



Port system evolution – the case of Latin America and the Caribbean



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ABSTRACT

The explosion of global container trade in the last two decades has significantly influenced the port geography of Latin America & the Caribbean (LAC), leading to a concentration of container traffic at selected ports. Theory suggests that, as port systems become mature, they tend to deconcentration, partly due to the emergence of secondary ports. Previous research has examined the region's dominant ports, but an unanswered research question is how the evolution of this port system is influencing and being influenced by the actions of those ports currently occupying a secondary rank in the LAC port hierarchy.

The methodology is based primarily on analysis of time series data on container movements between 1997 and 2012, revealing patterns of cargo flows and transshipment location choices. The institutional context of devolution processes and new investments in the region provides additional insight into the performance of selected ports. From a theoretical perspective, this analysis is situated within the context of recent institutional approaches that examine the port's ability to act through critical moments and junctures, in order to deepen understanding of which of the various factors influencing port system deconcentration are the most sensitive to successful institutional adaptations.

Results show that the manufacturing of strategic locations can be successful and may have driven the emergence of secondary ports in the LAC system. This finding demonstrates how path dependence can be challenged by new developments, the identification and success of which are nevertheless contingent on factors such as the first mover advantage, port planning regimes and diversification of port roles. The paper identifies some of the key factors influencing the transition of a port system from concentration at a few dominant ports to a deconcentrated system of primary and secondary ports, which can be applied to other port systems in future research.

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1. Introduction

Ports and port systems have been studied by geographers for several decades, as their evolution can be observed via spatial developments of nodes and corridors, as well as exhibiting processes of concentration and centralisation of trade and traffic flows. Numerous models have been developed to systematise and classify port system evolution, proceeding from the traditional spatial analyses of port expansion (Bird, 1963; Taaffe et al., 1963; Rimmer, 1967; Hoyle, 1968; Hayuth, 1981; Barke, 1986; Van Klink, 1998) to the more recent focus on port competition through hinterland accessibility, such as the concept of port regionalization as one possible pathway in port system evolution (Notteboom and Rodrigue, 2005; Monios and Wilmsmeier, 2012a,b). Other discussions include the competition in the maritime foreland, focusing on intermediate

transshipment hubs and the structure of maritime services (Sánchez and Wilmsmeier, 2006; Rodrigue and Notteboom, 2010).

This paper examines the Wilmsmeier and Notteboom (2011) four-phase model capturing the influence of the evolution of liner shipping networks on port development. The interest of this paper is the transition from phase three (mature hub-and-spoke networks, port devolution, penetration of international operators) to phase four (the rise of direct services, current hubs undermined and the rise of new secondary hub-and-spoke networks). The many influences on this transition are not yet fully understood. The goal of this paper is, therefore, to perform a detailed analysis of a representative case in order to develop a framework for systematic analysis of this important phase of system evolution.

One of the key observations in previous analyses is the efforts of secondary ports to counteract the concentration of container traffic at a few large gateways, seeking ways to overcome their peripheral status and increase their access to global trade routes. Wang and Ng (2011) identified this category of secondary ports in an analysis of the Chinese port system, yet they noted that such ports have not

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received sufficient attention in the literature. A similar finding was made by Wilmsmeier and Monios (2013) in an analysis of the UK port system. It is thus important for the key drivers of this development to be identified and explored in more detail. The goal of this paper to systematise them will be aided by applying recent theoretical approaches (particularly Jacobs and Notteboom, 2011) to an analysis of the transition of the Latin American and the Caribbean (LAC) port system from phase three to phase four. From this theoretical perspective, the paper aims to understand the evolution of maritime networks and the autopoietic nature of port development as secondary ports seek to reposition themselves within emerging feeder markets through a variety of proactive and reactive strategies that involve different actors within a complex institutional environment. The analysis will chart the progress of the LAC system moving through these phases and look for the critical moments, according to the rationale that such critical moments are likely to be similar in other port systems, hence these findings will be transferable to other contexts.

