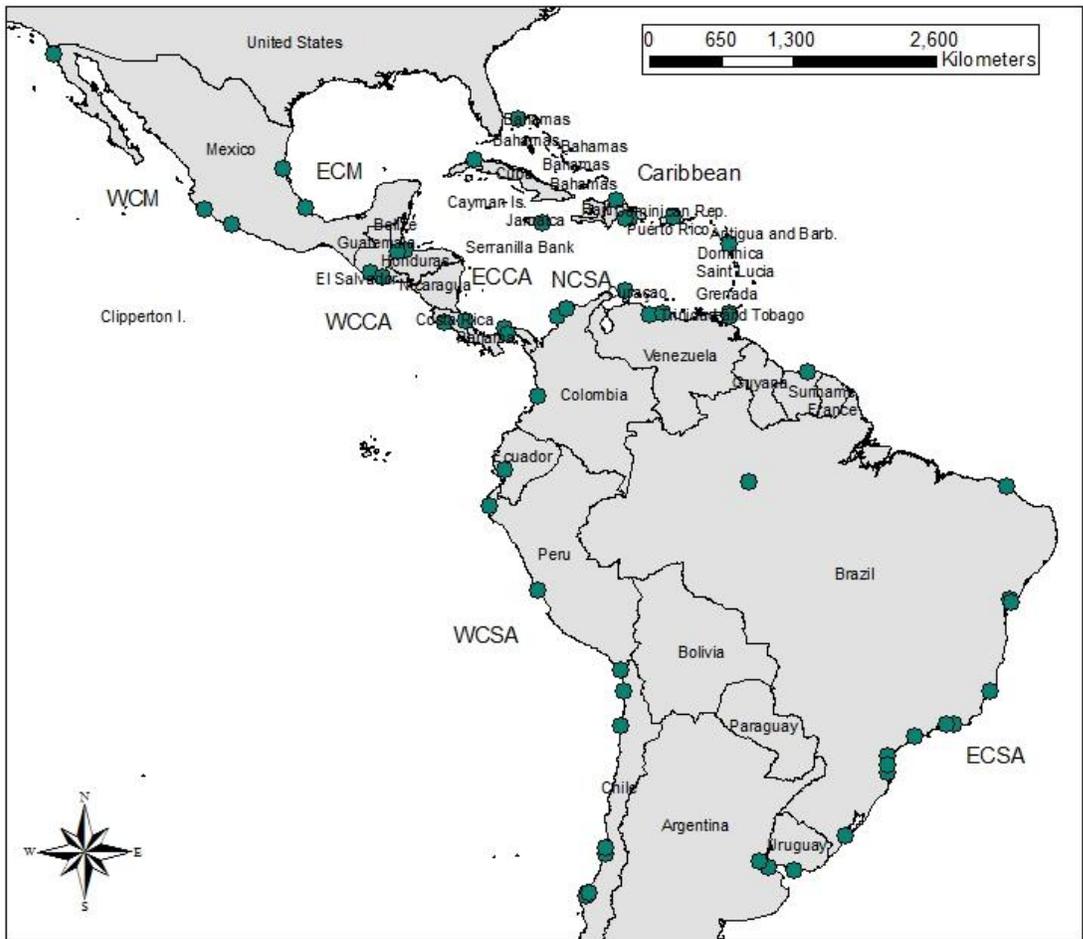
Ports have evolved from being traditional interfaces between land and sea to providers of complete logistics networks. Accordingly, the roles of the traditional actors in a port have changed and new actors have emerged. Port authorities have become intermediaries and facilitators of development driven by trade development, global shipping lines and international terminal operators. Ports are being increasingly differentiated not only by their ability to handle the latest generation of container ships, but also by their institutional efficiency and effectiveness to respond to market developments. Recently, however, discussions on port infrastructure capacity limitations in LAC (Perrotti and Sánchez, 2011) and the need for new a approach to port governance have resurfaced (Monios and Wilmsmeier, 2015). From momentum of current economic changes and maritime and port industry sector trends the need emerges to reflect on the current state of the port system, to evaluate emerging challenges and to question current institutional frameworks and governance strategies in the region.

This chapter reviews the changes over the last 15 years and analyses the current challenges of container ports in the region from three perspectives: a) the changes implied by the changing geography of trade, b) the arising challenges from a port life-cycle perspective regarding infrastructure and technical efficiency and c) the restrictions of the current institutional framework.

The LAC container port system

The Latin American and Caribbean (LAC) port system can be categorised first by territory and second by coastline: Central America¹ (split by east and west coast), South America (split by east, west and north coast), and the Caribbean. Container throughput in the LAC port system grew from 14.6 million TEU (twenty-foot equivalent units) in 2000 to 44.9 million TEU in 2013 (ECLAC, 2014). Throughput in 2013 was equivalent to 7.2 per cent of all global port movements. The map shows all LAC ports handling more than 100,000 TEU in 2013.

¹ West Coast Central America (WCCA); East Coast Central America (ECCA), North Coast South America (NCSA); East Coast South America (ECSA); West Coast South America (WCSA).



Map 1 - LAC ports with throughput over 100,000 TEU in 2012
 Source: Authors

The map depicts what at first appears to be a relatively even spread across the coastlines of each country. However, container throughput within each country or coastal range is not spread evenly across all ports (see Wilmsmeier et al., 2014 for full analysis).

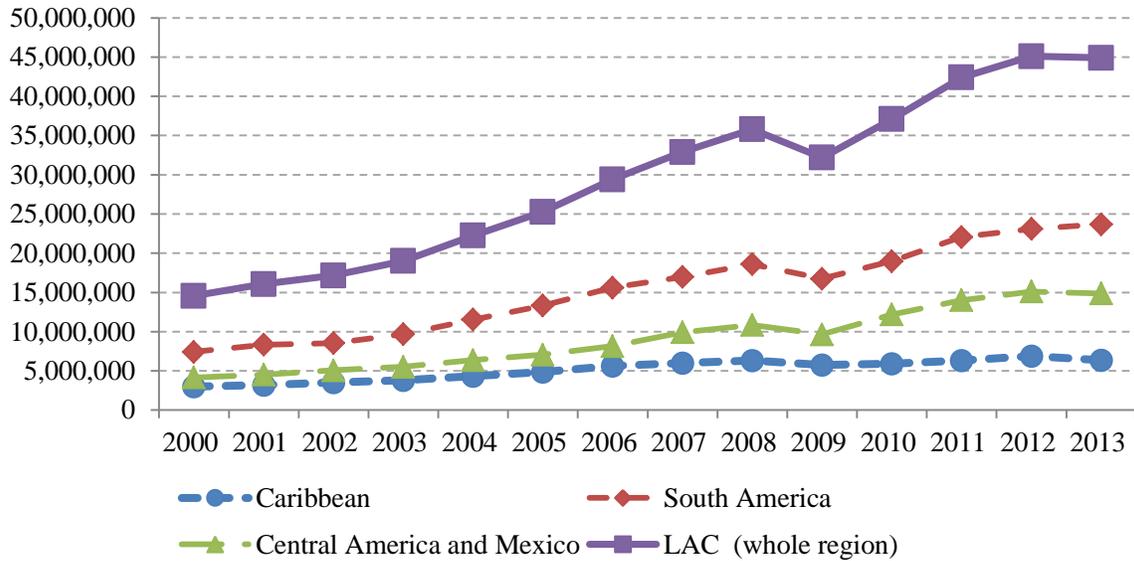


Figure 1 - Port throughput 2000-2013 (TEUs)
 Source: authors based on ECLAC, 2014, www.cepal.org

Figure 1 reveals the evolution of container throughput in the region and sub-regions. While all regions grew steadily until 2008; the region experienced a negative growth in 2009 due to the global financial crisis and since 2010 the speed of container activity expansion has slowed down leading up to a reduction of throughput in 2013 (see Figure 2). The diminishing growth rates over the last years stand in clear contrast to the period prior to the financial crisis and mark the beginning of new challenges.

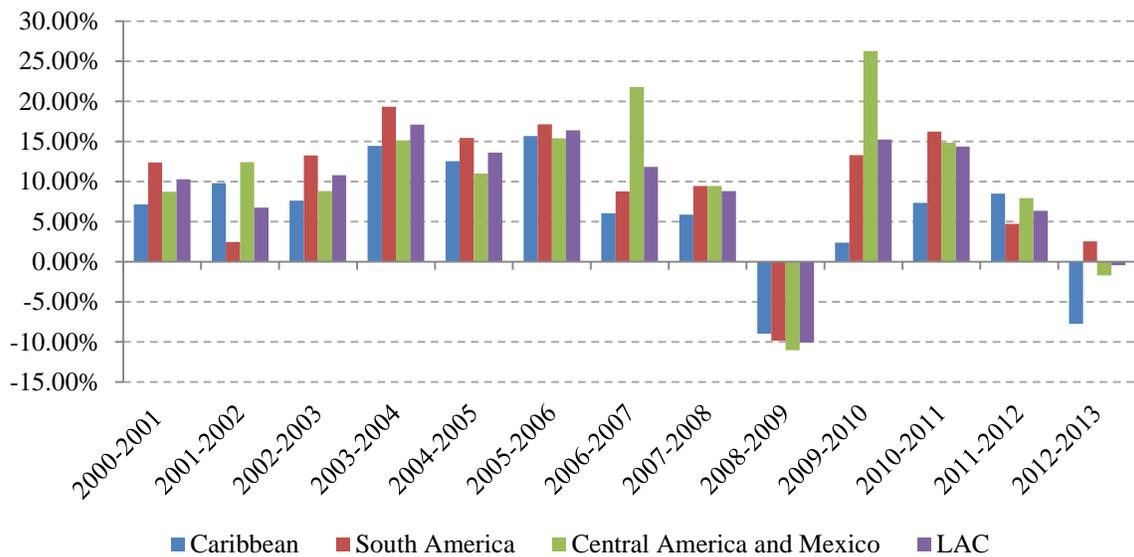


Figure 2 - year-on-year growth rates 2000-2013 (per cent)
 Source: authors based on ECLAC, 2014, www.cepal.org

Furthermore the shares of container activity have shifted. The Caribbean has lost a significant share of activity in the region, while Mexico and Central America (esp. Panama) have expanded their

market shares. Central America (mostly Panama) has recorded the most impressive growth figures over the last 14 years. Port activity growth in Panama is particularly related to transshipment traffic, which reflects the changes in liner service strategies that build on hub-and-spoke structures as indicated by Wilmsmeier and Notteboom (2011), thus leading to a concentration in the port system towards transshipment hubs, a development that is driven by liner shipping strategies rather than economic development. The Caribbean continues to be a key market for transshipment; however, it has been losing market participation to the coastal regions (NCSA and Panama) over recent years, indicating a shift from the traditional transshipment hubs (e.g. Kingston, Jamaica and Freeport, Bahamas) towards Panama and Cartagena, Colombia.

