

Container Transshipment and Logistics in the Context of Urban Economic Development

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ABSTRACT It is widely recognised that there are strong relationships between containerisation and supply chains that are giving rise to significant clusters of logistics firms around the large gateway ports, which helps reinforce the status of many as global cities. Recent research, policy documents and regional development strategies suggest that transshipment hubs should be able to develop logistics businesses as well. In this paper, it is argued that the differences between gateway ports and transshipment hubs are very great, and that while the shipping lines have been eager to establish transshipment in many locations, logistics firms are reluctant to follow. A number of reasons for this to be the case are examined, including the long-term uncertainty of shipping services to transshipment hubs, the costs of stripping containers in hub ports with no scale advantages, the distance from major markets, and the limited volume of actual goods available in most hubs. Empirical evidence is presented to demonstrate the weakness of hubs as logistics centres, the major exception being Singapore. The evidence presented suggests that the economic development potential for cities developing as transshipment hubs is much more limited than suggested in the literature.

Introduction

In this paper, the relationships between container ports and their positioning in logistics supply chains are examined. This is a field that has already received a great deal of research and from which has emerged the concept of port-centric logistics and port regionalisation (Heaver 2002; Mangan and Lalwani 2008; Notteboom and Rodrigue 2005; Panayides and Song 2008). Here, gateway ports that serve large hinterland markets are shown to attract significant clusters of logistics firms along the main land transport corridors. Logistics and the management of supply chains represent functions that help define the emergence of extended cities (Beaverstock, Smith, and Taylor 2000; Easterling 2004), and there is a body of research that shows that ports and airports contribute to global city status (Cartier 1999; Ducruet and Lee 2006; O'Connor 2010; Verhetsel and Sel 2009). While the port literature has demonstrated the strong spatial interrelationships between gateway ports and logistics, there remains one class of major container ports that for the most part have failed to attract logistics operations: the pure transshipment hubs. These are ports whose primary function is to transfer containers from one ship to another, usually at strategic locations where different shipping lanes converge. This is a distinction examined in this paper. Why in the case of the gateway ports is there a clear spatial and functional association with logistics, while in the case of the pure transshipment hubs the links have been difficult to establish? Despite a recent attempt to apply the concept of port regionalisation to transshipment hubs (Rodrigue and Notteboom 2010) and policy prescriptions for establishing logistics in pure transshipment ports (ESCAP 2002, 2003), it is suggested here that, with a few notable exceptions, such ports are not attractive to logistics activities

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and thus are unlikely to generate significant economic benefits to their regional economies commensurate with their size of port activity. This hypothesis is validated non-quantitatively by considering the spatial requirements of logistics and by undertaking a set of empirical case studies involving those ports that are most dependent on transshipment.

Defining Hubs: A Fundamental Issue in Linking Transshipment and Logistics

There is considerable vagueness in defining transshipment hubs. This explains in part why we question linking logistics as a means of diversifying the economic base of cities that are pure transshipment ports. There is wide acceptance that there are two broad types of container traffic. The first comprises boxes that are exchanged across the quay walls for local and regional markets. This is the earliest and still most prevalent type of container traffic. The ports that are dominated by such trade are usually referred to as gateway ports or hinterland ports. In the 1990s, the shipping lines began to develop new types of services to facilitate the utilisation of their largest vessels while ensuring extensive market coverage. They used new ports for the most part, located at strategic positions between major markets, and where containers were transshipped between vessels (Fleming and Hayuth 1994). In traffic volumes, these include some of the ports that have experienced the largest growth over the last decade. Transshipment activity has subsequently been extended to many gateway ports. Ports such as Rotterdam now handle boxes that are transshipped to smaller vessels for onward delivery to Scandinavia, for example (Ng and Yu 2006). However, their primary function remains that of gateway traffic.

