Explaining the New Seaport Competition

by

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## Abstract

In recent decades, competition has become an extremely prominent issue in the seaport industry due in large part to fundamental changes that have redefined the competitive environment. New technologies such as containerization and intermodalism are widely acknowledged to be the main factors forcing these changes, yet the broader role of more intense competition between seaports has been generally overlooked. This thesis develops a framework for examining these processes of change and uses it to explain how the new modes of shipping produced a "new" seaport competition. I deviate from the positivist-based "extensive" approach that dominates the body of research on seaports, and take instead an "intensive" approach grounded in the philosophy of realism. First, I theorize seaports as production-systems and competition as a process of managing strategic problems and solutions that are necessarily situated within a particular spatiotemporality. Second, I apply that theoretical framework to explain how the nature of competition between seaports has changed with the emergence of containerization and intermodalism. Third, I corroborate that explanation by presenting the results of interactive, minimally structured interviews with seaport officials from ports in Tacoma, Seattle, and Vancouver, on the issues of competition and change. The major finding is that containerization and intermodalism produced a "new" competition by transforming the temporal and spatial dimensions of the strategic problems for seaport productionsystems in the realms of (1) customers/markets, (2) the seaport product, and (3)strategies. This research complements the existing literature by emphasizing the

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structures that have produced the change in seaport competition and examining the issue from the perspective of seaports rather than demand-side factors.

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## **Chapter 1**

# Charting a New Approach to the Study of Seaport Competition

"If the two lines wanted 'Disneyland,' the port would build it for them" quipped the chief of the Port of Philadelphia in May of 1998 (Fabey, 1998a, p. 34). The two shipping lines referred to here, Maersk Line and Sea-Land Service, had gone public in previous months with their desire for a "super-container hub" onto which they would concentrate virtually all port calls along the U.S. East Coast. In rapid response, the Port of Philadelphia and other seaports up and down the coast put together various offers to build the "fantasy park" of any shipping carrier's dreams. The timing of this clamoring and wooing by the seaports is particularly telling because during each of the previous two years U.S. ports had spent well over U.S.\$1.3 billion on capital expenses (Fabey, 1998b). Yet in 1998 they offered to spend hundreds of millions more of the public's money to capture the business of but a few major lines. According to trade journalists and academics alike, this episode reflects a general intensification of seaport competition that has occurred in the wake of the container and intermodal revolutions in shipping. The purpose of this thesis is to provide a causal analysis of how the technological and organizational changes associated with these "revolutions" transformed the nature of competition between seaports.

A perusal of both the trade and academic literatures on seaports or a discussion with a port official or two would convince almost anyone that competition is one of the

most salient issues facing seaports in the 1990s. Geographers have been among the most active analysts of seaport competition and in recent years they have produced intelligent and useful work concerning the emergence of the new competition between seaports. Nevertheless, despite the quality of this work, and its valuable contribution to transport, seaport, and shipping studies, it has shed little, if any, theoretical light on the issue. As a result, the recent literature on seaport competition and the changes it has undergone since the mid-1970s consists mostly of accounts showing the general characteristics of the "new" competition while lacking insights into the process by which it came about. The objective of this thesis is to examine that process by taking a new direction in research on seaports. In this introductory chapter, I will first provide a brief historical survey of the literature on seaport competition. Next, I will contrast the typical methodology found in that literature with an alternative methodology on which my research design was based. Lastly, I will sketch out the structure of the remainder of the thesis in which I examine the effects of containerization and intermodalism on the nature of seaport competition.

### Literature review

Seaport competition is in the news, literally. Take, for example, an article in a recent issue of the Journal of Business Strategy titled, "The Good Fight on the Cote d'Azur", which reports on "the war for Europe's port business [in which the Port of] Marseilles . . . fights off the huge bullies to the north and the guerilla forces surrounding it" (Mullin, 1996, p. 60). Less sensationally (its title aside), an article in a Canadian transport journal, called "Port Wars", is one among numerous accounts of the intense competition for container traffic among North American West Coast seaports (Robertson,