Wilmsmeier et al. (2014) also observe a shift in Central America and Mexico from the Caribbean coast towards the Pacific coast. In 2013 50 per cent of container throughput in Central America and Mexico was handled in Pacific coast ports. By way of comparison, the ports on this coast did not even reach a 20 per cent share in 2000. In contrast, the three coasts of South America have remained in balance, maintaining throughput in the time period at a proportion of 50:35:15 between east, west and north coasts, respectively. The shift of activity in Central America and Mexico is a result of the increased trade with Asia, but also the expansion of transshipment activity, especially in Balboa, Panama and Lazaro Cardenas, Mexico.

Analysing port activity by country reveals that in 2013 one-fifth of all containers in LAC were moved in Brazil (19.3 per cent), followed by Panama (14.6 per cent), Mexico (10.9 per cent), Chile (8.5 per cent) and Colombia (7.0 per cent). However, the port throughput at regional and country level is only a very crude reference of the current state of the port system. In order to understand the evolution of a port system, it is necessary to take a spatio-temporal perspective, investigating disaggregated figures at country and sub-regional level over an extended time period.

On the ECSA, Brazil's share of container throughput expanded from 60 per cent to 74 per cent between 2000 and 2013, Argentina share dropped from 51 percent in 2000 to 17 percent in 2013, in a market that reached total volume of 11.7 million TEU in 2013.

This shift originates primarily from the expansion of Brazil's economy, its further insertion into the global economy and its population size. By way of example, currently Brazil is one of the world's largest exporters of chicken and beef, a trade that has only recently developed as a response to the growing demand in the emerging Asian economies. Uruguay, the smallest economy on the ECSA, was able to grow its market share to almost 8 per cent. This achievement is driven not solely by the economic development of the country, but also by its strategy to act as transshipment hub and gateway for Paraguayan as well as southern Argentinean cargoes (see also Wilmsmeier, Martínez-Zarzoso and Fiess, 2010).

Wilmsmeier et al. (2014) observe a spatio-temporal diversification process, which is particularly driven by the emergence and expansion of secondary ports. Brazil, Chile, Mexico and Panama are good examples of these processes. In Brazil, Santos' traditional dominance has been eroded by emerging ports. Furthermore Rio de Janeiro, which has traditionally been the second biggest container port in Brazil in 2000 lost 50 per cent of its market participation over the last 14 years. A number of secondary ports and greenfield projects have emerged that not only led to a geographic spread of container activity but also initiated a spatial deconcentration process. Rio Grande held an

important market participation of 10 per cent in 1997 and was expected to evolve as a competitor to Montevideo and Buenos Aires (Sánchez and Wilmsmeier, 2006) in the south of Brazil as its infrastructural conditions and draft of 15m favoured the handling of post-panamax vessels. The port expanded and increased its market share to over 13 per cent in 2003, benefitting from the repercussions of the economic crisis in the port of Buenos Aires (see Sanchez and Wilmsmeier, 2008). However, since then its share in Brazilian container throughput has decreased to almost 8 per cent in 2013. Despite its continued growth the port could not keep up with the speed of expansion of overall national container activity. Looking at other ports, the port of Itajai (including the new Navegantes terminal) doubled its market share to 13 per cent in 2013, Manaus also doubled its share to 6 per cent, while Suape more than tripled its participation to over 5 per cent in 2013.

Balboa, located on the Pacific coast of Panama, has taken half the country's throughput from the previously dominant port of Colón, on the Caribbean coast. Mexico's port activity in 2013 was less concentrated than in 2000, due to the shift of activity to the Pacific coast, with Veracruz losing share to Manzanillo and the emerging Lazaro Cárdenas. In the Chilean market, the emergence of secondary ports is particularly notable, which has led to a greater geographical spread of port activity towards the south of the country (Wilmsmeier et al., 2014) based on the appearance of San Vicente (SVTI) as a new player in 2005 and the growth of the co-located Lirquen. These developments effectively reduced the market share of the two traditional main ports, Valparaiso and San Antonio, by more than six per cent market share between 2005 and 2013. However, the pure numerical analysis by port does not reveal the systemic relationships in the port system created by the privatisation efforts over the last two decades and the internationalisation of container port operations. In the case of Chile this is particularly interesting as San Antonio and San Vicente share the same operator. Thus, while the port of San Antonio was not able to increase its market share of the port system (but it did grow in absolute terms), the private operator's relevance and share in port activity grew strongly when one considers the ports of San Antonio, San Vicente and the other Chilean ports operated by the same company.

Colombia's port system contrasts this development as the port of Cartagena concentrates the greatest share of port throughput in the country. This results from the changed function of the port from a traditional gateway port for national cargo to a hybrid port with a significant share of transshipment. In a regional context, these developments reveal the different stages of maturity of the port system in the LAC countries, where the spatial deconcentration of activity is also an expression of geographical shifts in the economic activities of the countries and in the case of transshipment and hybrid ports might reflect changes in the strategies of shipping lines and terminal operators. Wilmsmeier et al. (2014) identified three categories of ports in LAC: pure transshipment hubs (minimum of 70 per cent transshipment cargo), hybrid ports (between 30 and 70 per cent transshipment cargo), gateway ports (less than 30 per cent transshipment cargo) and local and inter-islands transshipment ports.

Analysis reveals that the share of transshipment cargo in the Caribbean basin (ECCA, ECM, Caribbean and NCSA) decreased slightly from 48 per cent (1997) to 40 per cent of total traffic in 2013. However, the incidence of transshipment traffic in the region is significantly above the 2011 global average of 31 per cent (Drewry, 2013). Colón, Panama recorded the most significant growth in absolute terms, it has retained its approximately 50 per cent market share. Freeport has taken

some market share from Kingston, but importantly, Colón has been able to maintain its upward trend of container throughput while both of the other transshipment ports have dipped in the last few years. The share taken by local ports has declined, while gateway traffic has remained stable. What is most interesting about the data is that hybrid ports have significantly increased their market participation from 12 per cent to 23 per cent. Cartagena, Colombia was the most successful hybrid port by increasing its market share from 5.5 to 11.6 per cent in the same period, while other hybrid ports Port of Spain and Point Lisas were not able to increase their market share, despite overall traffic growth. Cartagena's transshipment share in total container movements increased significantly since 2005 when Hamburg Sud decided to make the port its strategic transshipment hub for Latin America and the Caribbean connecting to seven of the carrier's services between North and South America, the Caribbean, the Mediterranean and North Europe. Hamburg Sud's transshipment volume through Cartagena has increased fivefold between 2006 and 2012

Other points of interest are the emergence of new ports such as Caucedo, Dominican Republic, opening in 2005 and reaching almost 1 million TEU by 2011. The port appeared based on a greenfield development and is operated by the global terminal operator DP World with the aim to become a new transshipment port in the region. Since then the port has evolved to a hybrid port by capturing significant amounts of the increase in local destination cargo and at the same time pursuing the goal of attracting more transshipment cargo, which reached a share of above 50 per cent of all container movements in 2011. The success of hybrid ports suggest the growth of secondary ports as second-tier regional hubs, similar to the findings in the Chinese port system by Wang and Ng (2011). Such ports have managed to insert themselves in between global and local flows, providing transshipment to intermediate services as well as serving local and regional gateway traffic.

Gateway traffic is more complex, as due to the difficult geography of the regions, many gateway ports are not competing for an overlapping hinterland. Therefore, traffic counts are related more directly to the increase of global trade rather than the changes in the port system. Most gateway ports experienced a similarly steady increase in total throughput across the time period.

Ducruet et al. (2009; p.359) argued that "concentration stems from the path-dependency of large agglomerations", while drivers of deconcentration include "new port development, carrier selection, global operation strategies, governmental policies, congestion, and lack of space at main load centres." According to Ogundana et al., (1972), Barke (1986) and Hayuth (1981), port system concentration will eventually reach its limits and invert, leading to a process of deconcentration, a phenomenon discussed by Slack and Wang (2002), Notteboom (2005), Frémont and Soppé (2007). Wilmsmeier and Monios (2013) argued that existing theory falls short of differentiating between deconcentration that emerges upon failure of a system in a reactive manner, deconcentration that materializes from proactive port development strategies, and deconcentration that emerges from new economic and industrial development. Thus, the drivers of deconcentration processes can be related to the port system, the transport system (i.e. hinterland infrastructure and carrier strategy) and as well as the economic system (e.g. logistics strategies, economic development).

The rise of secondary ports has already been identified in recent research (e.g. Wang and Ng, 2011, in China; Wilmsmeier and Monios, 2013, in the UK; Wilmsmeier et al., 2014, in LAC). However, unlike previously dominant ports, the emergence and location of such ports has not been explained

satisfactorily by natural location advantages, suggesting that such developments are driven to a large degree by other factors, such as the planning and regulatory regimes in each country. It is recognized that to some extent these factors will be unique to each port system; nevertheless, some of these key influences, such as port devolution policy, the introduction of the private sector to port operations, the ongoing relation between the private operators and the changing regulatory system (Wilmsmeier et al., 2014), and the conclusion of a ports life-cycle (Cullinane and Wilmsmeier, 2011) have been hypothesised to be key factors in any such critique.

The previous descriptive analysis gives an overview of the state of the LAC container port system, but in order to understand the drivers of these development a more detailed look at the complexity and critical factors of port system evolution is necessary. *"One major difficulty lies in the fact that the integration of phenomena which we must study in areas is an integration of a large number of independent, or semi-independent factors. Consequently, we seldom have to do with simple relationships (...). Theoretically we might follow the logic of the systematic sciences by assuming that all other conditions remain the same (...) Even if we knew the theoretical principles governing the relation of each individual factor to the total result (...) the sum total of all relationships would be far too complicated for us to be able to use. This is a general difficulty that applies not only to all the more complicate aspects of the social sciences, but also to many phenomena in the natural science."* (Hartshorne, R. 1939, pp. 203) in (The nature of geography. A critical survey on current thoughts in the light of the past. Annals of the AAG, 29).