The term “hub” is frequently used interchangeably between the gateway ports, which may have some transshipment traffic, and the pure transshipment ports, which may have small hinterland traffic activity. For example, Nam and Song (2011), following the work of Huang, Chang, and Wu (2008), define hubs as where transshipment traffic accounts for over half of the port’s traffic. A similar assumption is contained in the work of the Korean Transport Institute (ESCAP 2007) and in Rodrigue and Notteboom’s (2010) recent work on applying their port regionalisation model to forelands. The difficulty arises because transshipped containers are double counted in measuring port traffic, as they are lifted off one ship before being loaded onto another vessel for onward delivery. It is still the same container with the same goods inside, a distinction that is of primary significance when logistics is considered (see below). Thus, the traffic of a port handling 1 million Twenty Foot Equivalent Units (TEUs), with a 50 percent share of transshipment, is largely made up of containers destined for the hinterland when the numbers of different containers are counted. In this case, the transshipment traffic would account for only one-third of the numbers of containers that might be available for logistics activity from ship-to-ship transfers. Even ports generating 66.6 percent of their total traffic count through transshipment would only equal the number of boxes generated by the local market. It is suggested here that the term “transshipment hub” be applied only to those ports for which over 66.6 percent of their traffic is made up of ship-to-ship transfers. This definition does not ignore the diversity of gateway ports that handle varying amounts of transshipments (Ducruet and Lee 2006) where perhaps some other categories need to be recognised.

A second point is that the double counting of transshipped containers gives a false impression of the market potential for logistics. There were 20 ports in 2008 whose container transshipments exceeded 66.6 percent of total traffic (see Table 1). 2008 was used, despite it being a year of the global financial crisis, because the 2010 Drewry report had incomplete transshipment data for 2009.

Slightly fewer than half of the transshipment hubs generated more than 1 million TEUs when counted once. Indeed, only three generated more than 2 million. Thus, the potential for logistics

TABLE 1. TRAFFIC OF TRANSSHIPMENT HUBS 2008 (TRANSSHIPMENT TOTALS ARE BASED ON SINGLE COUNTS OF CONTAINERS).

Port	% TS	TS-TEU	TEU-Hinterland
Aden	88	216,480	59,040
Algeciras	95.2	1,582,224	159,552
Astakos	73.3	140,003	101,994
Caucedo	67.5	248,738	239,525
Colombo	75	1,382,625	921,750
Costanza	75	517,875	345,250
Damietta	81.3	441,459	203,082
Freeport	99	840,510	16,980
Gioia Tauro	95	1,610,725	169,550
Khor Fakkan	90	945,900	210,200
Kingston	86	823,880	268,240
Malaga	97.2	218,700	12,600
Marsaxlokk	95.6	1,087,450	100,100
Panama	90.1	2,089,698	455,605
Port Said	96.3	1,152,230	88,541
Salalah	99	1,518,660	30,680
Singapore	85	12,715,150	4,487,700
Tangers Med	99.2	456,816	7,368
Tanjung Pelepas	95.8	2,618,314	229,572
Taranto	86	338,410	110,180

Source: Drewry (2010).

development if it is to be based on the number of containers transshipped is not great, and their gateway traffic is very small. The exception in every case is Singapore which in 2008 handled 12.7 million of transshipment TEUs counted separately, and its hinterland traffic totalled 4.5 million TEUs, a hinterland traffic that is greater than the total traffic of all but 22 of the largest container ports in the world.

Different Interests and the Spatial Organisation of Container Shipping and Logistics

Frequently overlooked by those examining container shipping and logistics is that the carriers are concerned primarily in transporting boxes, while the logistics industry is focused on the content of the containers (Fremont 2009; Gouvernal and Huchet 1998). The revenues of the carriers are based on the services sold to their customers, the shippers, or their intermediaries. The goal of the shipping lines is to maximise these revenues by filling their ships, and because of scale economies they seek to deploy their largest vessels on services between ports in the main global markets. Smaller markets can be served by smaller vessels, but in order to maximise the deployment of the largest (and highest revenue-generating) vessels the carriers in some situations transship boxes from mother ships to smaller vessels in order to distribute the containers to the lesser regional markets.