The methodology includes both quantitative and qualitative analysis. The former is based on a UN-ECLAC database covering 180 container ports across the LAC port system from the years 1997–2012. Maps and charts are used to examine processes of port throughput concentration and deconcentration over time, transshipment location choices and decentralisation through the success of emerging secondary ports, from both a macro system perspective (the entire LAC system) and a sub-regional perspective (divided into coastal ranges). While numerical measures of concentration applied to the port sector such as the Herfindahl–Hirschman index (HHI) and the Gini coefficient are calculated and provided in Appendix A, the analysis in this paper does not rely on them. Both are measures of concentration or equality in a system, yet care must be taken interpreting such indices as they can be misleading without further information. Understanding of a port system cannot be derived from such aggregated indices and requires close analysis of changes in throughput at individual ports over time, particularly when new ports enter the system during the time period under study. Moreover, appreciation of qualitative data relating to port development and infrastructure investment strategies at primary and secondary LAC ports are required; these are examined through discussion of selected examples. In order to bring the quantitative and qualitative findings together, the institutional literature provides assistance through the adoption of a theoretical perspective that builds on recent institutional approaches that examine the port's ability to act through critical moments and junctures.

The following two sections examine peripherality, the role of concentration of container service provision at hub ports, port development strategies and the importance of liner network connectivity. Port system evolution models are discussed and the need to understand the transition from phase three to phase four of the Wilmsmeier and Notteboom (2011) model is established, as well as the rationale for the selection of the LAC case. A discussion on the port's ability to act in the context of recent institutional literature is raised in order to provide a framework for identifying the critical moments influencing the transition from phase three to four. The LAC port system and its evolution are analysed in section five, while section six reviews the institutional setting relating to port devolution and the development of new ports in the LAC system. Section seven summarises the findings into a framework of critical moments, systematising the key influences and section eight concludes with suggestions for future research deriving from this framework.

2. Peripherality and concentration

Issues faced by peripheral regions include high transport costs and an inability to generate economies of scale and density

(Nijkamp, 1998). In the context of maritime trade peripherality is particularly driven not by geographic but by economic distance, reflected in connectivity and market structures (Sánchez and Wilmsmeier, 2010). This is relevant in the context of the increasing integration and reduction of economic, legal and practical barriers between countries within supranational trading blocs and in the Latin American case related to the physical integration initiatives that aim at increasing regional integration based on infrastructure development. Furthermore, a distinction may be drawn between peripheral regions within a country and peripheral countries. Nijkamp (1998) noted that “a system of regions is much more an open trade system without customs or institutional barriers. Thus, competitiveness plays a crucial role in regional development [and].. factor mobility tends to be much higher between regions” (p. 8). The reduction of internal barriers can lead to a concentration of container traffic at fewer, larger gateway ports, but also to a diversification and decentralisation of port traffic through an extension of port hinterlands as a result of infrastructure development. This paper aims to understand the drivers for a multiple gateway approach that would lead to decentralisation and provide secondary ports with a greater role, while simultaneously providing increased opportunities for peripheral trade.

Numerous studies on port system development exist, evolving from the traditional spatial analyses of port expansion and upgrading of berthing and handling facilities (Bird, 1963; Taaffe et al., 1963; Rimmer, 1967; Hoyle, 1968; Hayuth, 1981; Barke, 1986; Van Klink, 1998) to the more recent focus on port competition through hinterland accessibility, such as the concept of port regionalization as one possible pathway in port system evolution (Notteboom and Rodrigue, 2005; Monios and Wilmsmeier, 2012a,b). Other influences on port system evolution include the competition in the maritime foreland, focusing on intermediate transshipment hubs and the structure of maritime services (Sánchez and Wilmsmeier, 2006; Rodrigue and Notteboom, 2010), and in particular the role of the concentration of liner services (e.g. Frémont and Soppé, 2007; Lee et al., 2008; Wang and Ducruet, 2012).

As a port system moves towards concentration, particularly for unitised cargo, significant challenges to hinterland infrastructure become apparent. 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 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). While network development and port choice are based on many factors, the port's ability to “steer their own future” (Olivier and Slack, 2006; p. 1414) can exert some influence. Ports can take on “the challenge of the periphery” (Barke, 1986; Hayuth, 1981; Slack and Wang, 2002); in particular, secondary ports can take advantage of wider trends such as the limits of concentration and reposition themselves to take advantage of a network that may be changing from an outdated system of hubs to new structures.

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 materialises from proactive port development strategies, and deconcentration that emerges from new economic and industrial development. Thus the drivers of deconcentration processes can be related not only to the port system, but also to the transport system (i.e. hinterland infrastructure and carrier strategy) and the economic system (e.g. logistics strategies, economic development)

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