Wilmsmeier et al. (2014) identify critical moments in port development in the region (see figure 3). These critical moments do not appear either in sequence or simultaneously but rather in a diversified spatio-temporal manner, suggesting the influence of local and regional institutional and global industry specificities. Their framework contextualises, systematises and identifies the spatio-temporal instances of such key influences on port development.

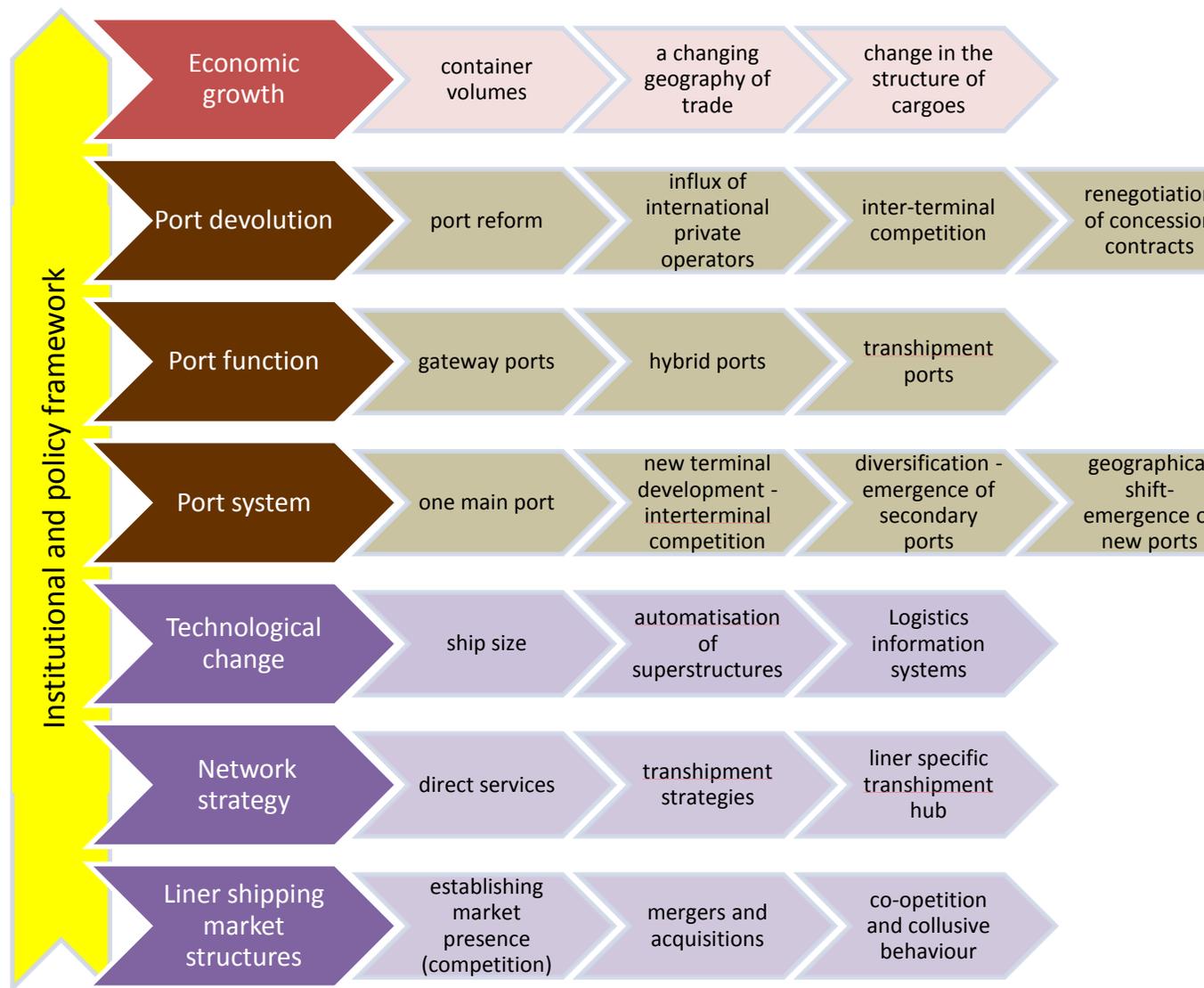


Figure 1.2 Critical moments in LAC port development
Source: Authors

Critical moments exert a determinative impact on whether it is productive or unproductive mobility. The moments when investment comes online or the industry changes, must be capitalised on by key stakeholders. Global replication of identical strategies will not work unless the correct mix of critical moments are arrayed in a suitable spatio-temporal pattern. When analysing the evolution of a port system and its sub-systems, it is important to be aware not only of path dependence exerted by previously-dominant ports but the contingency of port development upon port devolution, competition and public policy and strategies. The work contained herein underscores the temporal aspect of path dependence supporting the view of Jacobs and Notteboom (2011) that the “window of opportunity” has to be open long enough to achieve the institutional transformation at the critical juncture, otherwise the window closes again.

A number of questions requiring disaggregated research emerge from the descriptive analysis. What implications does current development have for the policies of individual countries within the

region? What is the role of shipping lines in driving the emergence of new and secondary ports as well as the expansion of existing port? How far does economic development contribute not just to throughput growth but also to a geographical diversification of the growth of container ports? Are other economic or institutional variables playing a role in the emergence of these ports? What has been the effect port devolution and international terminal operators?

The following section will discuss specific critical factors of port development in more detail and try to show the interconnections and interdependencies between these factors.

A changing geography of trade

The continued expansion of the demand for material mobility, thus container trade and related logistics comes at a cost, particularly in rapidly developing economies. It raises demand for infrastructure, initiates land use debates, drives increased energy consumption and emissions and it exploits natural resources.

The traditional geography of production and consumption is changing. By 2025 the portion of the world population belonging to the consuming class will be - for the first time in history - greater than the group living in conditions below consuming class, and the global consuming class will have grown by 75 per cent between 2010 and 2025. Additionally, most of the population belonging to the consuming class in 2025 will be living in the countries today considered as emerging markets.

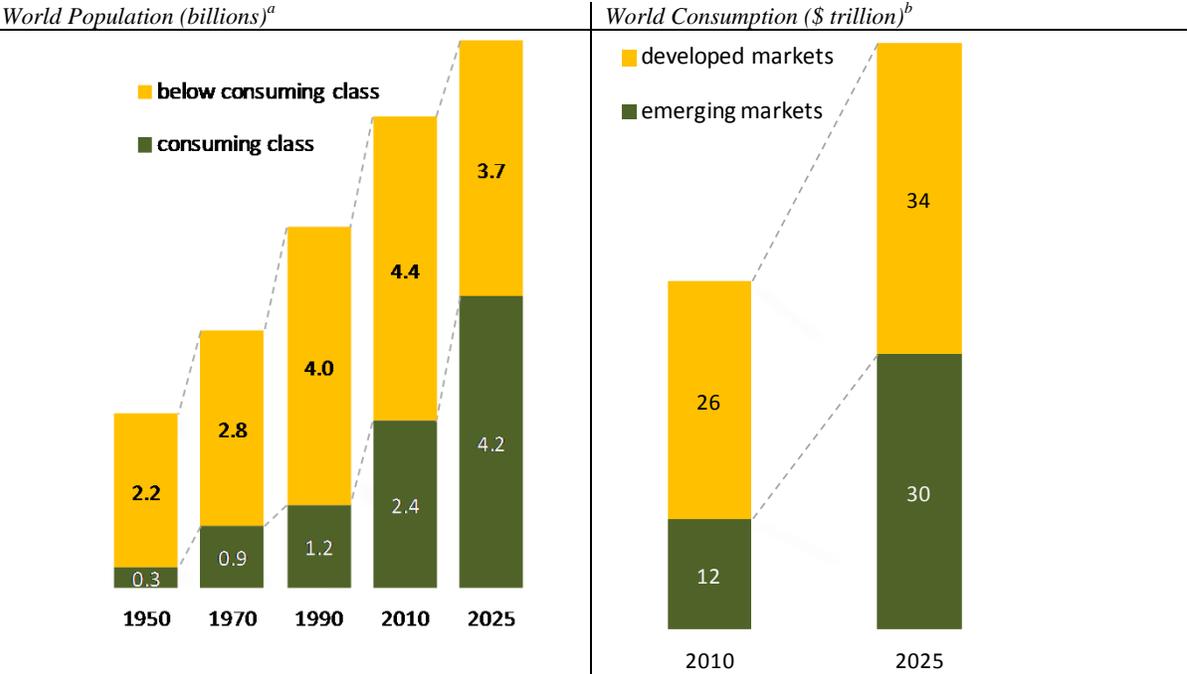


Figure 3: Evolution of world population and consumption until 2025
 Source: Authors, based on A. Maddison, 2012
 Notes: a) consuming class: daily disposable income is equal or greater \$10, below consuming class, less \$10; incomes adjusted for purchasing-power parity. 2025 projected data.
 Notes: b) estimate based on 2010 private-consumption share of GDP/country and GDP estimates for 2010 and 2025, assumes private consumption will remain constant. 2025 projected data

The economies in Latin America and the Caribbean have been part of the expansion of economic development and trade. Since 2000, the region has experienced a continued growth in GDP per capita. This development has been significantly driven by trade liberalization has increased the high demand for natural resources from the Asian economies (especially China and India) and the overall growth of the global economy in terms of exports. At the same time the increase in purchasing power from growing GDP has had a positive influence on imports in terms of volumes and value.

Figure 4 illustrates the increase in the volume of international maritime trade between 2000 and 2012, which grew more than four-fold in this time span and underlines the growth in container trade as described in the previous section.