While the preoccupation of the carriers is filling ships with boxes and managing the global disposition of containers, the contents of the containers are of little direct concern to them (Fremont 2009). The exception would be for dangerous goods and goods requiring special attention, such as refrigerated cargoes. The goods in the containers are the direct concern of shippers and third-party agents, such as forwarders. For these actors, placing goods in containers on ships to be delivered from one port to another is only one part of a process of freight management that may extend from sourcing raw materials, their manufacture, the assembly of components, all the way to their eventual delivery to the customer. These freight management issues have become structured in what is referred to as logistics and supply chain management.

Transportation is central to logistics. Inevitably logistics providers have to incorporate various modes of transport carriers in their supply chains. However, transport provision is largely the purview of specialised transportation companies with whom the logistics firms have to negotiate rates and services. Only a few of the transport companies provide logistics services, and even those that have a logistics subsidiary, logistics activities represent a small part of their overall transport operations (Fremont 2009). Thus, there is a major division in logistics between carriers providing transport services, and the logistics providers who are involved in organising the cargo flows.

The most important determinant for the location of logistics activities is market access (Gouvenal, Lavaud-Letilleul, and Slack 2011). In one sense, this means that major centres of economic activity and population concentration possess general advantages to attract logistics businesses, but because accessibility implies transportation, and because transportation plays an important role in logistics, ports, railway terminals, and major freight airports serving major market areas represent particularly important specific location determinants for logistics. For example, more than half of the European logistics centres of U.S. and Asian companies are located in the Netherlands, due in part to the presence of the port of Rotterdam and Schiphol airport and its location in the heart of the main European market (ESCAP 2003). The largest concentration of logistics in the U.S. is the Inland Empire of Southern California, whose firms are tied to the ports of Los Angeles and Long Beach for container imports, as well as to the rail intermodal yards for national distribution (Bonacich and Wilson 2007). Thus, good transport infrastructure and market access are essential requirements for logistics hubs. Consequently, there is a spatial accordance between the major container ports that are located in the major market areas of the world and the major centres of logistics activity.

Transshipment hubs are different, since they do not have access to large local markets, but exploiting what Fleming and Hayuth (1994) refer to as intermediacy, they take advantage of a strategic location, deep water, and low labour costs. In addition, their expensive infrastructures are often provided by public authorities at low rents in order to attract economic activity in regions of limited development such as the southern Mediterranean and Caribbean Seas (Gouvenal, Debie, and Slack 2005; McCalla, Slack, and Comtois 2005) and in the Arabian Gulf and Malaysia.

A major issue for transshipment hubs is their fragility. Lacking a local traffic base that could anchor carriers to them, and because the carriers have little financial investments in the sites, they are vulnerable to changing strategies of the carriers and by market conditions. There have been several examples cited in the literature (Gouvenal, Debie, and Slack 2005). Why would a logistics company invest in such an intermediate site from where the transport provider might terminate service?

The fragility of the hubs has prompted a number of observers, both from academia and the policy field that hubs should seek to develop logistics activities (ESCAP 2003; Nam and Song 2011; Rodrigue and Notteboom 2010). This, it is argued, would help augment the local economic benefits

generated by the port and help it retain carrier services by creating a local traffic base. The model that is raised as an example is Singapore, the world's largest transshipment port which has established itself as the leading centre of logistics.

In this paper, it is argued that this is an unlikely solution for most other pure transshipment hubs, in part because they do not possess the attributes sought by the logistics industry. These ports are used to meet the needs of the carriers and their features do not match the requirements of the logistics industry. Most of the hubs are many days sailing away from major markets and the containers would still have to be off loaded in ports closer to the markets. For the shipping lines transshipment works when the costs of transshipment are less than the costs of providing delivery to markets in smaller vessels. For potential logistics providers, transshipment hub ports offer extra costs in transit processing and delays in supply chains over operations closer to the markets. The containers would have to be stripped and resorted without any scale advantages that accrue to logistics centres located in port regions serving major markets. The goods would still be placed in maritime containers, rather than cross-docked to the larger domestic containers used in North America or the road trailers in Europe. It is probable that the assembly of final delivery batches would still have to be done closer to the markets. Furthermore, the ever-present threat of service modification or withdrawal by carriers makes logistics development in hub ports a riskier proposition than those adjacent to final markets. This is a particularly significant problem when the transshipment hub port is the domain of one or two carriers only.