1988). Amid the fray, according to yet another article, the Port of Oakland enlisted U.S. Vice-President Gore to maximize awareness of its new dredging project (Hanscom, 1994b). Meanwhile, the Port of Seattle made the news by announcing plans to expand and redevelop its Terminal 5 (Watson and White, 1997). At the project's groundbreaking ceremony, U.S. Secretary of Transportation Peña boasted that he wanted all of Asia "to know what the [Port of] Seattle was doing, and what [it] had to offer" ("Remarks", 1996, p. 1). In Europe, an article in the journal <u>Transport</u> chronicled the words of Stuart Bradley, Managing Director of the Associated British Ports, who claimed that as the result of an abounding "competitive spirit," "The ports industry in the UK is as well placed and healthy as it has ever been in my working lifetime" (Davies, 1994, p. 8).

The issue of competition has also surfaced with vigor in the academic press. A recent issue of <u>Tijdschrift voor Economische en Sociale Geografie</u> (1996, Vol. 87, No. 4) exemplifies a seemingly unprecedented level of interest in this topic among seaport scholars. All seven articles in the issue featured European seaports, and five considered competition in some way. The relative popularity of this subject is also indicated by the variety of scholars who have examined different aspects of seaport competition on all six of the world's inhabited continents. In fact, in the current literature on seaports and competition, economists, political scientists, transport and logistics analysts, and economic and transport geographers are all represented.

The arrival of this topic on an increasing number of academic agendas does not signify the birth of a new realm of research, but it does indicate a renewed interest in seaport competition. The formal study of seaport competition began at least as early as the First World War era with Roy MacElwee's work on "port problems". His principal

contributions were in the form of two large books, <u>Ports and Terminal Facilities</u>, published in 1918, followed in 1926 by <u>Port Development</u>. In these books, he analyzed the principal characteristics that are basic to the "competitive ability" of a port, and argued that these characteristics or "advantages" determined which seaports would attract cargo and which would not. He noted that

Ports geographically widely separated compete with each other . . . Each port endeavours to attract ships to it from its competitors and also seeks to attract interior freight to itself which might be routed through its rivals. (MacElwee, 1918, p. 33)

And in order to succeed against its rivals, MacElwee argued, the dominant concern of a port should be those characteristics or criteria that determine the route of cargo flows, as they constitute the bases of competition between seaports. A port fulfilling the criteria for cargo routing thus had an advantage over other ports. As he strongly contended again and again, "To be able to sell the port means that there are definite advantages as compared with other ports. As port traffic is highly competitive these advantages must be found" (MacElwee, 1926, p. ix). Across the two volumes, MacElwee identified and systematically discussed both physical and "traffic" advantages and the importance of each to the "attractive" seaport. Despite practical limits, physical advantages, including the depth of the approach channel, the inland terrain, and absolute location, could be altered in the port's favor. More important in selling the port, however, are "traffic" advantages, including the load factor (the balance between incoming and outgoing cargo), rail and water rates, and cost and service levels at terminals. Having identified these important factors, MacElwee suggested that they could serve as guides in port development, which, he wrote, "is understood [as] those activities that bring increased marine commerce to a selected transshipping point" (MacElwee, 1926, p. 3).

Weigend (1958) provided another early and prominent consideration of seaport competition, and one of the first in geography. In fact, compared to MacElwee's rarely cited work, Weigend's work can be credited as having the first significant impact on the wider discipline of geography. Weigend explicitly advanced the concept of the hinterland in the study of seaport competition. A seaport hinterland represents collectively the landward sources (either as inland destinations or origins) of a port's throughput. Since every seaport has a hinterland, the characteristics of the hinterland (spatial size usually but also its composition) might serve as a measure of competitiveness. Weigend argued that as a "dynamic port seeks to attract as much traffic as possible from wherever it can" (Weigend, 1958, p. 185), it will alter the dimensions of its hinterland. A competitive situation arises when the hinterlands of two or more seaports overlap or intertwine.