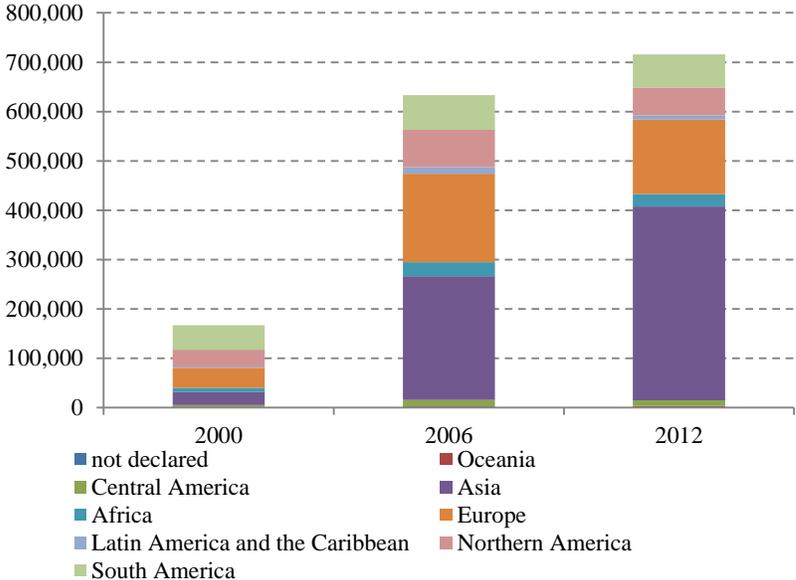


Figure 4: Evolution of volume (metric tons) of South American international maritime trade, 2000-2012
 Source: Authors based on International Transport Database, ECLAC, various years

Beyond expansion in the volume of trade the changes in the geography of this trade over the last 14 years is of high relevance as it reflects the emerging importance of new trade lanes and trade relations. Figure 5 depicts the expanding relevance of South American trade with Asia, which in terms of volume made up more than half international maritime trade in 2012 and was accompanied by a doubling in the share in terms of value to above 36 per cent. At the same time, the relevance of the traditional markets of the region (Europe and North America) have lost significant in importance. Further intraregional trade has suffered a significant loss in relevance to the region as it has not increased in terms of volume or value in the period between 2000 and 2012. In terms of value, 87 percent of the import cargo and 54 of the export cargo is containerized.

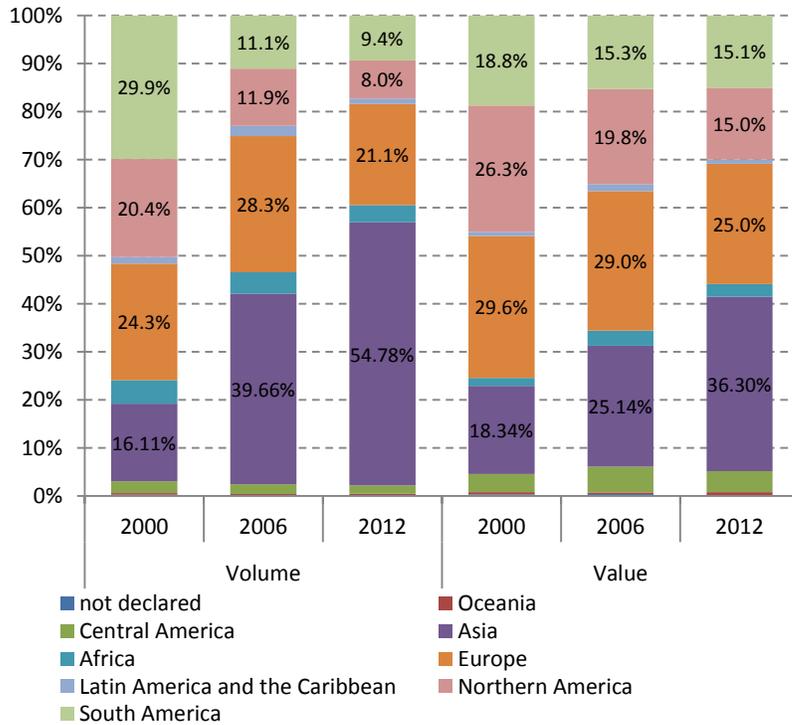


Figure 5: Share in South American international trade by region in terms of of volume (metric tons) and value (current USD), 2000-2012

Source: Authors based on International Transport Database, ECLAC, various years

How do these developments influence the LAC port system? The shift in trade relations has led to an increased demand for liner services between LAC and Asia. The LAC Asia routes in contrast to some of the traditional main routes (WCSA-Europe, WCSA-East Coast US) do not have size restrictions as they do not pass the Panama Canal. In consequence the increases in ship size on the Asia routes have been faster and thus have been the driver for infra- and superstructure demand in the ports of the region. Wilmsmeier (2013) demonstrates this for the case of South America. He is also able to identify the cascading effect that emerges as a repercussion of the economic crisis and the oversupply of vessel capacity at the global level (cf. Yeo, 2014).

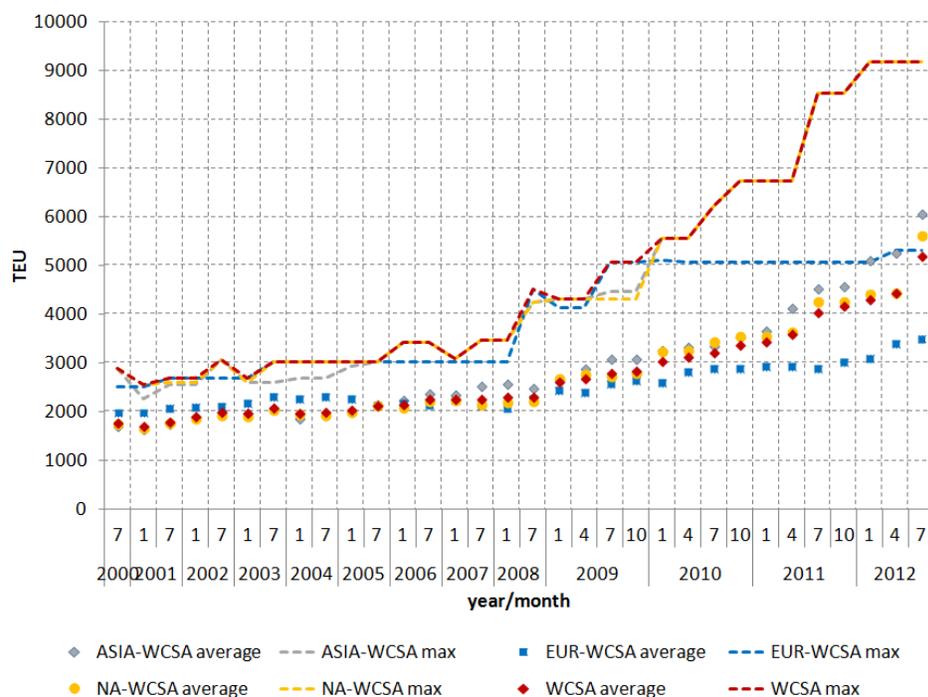


Figure 6 - Evolution of vessel capacity on West Coast South America main trade routes, 2000-12

Note: The main trade routes are transpacific, transatlantic and Europe-Asia.

Source: Wilmsmeier, 2013, based on ComPairData, Lloyds List and Marine Traffic, various years.

Wilmsmeier (2013) shows in detail how the changing characteristics of vessels deployed in the region impact the port system in various dimensions of infra and superstructure development. Beyond vessel draught, increased length and breadth of vessels determines the minimum required infra- and superstructures in ports. The latter characteristic, by way of example, is a key indicator for superstructure requirements in ports, especially the reach of ship-to-shore cranes. Additionally, the breadth of vessels serving the subregion increased from 32.5m (2000) to over 45m (2012).

In consequence, the changing volume and geography of trade creates a multiplicity of pressures to adjust port infrastructure, as well as emerging pressure for new and planned port development. A recent study expects 13 000-TEU ships to start calling regularly on the coasts of South America between 2016 and 2020 (Sánchez and Perrotti, 2012). This would have direct implications for the liner shipping networks and port infrastructure in the region. If some secondary ports have insufficient handling capacity to accommodate bigger ships, this would support the growth of regional second-tier hubs, which would be able to serve the smaller ports either by smaller feeders or even land transport (thus raising issues relating to the quality and capacity of hinterland infrastructure links).

The introduction of ever-larger vessels on mainline routes may be attractive for shipping lines but will strain ports severely. Ports invest large sums in upgrading their facilities and competing to receive vessel calls, but handling demand spikes is difficult. Large container drops can result in inefficient crane utilisation as the numerous large cranes required to service large ships are not all required between calls; furthermore, large numbers of containers cannot always be moved in and out of ports smoothly. Moreover, shipping lines already have trouble meeting their own schedules; current average reliability across the industry is below 70 per cent. The larger the vessel and the

greater the volume of transferred containers at each call, the larger the knock-on effect of poor reliability on the rest of the container system.

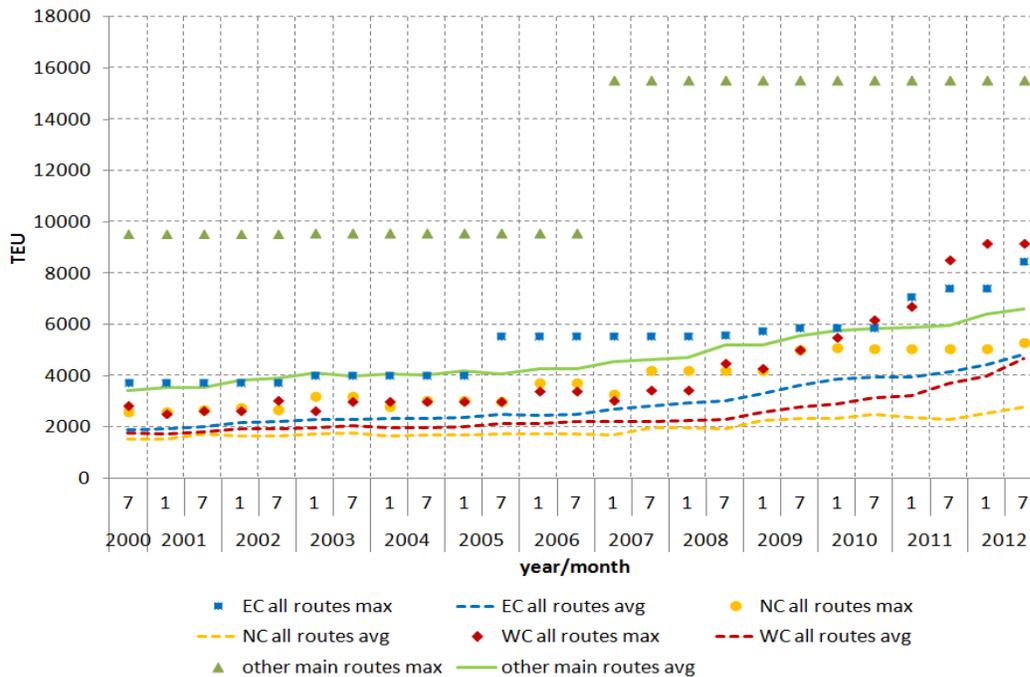


Figure 7 - Evolution of vessel capacity on South American and other main trade routes, 2000-12
 Note: EC = east coast; WC = west coast; NC = north coast; the main trade routes are transpacific, transatlantic and Europe-Asia.
 Source: Based on ComPairData, Lloyds List and Marine Traffic, various years.