Testing the Hypothesis

The central claim of this paper is inordinately difficult to test empirically. This is because there are neither standardised measures nor inventories of logistics industries across the spectrum of port cities. This makes it impossible to undertake any quantitative investigation into the relationships between transshipment activity and logistics. Others have faced the same difficulty. O'Connor (2010), for example, used airport and shipping data as surrogates for logistics, but since this paper explores the relationship between these two activities, it would be inappropriate in this case. Instead, a survey of hubs and their logistics activities is presented, based on a set of case studies of the nine hubs that generated more than 1 million TEUs in 2008 (see Table 1). Since these are the biggest transshipment ports, it could be assumed that if transshipment can attract logistics operations, these would be in the most likely candidates. The survey is based on published reports, directories, as well as visits and interviews in six of the transshipment hubs: Gioia Tauro, Kingston, Marsaxlokk, Panama, Singapore, and Tangiers-Med.

Five of the nine hubs selected have failed to develop related logistics activity to any degree. These include the four ports located in the Mediterranean (Algeciras, Gioia Tauro, Marsaxlokk, and Port Said). This is despite efforts by regional development agencies and port authorities to exploit perceived opportunities. Algeciras and Gioia Tauro have been established for more than 15 years and yet logistics activities have been difficult to take root.

The lack of success in attracting logistics is borne out by a recent study of the economic impact of Algeciras (see Table 2). Out of the total direct and indirect employment in the port of 3,337, only 137 jobs were accounted for by intermediary services, i.e., logistics (forwarders but also ship agents and customs brokers). We break down these figures for transshipment trade and import/export activities. Overall, transshipment accounted for 1,792 jobs, mainly in cargo handling and government, but for the category of intermediary services only 37 direct jobs were generated. Hinterland trade contributed more jobs than transshipment to the intermediary sector. Thus, transshipment of containers that

TABLE 2. ECONOMIC IMPACT OF CONTAINER ACTIVITY AT THE PORT OF ALGECIRAS.

	Port employment as a whole	Total employment in intermediary activities	Total employment due to transshipment	Total intermediary employment due to transshipment
Direct	2,294	111	1,792	37
Indirect	1,043	26	809	9

Source: Coronado et al. (2006).

generated 1.6 million individual container moves at Algeciras in 2008 generated fewer intermediary services jobs than the hinterland container traffic that was only one-tenth of this total.

Salalah, the fifth hub, is outside the Mediterranean, but it too has minimal logistics businesses. Selected by Maersk as a transshipment hub in the Indian Ocean, its traffic growth has been great. Local authorities are planning to build a logistics park in conjunction with the airport, but as yet it has to be developed.

The other four hubs have been somewhat more successful in attracting intermediate businesses, although it is not easy to disentangle the specific role that transshipment has contributed to their success. The port of Colombo, for example, has a relatively large hinterland traffic as well as a significant transshipment function (Table 1). It owes its success as a transshipment facility to transfers from South India. As with other transshipment ports in general, the transshipment trade is fragile. For example, in 1997 Colombo lost 65 percent of the business of its largest carrier, Maersk, which relocated its transshipment business to Salalah (Galhena 2003). The future appears equally questionable because of the recent modernisation of Indian ports and the present construction of a major transshipment facility in the south of Sri Lanka, at Hamambota, which is likely to divert even more transshipment traffic from Colombo. Nevertheless, Colombo has established a logistics park and container freight station adjacent to the port's facilities. However, the firms that are involved are related more to the domestic clothing industry and agricultural exports rather than ship-to-ship transfers.