A further dimension of technological change in ports is driven by the rapid expansion of reefer cargo (Vagle, 2012). The global demand for perishable products, especially fruit, has grown substantially, increasing the need for refrigerated seaborne transport capacity. The associated trade flows mainly originate in the southern hemisphere and are directed towards the industrialised countries in the northern hemisphere. Total seaborne reefer trade was around 95 million tonnes in 2013 (seaborne) and is expected to reach 112.0 million tonnes by 2016 (Drewry, 2014). The seaborne reefer trade in 2013 was equivalent to 3.1 million 40'full High Cube reefer containers or 2.5 percent of the worldwide seaborne trade of dry cargoes of all kinds.

In general containerized reefer trade has been one of the fastest growing market segments in the liner shipping industry to and from LAC (BTI, 2014). Reefer cargo requires constant refrigeration to maintain the quality of the product and thus consumes a significant amount of energy while moving in the supply chain. Hence, reefer trade poses an additional pressure on efficient energy consumption besides the energy required for regular port activities and operations.

The deployed weekly capacity of TEU and reefer plugs on the SA main routes more than tripled between 2000 and 2012. This shift is also reflected in the number of reefer slots per ship deployed in the region – up to 1,500 per vessel. WCSA and ECSA are the regions in the world where ships with the highest number of reefer plugs are being deployed.

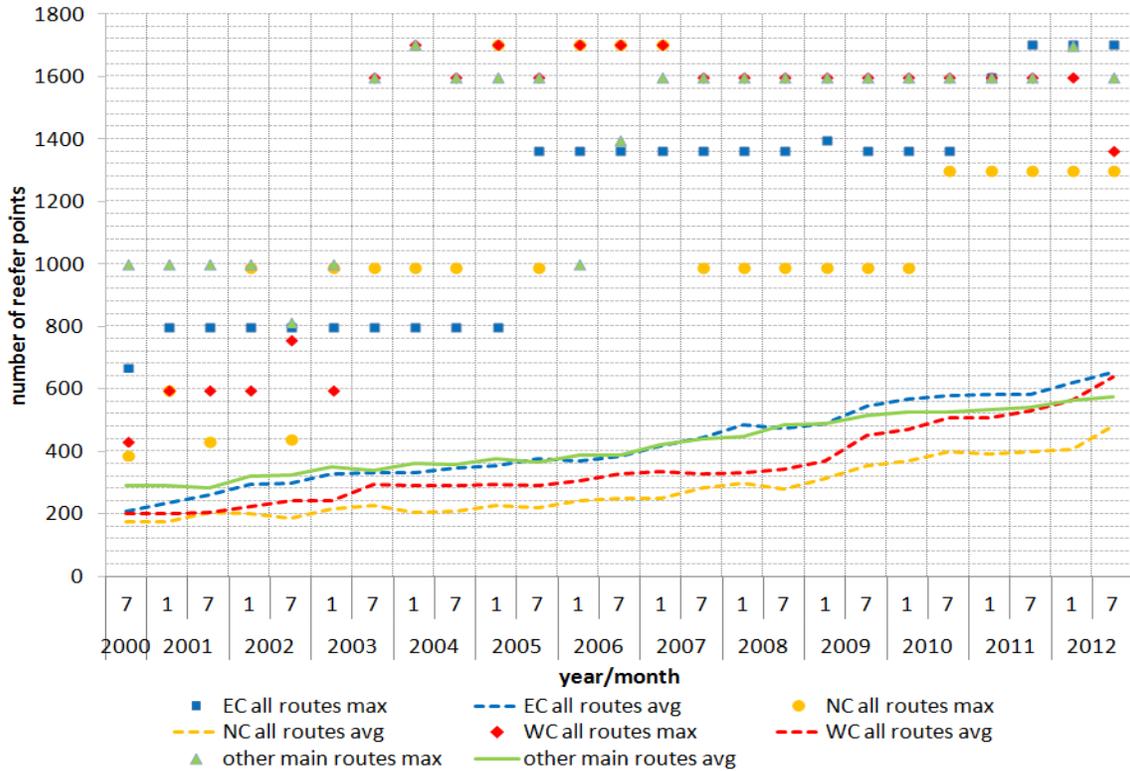


Figure 8 – Reefer capacity of vessels deployed on WCSA main routes, 2000-12

Note: The main trade routes are transpacific, transatlantic and Europe-Asia.

Source: Based on ComPairData, Lloyds List and Marine Traffic, various years.

This structural change in trade also has significant repercussions on ports, as the handling of reefer cargo requires not only additional installations for cooling and specific services to manage the units, but also has significant impact on the energy consumption of the ports in the region.

Consequently, these changes are accompanied by a shift in industrial production and thus economic growth and development will lead to a new configuration and scale of supply chains and sustainability challenges for ports. Given the current paradigm of growth, the question is: to what extent current port location and institutional frameworks are prepared to handle the emerging changes and challenges.

Based on the recognition of the changing geography and structure of trade, new challenges are emerging to synchronize port development, maritime networks and demand, further complicated by emerging structural changes and geographical shifts in manufacturing, distribution and consumption. An emerging question is how the public and private sector response and existing strategies in terms of operation and institutional frameworks have and will be delivering results in this structurally changing and geographically shifting maritime geography of trade.

Port devolution and productivity

Beyond the changes in throughput volumes, the appearance and geographical spread of port devolution processes in the region since the beginning of the 1990s have marked critical moments

for the ports and port system (Wilmsmeier et al, 2014). Ports have undergone and some are still in the process of implementing structural reforms in many countries, involving private capital in specialised terminal operation through the landlord scheme. Main container ports are now operated by international companies, and the competition among these to win concessions and within the market has been increasing.

In Latin America and the Caribbean the intention of devolution was to "secure the benefits for commercially driven decision making organisation previously run by government" (Baltazar and Brooks, 2007, p 380) and to solve existing problems in ports such as excess of work force and regulation, inefficiency of port operations and deficits in the provision and maintenance of infra- and port superstructure investment, and security challenges (cf. Sánchez and Wilmsmeier, 2007; ECLAC 1992).

Thus, port reform beyond its initial objectives of devolution of power, improved competitiveness and technological efficiency, has facilitated the corporatization of the port system as well as horizontal and vertical integration. The question that emerges is, if the results from port reform have been sufficient to respond to demand growth, infrastructure needs and the changing expectations in the related private sectors such as the integration of port infrastructure with their hinterland.

This process facilitated the appearance of international port terminal operators in the region (see also Sánchez and Wilmsmeier, 2006). In 2006, 35 container terminals were being operated by international terminal operators in 12 countries of the region (Wilmsmeier et al., 2014). This number increased to 51 by the beginning of 2012. Along with the global terminal operators the emergence and progressive development of Latin American capital owned port operators can be witnessed (e.g., Brazilian, Chilean or Colombian companies) with technical performances similar to the aforementioned companies.

While the simple presence of private port operators is not a guarantor of success in port and terminal development, it can be argued that these operators changed the level of competition, productivity, and efficiency in the region. Until 2006 intra-port competition was restricted to the port of Buenos Aires, the Caribbean coast in Panama and the competition between Valparaiso and San Antonio in Chile as they serve a congruent hinterland (Wilmsmeier, Sánchez and Doerr, 2008). Since then the further influx of international terminal operators has brought a new level of intra-port competition to Callao, Peru (APMT and DPW), Panama's Pacific coast (PSA and HPH), Buenaventura, Colombia (TCB and ICTSI), Lazaro Cárdenas (APMT and HPH), Manzanillo, Mexico (SSA, HPH, ICTSI) and Santos, Brazil (DPW, APMT and Santos Brazil).

It is interesting to observe that each international operator shows specific specialisation strategies. In the first phase, during the influx of international operators, the interest concentrated on the countries' main ports of which many in the 1990s did not have sufficient scale to make operation viable for two competing operators (except Buenos Aires and Panama's Caribbean coast). The continued growth in demand has changed this situation and, since 2005, the increase in competition can be observed, as described above. HPH has a clear dominance in the Central American market (i.e. Mexico). APMT has been focussing on new terminal developments with a strong interest not only in transshipment cargoes but lately in gateway ports with potential to develop towards hybrid

ports (e.j. recent development in Costa Rica). DPW has a more presence only in key ports in the region in each sub-region.

Given the historic need for infrastructure development in the region (Wilmsmeier and Sánchez, 2006), most development initially took place in the main ports. However, in more recent years, secondary port started to engage in more integrated development strategies that also included the consideration of logistics development connected to the port (e.g. Manaus, Brazil; Puerto Angamos, Chile) (cf. Wilmsmeier et al., 2014)

The influx of private companies is not only a mere shift from public to private in the process of devolution, but further included a diversification of private operators. Notteboom and Rodrigue (2013) differentiate between (i) port authorities; (ii) private port terminal operating companies; and (iii) the shipping lines. Today over 80 per cent of container port throughput are controlled by private operators.



Figure 9: Private port operators in Latin America and the Caribbean, 2006
Source: Authors



Figure 10: Private port operators in Latin America and the Caribbean, 2012
 Source: Authors

In this respect LAC has been catching up in comparison to Asia or other regions, where global port operators had strong portfolios much earlier than in this region. This has converted ports from isolated localized entities to parts of global networks, global horizontal integration and parts of global corporate strategies. In consequence container terminals now are part of more ample network strategies that reach far the local embeddedness of these entities.

As the Latin American economies have become increasingly integrated with the global economy (Rozas and Sánchez,2004; ECLAC, 2012; Rodrigue, 2012), productivity and efficiency of ports in changing environments (i.e. strong changes in demand) are a key factor to strengthening economic development. In the current environment and given the continuous increases in ship size (Sánchez and Khanna, 2000), the technological evolution of container handling is and has been a prerequisite in successful port development (UNCTAD, 2012). The discrete characteristics of advances and the ports' adjustment to the continuous evolution of freight transport demand will inevitably lead to alternating situations of either infrastructural insufficiency and scarcity of supply on the one hand (i.e. excess demand), or to a surfeit of port infrastructure (i.e. surplus supply) on the other (Cullinane and Wilmsmeier, 2011). Thus, an interesting question is how this natural characteristic of a virtually constant harmonic mismatch of port infrastructure supply and demand is reflected in port productivity and port efficiency in dynamic market conditions. Consequently, it might be

expected that demand excess as well as supply surplus will negatively affect the efficiency and performance of a port (Sánchez and Wilmsmeier, 2010).

Port planners feel pressure to invest in infra- and superstructure as they know that underinvestment and a lack of capacity will lead to a loss of port traffic. However, these investments lead to significant financial burdens without guarantee of customers. The economics of liner shipping have contributed to some negative effects for ports; on the one hand, the downward pressure on market prices triggers an increase in the supply of terminal capacity, and on the other hand, an improvement in terminal productivity is accompanied by a decline in profitability. These paradoxical developments lead to a common belief that cost leadership and economies of scale provide competitive advantages.

This belief is highly questionable as the requirements for port development go beyond pure efficiency and economies of scale. The important necessity of efficacy in port development is often neglected and is a definite option for confronting the increasing power of shipping lines.

The devolution processes shifted the responsibility and management of productivity and efficiency of port infra and superstructure towards the private sector. The above mentioned port reform and increased private sector participation led to significant changes in port operation in the region during the 1990s and the first decade of this millennium. Numerous studies have discussed the success of the port reforms in the region (Hoffmann, 2001; Kent and Hochstein, 1998; Tongzon and Heng, 2005; Estache et al., 2002; Wilmsmeier and Monios, 2015). Efficiency gains from port reform in the Latin American Caribbean port system have been widely studied (Morales et al., 2013, Estache, et al., 2004; Barros, et al., 2012; Rios and Maçada, 2006; Wilmsmeier et al., 2006). While these studies identify advances and improvements in port efficiency through private sector involvement, results in the global literature on the relationship between port efficiency and private sector involvement vary and are sometimes even contradictory as recently discussed by Gong et al. (2012) and Bichou (2013).

Port reform undoubtedly led the terminals in the region to catch up in terms of quay productivity, reduced port charges, the attraction of new investment to modernize existing port infrastructure and an overall reduction in labour issues (although still with occasional disputes).

Sustained positive market development in the past decade has made efficiency and productivity gains in ports relatively “easy” to achieve as demand was continuously outgrowing supply (Wilmsmeier et al. 2013). Expansion of infrastructure and technology deployment was the preferred response in Latin America and the Caribbean (LAC) as in other regions. The influx of international and global container terminal operators were seen as a *panacea* to solve these challenges and to provide the necessary capital to rapidly expand infrastructure and deploy technology. Certainly, port infrastructure development advanced, but nevertheless by 2005 it became obvious that the gap in infrastructure development, a condition that had also triggered port devolution processes in the 1990s, was rather increasing than decreasing (Perrotti and Sánchez, 2011).

Measuring changes in productivity during a period of changing market conditions allows measuring the success or failure achieved by production units as well as getting a deeper understanding of the

drivers and sources of efficiency and productivity differentials (Cullinane, and Wang, 2005; Lovell, 1993).

From a pure infrastructure perspective container port infrastructure expanded 76 per cent between 2000 and 2013. This increase in capacity has been paired with quay productivity which has been estimated to have increased more than two-fold in the same period.

	2000	2005	2007	2009	2011	2013	2000-2013 percentage change
Throughput (Million TEU)	4.4	11.9	15.4	16.0	22.7	24.6	177
Berth length ('000m)	13.0	27.0	34.6	33.9	44.0	46.3	76
Ship-to-shore cranes (no.)	60	92	119	161	187	204	238
Berth productivity (TEU/m)	338	792	923	829	1019	1077	219

Table 1: Infrastructure expansion and berth productivity in selected LAC ports 2000-2013

Source: : Author based on ECLAC surveys and ECLAC's Maritime and Logistics Profile

In general terms container terminals in Latin America and the Caribbean have reached productivity levels comparable to other regions in the world. The figure below depicts the average moves of ship-to-shore cranes per operating hour in different regions. Main ports in Central America (esp. Mexico, Panama and the main transshipment ports in the Caribbean) reached globally comparable productivity levels by 2005. For the case of South America it becomes evident how crane productivity increased with the advancing of the implementation of new superstructures in the sub-region (cf. Wilmsmeier et al., 2013). The ports in the region have still not reached productivity levels of Asia, but the gap has been closing. The reason for this development relates that container terminals across the world which are operated by main container terminal operators are more and more operating similar equipments.

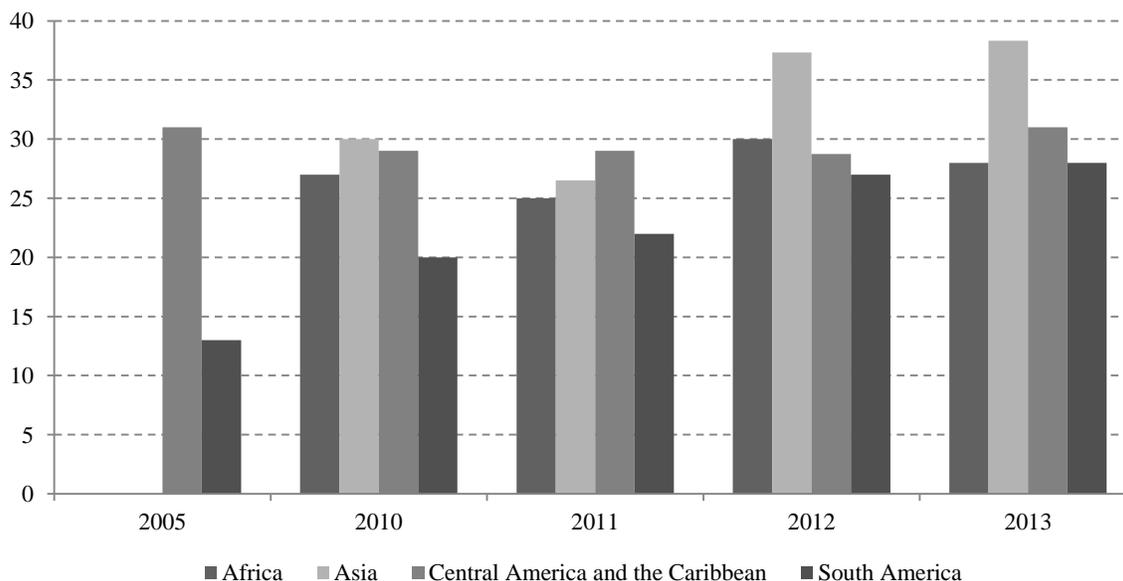


Figure 11: Average ship-to-shore crane productivity in selected regions, 2005-2013

Source: Authors, based on container terminal survey 2014.

Note: average numbers reflect performance a 42 container terminals across the regions.

In the current volatile economic climate it may be the adequate time to reflect on and analyse the evolution of container port productivity and efficiency in dynamic market conditions and over a longer period of time. Productivity and efficiency are related but different concepts. Productivity is the ratio between the obtained products and the factors used in its production. On the other hand, technical efficiency is the capacity of obtaining maximum amount of output from certain inputs (output orientation) or, alternatively, as the capacity of obtaining a given output level using the minimum amount of inputs (input orientation). Also, a company presents scale efficiency if it reaches the maximum productivity by means of the current technology. From the previous definitions it is possible to deduce that technical efficiency is only one of the determining factors of productivity (for further discussion see also Kao et al., 1995).

Wilmsmeier et al. (2014) analyse the changes in productivity and efficiency in LAC from 2005 to 2011 and reveal the complexity of efficiency measures and underlines a necessary wider perspective on port productivity and efficiency. Their results in line with Cheon et al. (2010) clearly show that infrastructure and/or superstructure expansion as single measures will not necessarily and directly increase technical productivity and efficiency of a terminal, but requires an integrated management and organization of the different components to obtain the desired results.

Most existing studies find advances in port efficiency and productivity independent of the region of study, but many of those were conducted during periods of uninterrupted sustained growth. Given the changing dynamics of economic development in 2008 and 2009 and the slowdown of container throughput growth since 2010 new questions arise. How big is the time lag of infra- and superstructure investment (and availability)? Do the existing governance frameworks enable the public and private sectors to respond effectively and act with real agency in a changing and dynamic environment?

Wilmsmeier et al. (2013) analyse container terminals at the top 16 ports in Latin America aiming a) to document the harmonic mismatch in the evolution of port infra- and superstructure endowment, and container demand and; b) to quantify the effect of the financial crisis and the posterior changing economic development on container port productivity applying non parametric Data Envelopment Analysis (DEA).

The results clearly demonstrate the changes in productivity when comparing the pre-crisis, crisis and post-crisis periods, showing first significant productivity and efficiency losses provoked through the economic crisis followed by a strong rebound of the same. Further, the impact of the crisis overcompensates the productivity gains in the pre-crisis period. This happens as the investments in new infra- and superstructures only materialize during the crisis, thus increasing input capacity by technological change in a period of regressing or even negative demand growth. The terminals are not able to compensate these losses by the improvement in pure technical and scale efficiency.

The increase in crane capacity has particular impact on the potential container handling capacity and productivity and in the case of the ports on the West Coast of South America the appearance of new crane capacity, especially in Ecuador and Peru, was an adjustment to external pressure from shipping lines thus implying technological progress, or better said “technological catch-up” as it eliminated the requirement to use geared vessels when calling in these ports (see Figure 11).

In this context it should be noted that capital intensive industries with increasing returns to scale are particularly exposed to demand shocks and will have difficulties to react effectively. Major shocks and demand decreases in international trade are out of the control of port operators and thus are likely to have severe effects on port productivity and efficiency.

Further the differentiation of terminals into transshipment, gateway and hybrid is a necessary step in any planned evaluation, as ports form part of different strategies and serve varied functions within the regional port system. Especially, terminals dedicated to transshipment traffic are not only exposed to changes in the economic environment, but also to alterations and changes in the strategies of shipping companies, which can result in immediate and high volume changes in demand, independent of a terminal's performance. For example, a shipping line might have guaranteed a minimum throughput in a specific terminal. In case of a sharp drop in demand, the line could deviate services from other terminals to satisfy the given guarantees to the specific terminal, independent of the other terminals' performance.

Thus, it might be argued that, in dynamic economic environments, the ability of the industry to respond in terms of proactive measures to counteract losses in scale such as engaging in port promotion or adopting equivalent policies to stimulate demand or improving somewhat the relative competitive position in the country, is at least of equal relevance as improving productivity. While adjustments in efficiency or effectiveness in adjusting management strategies by itself tend to be insufficient to quickly mitigate major demand shocks a combination of both might deliver more positive results.