Clearly, Singapore is the great exception to the hypothesis suggested here. It is a logistics centre of global importance, the model that most other transshipment ports seek to copy. Of prime importance is its strategic location, commanding the Straits of Malacca, through which a significant proportion of world maritime trade (break bulk, containerised, and bulk) passes. Its economic development and the growth of logistics began in the 1980s, with the relocation of industrial production from Japan to countries of South East Asia, where labour costs were much lower. Public authorities in Singapore (the Port of Singapore Authority and various government agencies) exploited the opportunity to process and transship industrial components manufactured in Indonesia, Malaysia, and Thailand to Europe and North America by developing world-class transportation handling facilities that were unmatched in the region. In parallel, international companies were encouraged to establish their regional logistics operations in the city-state. As a result, information and electronics components, among others, that were manufactured in neighbouring countries were fed to Singapore, where the parts were assembled, labelled, and packaged prior to the goods being loaded into containers to be put on ships or planes for delivery to the major consumer markets (ESCAP 2003). The success of Singapore, therefore, is due to a number of factors: its head start, the quality of publically provided infrastructures and equipment; financial incentives; and the

establishment of free trade zones which allowed for international companies to circumvent national quotas and defer payment of duties. Another important factor is the high levels of education and skills of a workforce that adapts to new technologies and work practices. This is in contrast to the skill levels of neighbouring countries (ESCAP 2003). Many of these success factors are quite unique to the particular case of Singapore and its geographical location with regard to emerging markets, and are difficult to replicate.

Tanjung Pelepas can be seen as an extension of the port of Singapore, especially in terms of its proximity to that hub. It is, however, under a separate jurisdiction (Malaysia), and it operates with dedicated facilities for key shipping lines, notably Maersk and Evergreen. It is second only to Singapore in the size of its transshipment traffic, but its hinterland traffic remains very modest. From the beginning, the Malaysian authorities created a free zone and offered financial subsidies as well as tax advantages, and 400 acres was reserved for logistics firms and 600 acres for manufacturing. Over the years, this free zone has grown to include many logistics and distribution companies including Nippon Express, Damco, Geodis, NYK logistics, as well as BMW's parts distribution centre. The availability of extensive shipping services at the port has been a factor in its success in attracting logistics, but other elements such as its proximity to Singapore industries and infrastructures, as well as availability of cheaper land and labour than what is available in Singapore. What is surprising is the size of the logistics park compared with the relatively small hinterland traffic of the port registers, suggesting there is leakage to the port of Singapore.

Four separate terminals, Balboa, Manzanillo, Cayo Coco, and Colon, all located in Panama have been combined in this paper. Together they represent a large transshipment and hinterland traffic centre. Panama owes its shipping importance to the Panama Canal, which confers upon it a strategic geographical location comparable to that of Singapore and the Straits of Malacca. This intermediacy is likely to increase with the completion of the expansion of the Canal in 2016. Panama has a significant logistics centre located in the Colon Free Trade Zone (a former manufacturing complex), and serves:

as a "one stop shop" for both Latin American buyers and sellers from the rest of the world, including Asia and the United States. Sellers operate showrooms targeted at small and medium-sized buyers, who make wholesale purchases of goods for retail sale in their respective countries. Goods are typically repackaged in smaller lots, priced in the local market currency, and transferred to the purchasing country without incurring income, value added, or transfer taxes. . . . Buyers benefit from the ability to purchase in small lots, reduced travel costs, consolidated shipping, improved shipping times, and credit offered by sellers. The sellers benefit from reaching smaller Latin American markets in one location and reduced tax and transaction costs. (Hornbeck 2011:p. 11)

The Colon Free Zone generates 20,000 direct jobs, and covers 450 ha. There have been relatively few other logistics developments in Panama, although a new logistics park is planned for Balboa, on the Pacific entrance to the Canal, on the site of a former U.S. Military base.

This brief survey leads to several observations and interpretations. If the full complement of 20 ports identified as transshipment hubs is considered, it is evident that despite attempts to develop logistics activities in these predominantly transshipment ports, supply chain actors have been reluctant to exploit the opportunities that the shipping lines have established. There appears to be some relation with the size of transshipment traffic, as three of the largest hubs (Singapore, Tanjung Pelepas, and Panama) have developed logistics operations, suggesting a minimum threshold volume of 2 million TEUs. However, this association requires further investigation, since both Singapore and Panama have relatively large numbers of containers generated by their hinterlands (see Table 1), and as discussed above, Colombo falls well below the 2 million TEU transshipment threshold, but has a strong hinterland traffic base which differentiates it from other ports with comparable transshipment traffic (Gioia Tauro, Algeciras, and Salalah).