Wilmsmeier et al, 2013 demonstrate how external effects (e.g. changes in shipping lines strategies as response to changes in demand) on the already given harmonic mismatch of demand and supply in the port industry should be taken into account by decision makers when planning port development. Hence, new questions arise from the findings in relation to the timeliness and timing of infrastructure and superstructure investments and particularly the governance of this situation.

In consequence, while the results of devolution have responded to solve some challenges existing in the 1990ies, recent studies have shown that the devolution processes in Latin America and the Caribbean were not able to resolve underinvestment in container port infrastructure and port infrastructure expansion in line with growth of demand, despite a significant expansion of infrastructure and productivity. Thus as in other regions the results of port reform are mixed and substantially weak in governance (Wilmsmeier and Monios, 2015).

The institutional dimension

The devolution of port management and operations and, more generally, the deregulation of transport services, have opened new opportunities for development in the region. Port devolution not only facilitated the influx of international terminal operators, but also transformed the institutional structure in which actors and their relationships were embedded; this transformation spurred new strategies that required, at least on behalf of the successful ports, an identifiable process of institutional adaptation.

Global trends towards political decentralisation and devolution have been identified in the literature (Peck, 2001; Rodríguez-Pose and Gill, 2003). Devolution, however, is not necessarily an actual transfer of power but can be more of a qualitative restructuring (Brenner, 2004), characterised as uneven processes of hollowing out (Rhodes, 1994) and filling in (Jones et al., 2004; Goodwin et al., 2005), often resulting in asymmetrical acting capacity.

MacKinnon et al. (2010) argue that any consideration of the role of actors requires an approach that can assess structure and agency, and they note that Jessop (2001) is critical of Giddens's (1994) structuration theory for "assuming that a particular structure is equally constraining or enabling for all actors" (p.274). Of particular relevance for this paper, MacKinnon et al. (2010) stress "the contingent nature of state strategies, requiring concrete research to examine the interaction of structure and agency in particular temporal and spatial contexts" (p.274). This process is facilitated by considering the path dependent nature of state restructuring. According to Peck (1998; p. 29), "Geographies of governance are made at the point of interaction between the unfolding layer of regulatory processes/apparatuses and the inherited institutional landscape." The new geographies of governance created in the port sector at the intersection of an applied process of devolution and the legacy of current and previous institutional regimes have not yet been fully understood.

Jones et al. (2004) identify a recursive relationship between state personnel and institutions. MacKinnon et al. (2010; p.275) use the terminology of Duncan and Goodwin (1988) to assert that state personnel are both agents and objects of reform: "Devolution has not only created new organisational forms, strategies and relations which have changed the role of state personnel, it has also been ultimately interpreted and delivered through the actions of such personnel." This viewpoint can be transferred to port actors and even port institutions such as port authorities. These institutions have in many ways been both the agents and objects of reform, with a high degree of regulatory capture evident in port sector actors through their relationships with terminal operators and shipping lines.

In LAC reforms also lacked reform and continuous evolution. Deregulation and privatization had a major impact on the availability of more reliable and lower-cost services to the economy as a whole. These reforms in the port sector also complemented trade liberalization efforts. But in LAC in many cases reform fell short in creating institutional frameworks and policies to respond to the changing environment and merely focused on advances of productivity and technical efficiency.

Research on the perceived success of port privatization in 2000 revealed some of the early successes (Hoffmann, 2001). The experiences in Panama, Colombia and Chile were seen as the greatest achievements at that time. Today the cases identified by Hoffmann (2001) are much larger, but the emerging question is, if the reforms would be perceived equally successful in a long term perspective and if considering current economic change.

A major feature of the reform process in all countries was the elimination of state-run public monopolies (Estache et al., 2002), the decentralisation of port governance from the national level by the creation of local or regional port authorities and the involvement of the private sector to realise delayed investment in infra- and superstructure (Wilmsmeier and Monios, 2015).

Thus the national governments engaged in a strategy to push responsibilities into different spatial scales (local or regional) and to the private sector, based on the principal-agent theory under the assumption that this transformation will improve efficiency (Hartley et al. 1991; Parker, 1994). A main challenge today is that the objectives of public sector governance today follow principles defined almost a century ago (Sánchez and Pinto, 2014)

As stated above, the main drivers for port reform were the relief of financial public burden and to improve port efficiency gains through new labour arrangements and driven by standardization of port services. The current framework for intensive port devolution and port reform beyond scale increases is weak in many countries in the region. Further past challenges of infrastructure shortage (Perrotti and Sánchez, 2011) have returned and Latin America and the Caribbean countries infrastructure investment would need to average 5 percent of GDP over the next decade to catch up to international standards (Whitefield, 2014). With these new/old challenges for ports the mismatch between the institutional framework under which ports operate and economic and social reality is expanding. In this context, a new role for institutions and new forms of governance are emerging.

One might argue that Fordism has reached structural boundaries, as economies of scale eventually reach their limit and current market requirements are more commonly ruled by post-Fordist principles. This changes the source of competitiveness for ports from economics of scale, based on basic production factors (capital, land, labour) to economies of scope based on advanced production (service) factors know-how, procedures. The service demands transform from standard services, with long life cycles to large differentiated service requirements, with short life-cycles. Moreover as stated already the economic environment is highly dynamic with greater insecurity and risk.

The requirements for organisation are being modified. Standard processes and procedures need to be complemented to work in flexible, decentralised organizations with incident management needs. A further point of discussion is the role of the port as discussed above. This role has to be discussed and often is not clear. If the role of the port is to generate employment different measures and development potentials have to be considered. The same rule has to be applied if ports are thought to strengthen economic development or if ports are operated under private profit principles. The match between these different roles and the market requirements will have to be discussed in depth in further research.

A strong nexus exists between port system development and existing infrastructure capacity challenges. Governance is defined as the institutions, mechanisms and processes through which economic, political and administrative authority is exercised. This definition builds on an extensive literature arguing that governance has gone beyond government (e.g. Imrie and Raco, 1999; Hooghe & Marks, 2001), and acknowledges the important roles that private actors and civil society play in policy making. Importantly, governance as an analytical concept allows a focus on the arrangements that are non-hierarchical, multi-level or network based, and acknowledges the high degree of complexity facing modern policy problems.

Institutional approaches to port development have argued that the port authority has constraints on its ability to act, stemming from its specific nature. The key distinction is that port development is path dependent, heavily constrained by past actions and institutional design, but also contingent, in relation to private investment and public planning (Notteboom, 2009). Ng and Pallis (2010) showed

how port governance is largely determined by local/regional institutional characteristics, despite attempts to implement generic governance solutions. Notteboom et al. (2012) applied the concept of institutional plasticity (Strambach, 2010) to port development, arguing that, while port development is path dependent, a port authority can achieve governance reform by a process of adding layers to existing arrangements. In this way, the port authority does not break from the existing path of development, but develops new capabilities and activities via a process of “institutional stretching”. An example is given of port authorities investing in load centres in the hinterland, beyond their traditional jurisdiction, and the particular importance of informal networking is noted (see also Monios and Wilmsmeier, 2012). Jacobs and Notteboom (2011) asserted the need for an evolutionary perspective, drawing upon the economic geography literature to define the movement from critical moments to critical junctures, concluding that port authorities have windows of opportunity in which collective action is possible. The authors concluded that “the question of to what extent critical moments require institutional adaptations in order to materialise into critical junctures needs further thought” (p.1690).

A more sophisticated institutional appreciation of the port is required, as the entity normally considered a unified port is not only created by numerous actors but is endlessly being recreated with each new relationship or network in which the port is embedded. Thus the port’s connectivity is always changing and being recreated. Marx believed that the capitalist system carries “within it the seeds of its own destruction” (Marx and Engels, 1850; unpaginated). Perhaps the same logic could be applied to ports as they move through their life cycle, as the symptoms of success (concentration of container flows at a single port) are themselves the cause of congestion, stagnation and decline, if not addressed.

Port development in LAC, as in other port systems, has been driven first by significant and continued growth of container traffic. Strategies of liner shipping companies have evolved towards a wide implementation of hub-and-spoke networks, leading to patterns of concentration exhibiting significant effects of path dependence. However, the contingency of both private investment, public policy, and planning approval have been found to play an important role in port development, supporting newly-emergent port hierarchies.

Maritime sector dependency

"Globalisation has contributed to the remaking of the container shipping networks." (Slack et al. 2001)

In the maritime system convergence is a main principle. This conformity can be seen best in the extension of services to all markets and a shift in direct port calls. At the same time the shipping industry (maritime sector) is developing towards a stage of maturation based on the life cycle theory. A strong tendency towards concentration can be observed throughout the last years, and recently gaining velocity through mergers and acquisitions. While earlier bigger companies tended to buy small competitors to increase the geographical coverage of their services, recent mergers took place between global operators striving for market power (Wilmsmeier and Sánchez, 2010; Yeo, 2014). This process reaches beyond the earlier development and implies a strong rationalisation trend among shipping companies. This trend is fostered through appearing intentions

of shipping companies to not only gain horizontal market power, but also reach for vertical integration and control of transport chains (dedicated terminals). The increasing concentration has been a trigger for similar developments in the port system.

The current structure of the liner shipping services provided in LAC is rather oligopolistic (Sánchez and Wilmsmeier, 2010). During the last years a drastic reshuffle of the services provided and in result an inherent change in the maritime services network can be observed and a hierarchic services network has been developing (for details see Rodrigue 2005). A further observation is that shipping services have become more and more “footloose”

The interplay between the investment intensive port industry and the changing structure of the shipping sector makes ports portray a subordinate role. With many international shipping and logistics market players undertaking vertical and horizontal integration strategies, involving ports either directly or indirectly, the conventional taxonomy of port institutional players should be fundamentally reviewed. Strategies of vertical integration include ocean carriers and other multimodal providers (e.g. rail operators) engaging in terminal leasing and ownership. Shippers are also sometimes perceived as port owners, such as through dedicated oil or car terminals. Horizontal integration strategies were less common in the past but are gaining more support in recent years, such as through port co-operation and mergers (e.g. Copenhagen and Malmö Ports—CMP) and, more particularly, the expansion of certain ports beyond their initial spatial bases (e.g. the Port of Singapore Authority shortening its name to PSA and owning and managing ports and terminals in other countries). The impacts of such changes on the traditional perception of the port industry are dramatically significant in the sense that today’s ports can be owned and managed by many types of institutions (both within and outside international shipping and logistics markets), and that the long-established perception of ports as non-moveable assets no longer holds so much validity. The process of vertical integration implicates further changes leading to new challenges in transport network development and a restructuring of hinterlands.