It is also evident that many other factors contribute to the establishment of logistics in some transshipment hub ports. It is noteworthy that both Singapore and Panama occupy sites of exceptional strategic importance in world shipping, providing them with very high levels of accessibility and connectivity. While their own markets are modest, they have been able to exploit regional markets as sources or destinations of goods processed and manipulated in the hub ports. The proximity of these regional markets is important, with Indonesia, Thailand, and Malaysia being within no more than 2 days sailing from Singapore, and Venezuela, Colombia, and the Central American republics being less than a day's sailing from Panama. It is in these cases that feeder services may play a role in facilitating logistics activities in the hub ports.

Other critical factors include the provision of free zones to assure exemption from income, value-added or export taxes, superior banking facilities to help expedite trade and transactions, an educated and flexible workforce, and generous subsidies and grants to facilitate the establishment of logistics business along with strong government support. A further factor appears to be the issue of being the first in a regional setting to get a head start over competitors. Initial advantage is a well-established economic development factor, particularly when complemented by many of the elements of success mentioned above.

Conclusion

This paper argues that assumptions made about the ability of transshipment hubs to develop logistics activities need to be carefully evaluated. The argument is based on a number of points. One, container transshipment ports are exploited by the carriers as a means of coordinating services in order to serve regional and global markets. For the most part they are uninterested in the content of the boxes and are most unlikely to strip containers at these intermediate ports. Two, transshipment activity is footloose with carriers adjusting port calls with some freedom. What interest would there be for land-based logistics operations to be established when service provision can be fickle and uncertain? Three, the shippers and third-party organisers whose preoccupation is with the goods in the boxes and who are most involved in a range of logistics operations overwhelmingly establish logistics facilities close to the sources of production or final consumption in order to better manage goods provision and delivery in supply chains. These locations are at the gateway ports. Four, the issue of double counting transshipped containers inflates traffic totals at intermediate ports. Thus, from the perspective of opportunities for logistics activity, port transshipment traffic represents a much smaller potential for intermediate activities than the published data would suggest.

It is very difficult to test this hypothesis. It has been taken as given that the gateway ports have developed significant logistics activity, based on the large literature on the subject. However, the lack of actual data on logistics activity in general has made it difficult to provide detailed quantifiable comparisons with the transshipment ports.

The review of the largest transshipment ports and their logistics operations indicates that in only a few cases is transshipment associated with a large logistics industry. This suggests that these are exceptions where specific and only rarely replicable conditions are encountered. These conditions include strategic geographic location, size of transshipment traffic, the scale of hinterland traffic, the provision of trade facilitation measures, and the quality of labour and Information Technology (IT). Individually, these factors are not capable of generating significant logistics at any intermediate transshipment facility. For example, proximity to the Strait of Gibraltar and the Suez Canal has failed to lead to comparable logistics concentrations as those of Singapore and Panama.

There is a need to explore further the relationships between transshipment and logistics. In particular, this requires better data on logistics activity that measures employment, value added, and

output which would permit a more quantitative analysis. However, the evidence presented here indicates that assumed externalities of container handling are very limited for transshipment activity and any resultant urban economic impacts may be small. Much more caution must be exercised in policy prescriptions for the establishment of logistics in intermediate hubs as a tool to promote regional development.

REFERENCES

- Beaverstock, J., R. Smith, and P. Taylor. 2000. World city network: A new metageography? *Annals of the Association of American Geographers* 90: 123–134.
- Bonacich, E., and J. Wilson. 2007. *Getting the goods*. Ithaca, NY: Cornell University Press.
- Cartier, C. 1999. Cosmopolis and the maritime world city. *Geographical Review* 89: 278–289.
- Coronado, D., M. Acosta, M. Cerban, and M. Lopez. 2006. *Container traffic at the port of Algeciras Bay*. Berlin: Springer.
- Drewry. 2010. *Annual Container Market Review 2010/11*. London: Drewry Shipping Consultants.
- Ducruet, C., and S.-W. Lee. 2006. Frontline soldiers of globalisation: Port-city evolution and global competition. *GeoJournal* 67: 107–122.
- Easterling, K. 2004. The Orgman: Logistics as an organising principle of contemporary cities. In *The cyber cities reader*, ed. S. Graham, 179–184. London: Routledge.
- Economic and Social Commission for Asia and the Pacific (ESCAP). 2002. *Commercial Development of Regional Ports as Logistics Centres*. New York: United Nations.
- . 2003. *Improvement of Transport and Logistics Facilities to Expand Port Hinterlands: Policy Guidelines*. New York: United Nations.
- Fleming, D.K., and Y. Hayuth. 1994. Spatial characteristics of transportation hubs: Centrality and intermediacy. *Journal of Transport Geography* 2(1): 3–18.
- Fremont, A. 2009. Shipping lines and logistics. *Transport Reviews* 29: 537–554.
- Galhena, R. 2003. *Container Terminal Development and Management: The Sri Lanka Experience (1980–2002)*. New York: UNCTAD.
- Gouvenal, E., and J.-P. Huchet. 1998. La logistique des conteneurs. Le principal enjeu de l'industrie maritime de ligne régulière. In *La logistique, maîtrise du temps et de l'espace?*, ed. G. Fassio, 77–87. Nantes: Presse de l'université.
- Gouvenal, E., J. Debie, and B. Slack. 2005. Dynamics of change in the port system of the Western Mediterranean. *Maritime Policy and Management* 32(2): 107–121.
- Gouvenal, E., V. Lavaud-Letilleul, and B. Slack. 2011. Transport and logistics hubs: Separating fact from fiction. In *Integrating seaports in trade corridors*, ed. P. Hall, R. McCalla, C. Comtois, and B. Slack, 65–79. Farnham, UK: Ashgate.
- Heaver, T. 2002. Evolving roles of shipping lines in international logistics. *International Journal of Maritime Economics* 4: 210–230.
- Hornbeck, J. 2011. *The Proposed US-Panama Free Trade Agreement*. US Congressional Research Service. Washington: US Congress 7-5700.
- Huang, W.H., H. Chang, and C. Wu. 2008. A model of container transshipment port competition: An empirical study of international ports in Taiwan. *Journal of Marine Science and Technology* 16(1): 19–26.
- Korean Maritime Institute. 2007. *Logistics sector developments: Planning models for enterprises and logistics clusters*. New York: ESCAP, United Nations.
- McCalla, R., B. Slack, and C. Comtois. 2005. The Caribbean Basin: Adjusting to global trends in containerization. *Maritime Policy and Management* 32: 245–261.
- Mangan, J., and C. Lalwani. 2008. Port-centric logistics. *International Journal of Logistics Management* 19: 29–41.
- Nam, H.-S., and D.-W. Song. 2011. Defining maritime logistics hub and its implication for container port. *Maritime Policy & Management* 38: 269–292.
- Ng, A., and K. Yu. 2006. Assessing the attractiveness of ports in the North European container transshipment market: An agenda for future research in port competition. *Maritime Economics and Logistics* 8: 234–250.
- Notteboom, T., and J. Rodrigue. 2005. Port regionalization: Towards a new phase in port development. *Maritime Policy and Management* 32: 297–313.
- O'Connor, K. 2010. Global city regions and the location of logistics activity. *Journal of Transport Geography* 18: 354–362.

- Panayides, P., and D.-W. Song. 2008. Evaluating the integration of seaport container terminals in supply chains. *International Journal of Physical Distribution and Logistics Management* 38: 562–584.
- Rodrigue, J.-P., and T. Notteboom. 2010. Foreland-based regionalization: Integrating intermediate hubs with port hinterlands. *Research in Transportation Economics* 27: 19–29.
- Verhetsel, A., and S. Sel. 2009. World maritime cities: From which cities do container shipping companies make decisions? *Transport Policy* 16: 240–260.