Port operators and shipping lines have both exhibited strong concentration processes as well as increasing vertical integration. In 2012, the top ten carriers controlled approximately 63 per cent of the world container shipping capacity (Alphaliner, 2012), while the top ten port terminal operators handled approximately 36 per cent of total container throughput (of which 26.5 per cent was just the top four), measured in “equity TEU” (Drewry, 2012).² Strategic alliances between them have exerted a profound influence on maritime network structure and also on a region’s integration in the global maritime transport network. These developments have, to a certain extent, made port development dependent on network strategies of global players. The location of a port within the network influences the competitiveness of trade through that port and subsequently raises important questions regarding what determinants lead to the configuration of current networks and how these could be influenced.

The development of liner shipping networks is primarily driven by the demand for containerised transport, depending on the strategies of shipping companies and the demand of shippers for specific service characteristics. As such, the location of a port or a region within the global liner

² The “equity TEU” concept was devised by Drewry as a more accurate way than simple TEU throughput to account for the fact that some terminal operators have shares in each other.

shipping network is determined by the density of trade flows to and from a specific port or region. These factors then become the determinants of the service frequency, loading capacity, number of port calls per roundtrip and transshipment or relay strategies (Fagerholt, 2004).

Port selection can be based on several criteria, from physical characteristics and geographical location to port efficiency, strategic carrier considerations and hinterland access (Wilmsmeier and Notteboom, 2011). Magala and Sammons (2008) argued that port choice is a by-product of the choice of logistics pathway. Thus port choice becomes more a function of the overall network cost and performance. From the carrier's perspective, the economies of scale, scope and density in shipping, port operations and inland operations would favour a very limited number of load centres in a region (Cullinane and Khanna, 2000; Frémont and Soppé, 2007).

Reflections and emerging challenges

A functioning port infrastructure – more precisely, the services it provides – is essential to economic welfare in modern societies. Port infrastructure facilitates trade, integrates transport modes and connects producers and consumers in different markets. The performance of ports is essential for the functioning of the economy and for developing welfare. Latin America and the Caribbean have experienced a significant and continuous economic growth. However, the past environment is changing and while expansion of infrastructure reached important levels the "past ghosts" of lack of infrastructure investment and labour issues have returned. Port infrastructure also forms a significant part of a country's capital stock, in the case of container ports a great share is now held by international private companies. In order to catch up, maintain and expand existing port infrastructure, the public and private sectors are now in a position where considerable investments are required. Given the economic relevance of port infrastructure within a country's logistics system, its governance is a critical factor.

This chapter illustrates the development and challenges in the LAC port system since the turn of the millennium and portrays that port development is no longer a local or regional discussion given the internationalisation process that has taken place over the last 20 years. Such a perspective will inevitably fall short in analysis.

Port in many parts of LAC are still seen and dealt with by decision makers as isolated phenomena and lack the perception that they belong to a port group, hierarchy or complex which is functionally interrelated on a local, national and international scale. The development of ports as a dynamic phenomenon has for a long time been impeded. And the lengthy period of port reforms since the 1990s has not yet fully eliminated the sclerosis of port morphologies. If the ports situated along the coasts are imagined as spinal cords the delay of development has created fixtures and fractures in different parts, which today obstruct the dynamic movement of the whole.

The main deficit in LAC is institutional, as none of the reforms managed to close the infrastructure gap from the 1990s. The reforms remained at a first level and have not managed to transform the new port authorities into institutions with real agency (Wilmsmeier and Monios, 2015). An important focus of the reforms was on creating intra-port competition, many times leaving aside issues such as minimum scale efficiency (e.g. Buenos Aires - see Sánchez and Wilmsmeier, 2006), interport competition and port functions within a national or subregional port system.

Undoubtedly, differences exist between countries, but it is a common feature that the institutional structure and agency has not evolved in parallel to the port system, even as a reaction to changes in the environment. Rather than governing institutions in charge of ports in the region today are not governing, but merely reacting in a firefighting manner to shortages of infrastructure. Institutions have not developed the capacity to adjust their governance model to a changing economic and market environment. The life cycle of the ports and port system in the region advanced, but not their public sector management. The absence of advanced and integrated hinterland connections are another common issue across LAC, as is a lack of an integrated transport and logistics policy means that even after ports and terminals are upgraded, insufficient landside infrastructure or fragmentation and bureaucracy in the rail sector lead to congestion, delays and increased costs for port users. Such issues are often not part of the port development process and are not integrated with other governance regimes such as rail regulation (Wilmsmeier et al., 2015).

While institutional structures and settings are somewhat different within LAC countries, all share the strategy of devolution and decentralisation, while mostly sharing the lack of port infrastructure (except Mexico), absence or non-implementation of national port system development plans or an integrated transport and logistics policy. The capacity limit and timely provision of port infrastructure continues to be one of the main challenges in the region. Port reform in the region extended the life cycle of the existing port infrastructure through technical efficiency; however, the limits of port capacity are inevitably reached again, and now expansion is required outside the existing footprints. The lack of port capacity has already created in some cases a geographical shift of activity due to congestion (e.g. Santos, Brazil), leading to a reactive deconcentration to secondary locations. Thus, besides the emergence of new secondary ports driven by regional economic development, a certain level of growth can also be attributed to negative spillover effects from congestion in other ports or the hinterland of those ports (Wilmsmeier et al., 2014).

The efficacy of these national efforts has been hindered by the lack of agency in the institutional settings that have developed in the two decades since the initial reforms, suggesting that the temporal element and the autopoietic nature of the system are inhibiting new attempts at reform.

The operation of container terminals is now primarily in the hands of the private sector. The institutional structure of private investors has undergone significant changes in the last decade and today global and international terminal operators control the greatest share of container throughput in the region (Notteboom and Rodrigue, 2012). This influx of global groups raises a contradiction in the devolution process. The reform aimed to create smaller, more active, local or regional entities, but these decentralized entities are facing global players when negotiating concession contracts, thus creating a new incongruence of power. The situation now obtains where local, regional and even national institutions in the region lack the institutional knowledge to critically reflect, analyse and negotiate the wider impact and repercussions when passing the "power" of their ports to these global conglomerates.

The decentralisation process was successful in creating more local input in port development, but the steering, governing and coordinating roles of the state at a higher level was generally missed, or in some cases was created but not developed. A decentralized structure of port governance without a national framework or strategy remains a development of individual unarticulated entities where

the system is not able to capture economies of either scale, scope or density. Thus the mentality of reform has once again been overtaken by reality (lack of infrastructure, poor performance).

Rather than a structural reform in order to improve management and flexibility to respond to changes in the industry, a lack of decision making remains evident – it is just that the power has shifted to different organisations. Indeed, in many cases, it is the same personnel in the same positions, only in superficially different organisations. So institutions have changed but governance, particularly the aspect of agency, has not been reformed in any real sense. As a result, a question to consider in future research is whether the region is perhaps pending reforms once again?

Conclusions and outlook

The chapter analyses the intersection of clear trends in the evolution of port systems (decentralisation of port governance, concentration of power, and deconcentration of port traffic), in order to identify how the institutional setting governing the spatial diversification of container port activity has changed as a result of this intersection and whether it is suitable to deal with new challenges as they arise. An additional question was whether the new institutional settings created by port reform in developing countries are suitable to support the successful application of port devolution policies imported from developed countries with different political and institutional histories.

In the 1990s policy makers in LAC initiated what was intended to be a virtuous cycle to promote technical efficiency and expansion of the container port system. However, the role of political traditions in deciding the structure and agency of reformed organisations was neither part of the political discourse nor has it been comprehensively assessed since. The case findings show that port reform has simply replaced an old path dependency with a new one, involving, critically, a loss of power from the public to the private sector. For example, when poor management by a private operator leads to congestion or labour strikes that close the port and threaten the national economy, government actors have few levers to address the problem. Devolving to the local level in hopes of achieving a more active and informed local governance, it rather created institutional weakness vis-à-vis global terminal operators. Moreover, the reform failed to produce an integrated policy framework. It is open to question whether the short term gains of technical efficiency in individual terminals make up for such long term losses of control. Some recent attempts to regain national influence have been inhibited by the evolution of the institutional setting since the initial reforms, in which the required agency to disrupt the new path dependency is lacking.

Previous analysis (Gong et al., 2012) showed that port devolution works in a context of well-developed institutional infrastructure and capacities, such as integrated transport policy frameworks, investment strategies and plans, transparent disclosure, pricing competition and regulatory policy. These institutional conditions tend to be in place in developed countries; among developing countries, Latin America being no exception, the institutional capacity to proactively administer change is limited. This lack of institutional capacity becomes even more evident if an existing development path needs to be altered as this inevitably requires agency to effect the necessary change of institutional structure.

A new narrative is beginning to take shape that charts the rise of the need for a new reform of port governance, which emphasizes the spatial politics of port development and the "social/corporate" production of place. This shift towards the "political" is significant, especially for a sector that has traditionally been characterized by political innocence to say the least (Vuolteenaho and Berg, 2009: 1). Therefore it is important to re-examine the presented issues and to be attentive to both the subtle and substantive shifts currently underway at the present historical conjuncture.

Corporatization, commercialization, internationalization, devolution and privatisation of port operations are now global phenomena. The motives for ownership, devolution, and institutional restructuring are manifold, but principally, access to financing and investment and recently market strategies (global players) have been the driving forces. As such the geography of port operations has transformed over the last three decades in parallel to and driven by globalisation and at the same time on the back of changing geographies of trade, the firm and power.

While a broad discussion and analysis exists on power and globalisation of the industry, no works exist that discuss the spatio-temporal development of power in the port industry. There is so far no work that discusses the institutional and governance implications of the changing geography in the port operator industry.³

The current economic system tries to evade crisis through the spatial expansion of activity (shipping, port operation, etc.). The expansion of port operators is, therefore, not specific to the sector but a general indicator of capitalist development. The effects of path dependence and the contingency of both private investment and public planning approval have been found to play important roles in this process, further embedding emergent port hierarchies.

Several questions raised in the above analysis could therefore benefit from close analysis of individual port reform trajectories. It is therefore hoped that the findings from this chapter regarding lack of national system planning and proactive site development can provide the starting point for much-needed disaggregated research in the LAC region.

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³ The authors took the first steps towards such a critique in their contribution "The operation of ports", in Ng et al. (2014).

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