This hinterland-centreed approach is characteristic of many studies of seaport competition in geography. It was prominent in Kenyon's (1970) analysis of gradual changes in competition between seaports on the US Atlantic and Gulf Coasts. Specifically, he examined the effects of the St. Lawrence Seaway and differential truck and rail rates on hinterland size, noting, for example, that:

The traditionally depressed rail rates of the Mississippi, Ohio, and Missouri Valleys have undoubtedly extended the impact of New Orleans deeper in the Midwest than would have otherwise been the case. (Kenyon, 1970, p. 19)

Kenyon observed that while in "disputed hinterlands" proximity to port plays a subordinate role in the pattern of cargo flows, it is still very significant in "captive hinterlands". He argued, thus, that seaports serving "captive hinterlands", such as large

metropolitan areas, can justify the costs of expensive "high-calibre" development at low risk, giving them a competitive advantage in more distant and competitive hinterlands. This gives rise to a "success breeds success" effect (Ibid., p. 2), as in the case of the Port of New York, whose spatial hegemony over a large metropolitan area spurred not only the build-up of physical infrastructure, but commercial and financial development of the port as well.<sup>1</sup>

A recent example of a hinterland study is provided by Hoare (1986), who examined the Port of Bristol's chances of "tapping more trade by expanding its geographical hinterland into territory previously the preserve of other . . . ports" (p. 30). In this interesting study, Hoare argues that the Port of Bristol failed to understand the changed "geographical nature" of port-hinterland relationships when it constructed a new deep-water facility at Portbury in the late 1960s and early 1970s. At that time, various forces were eroding the port's captive hinterland and many of Bristol's potential regional users exported through London, Liverpool or other ports, which prevented the effect described by Kenyon (1970). Again echoing Weigend, this study viewed seaport competition as an endeavour to achieve control over a hinterland.

The exact nature of the influence that Weigend's ideas had on Kenyon (1970) and Hoare (1986) is uncertain, but the hinterland approaches taken by both are clearly reminiscent of Weigend's work. The hinterland concept was at the heart of other significant and early studies of seaport competition, including Taaffe, Morrill, and Gould's (1963) "Transport Expansion In Underdeveloped Countries: A Comparative Analysis", one of the most notable studies published in geography on seaports. In this article, the authors formalized the use of the hinterland concept in the study of seaport

competition. They introduced a model called the "stages model of transportation development" (indicated hereafter as the TMG model) that explained the relative rise and decline of seaports based on the interconnectedness of the inland transport system. Figure 1.2 is a diagram of the model showing each stage in the relationship between inland transport development and seaport growth. According to the model, as "major lines of penetration" push inland from a scattering of seaports along a seacoast, traffic will begin to concentrate at certain ports. The correlative effect is that the hinterlands of these ports simultaneously expand. In subsequent stages of development, feeder routes begin focusing on the major lines of transport, improving internal accessibility and giving rise to "a sort of hinterland piracy" as several seaports grow at the expense of the others.

There are limitations to the applicability of this model, namely its failure to account for the effect of changes in the nature of international boundaries separating the ports along a coastline as well as the neglect of the authors to consider the role of the colonial political economy in the development of the societies from which they drew their observations. These limits notwithstanding, the TMG model has been widely influential.

Rimmer (1967) sought to improve the model by including the impact of maritime networks on seaport competitiveness. Figure 1.1 shows Rimmer's conceptualization of the TMG model with seaward connections added at each stage. In his study, Rimmer applied the refined TMG model to show changes in the relative status of Australian seaports. While the TMG model is not always formally acknowledged, the general framework it represents has been applied in more recent studies, as with Biagini's (1984)

<sup>&</sup>lt;sup>1</sup> See also Hayuth (1985, p. 85)



with Biagini examining the different stages in interport competition for the ports of Genoa and Savona as the inland transport network developed and Forward explaining the dominance of the port of Vancouver on the Canadian West Coast as a function of superior inland connections. The port of Prince Rupert's failure to develop into a "junior competitor" was, Forward explained, due to the inability of railroads serving it to stay in business.

The attention more recently attracted by the topic of seaport competition has, in large part, been the result of a new competitive regime introduced by the diffusion of containerized intermodal cargo transportation. This new method of goods movement has dramatically altered the competitive environment for nearly every general cargo seaport in the world and, consequently, research on its effects on the distinguishing features and patterns of seaport competition constitutes a majority of the literature on seaport competition. Most of this research has focused on North American and European ports, though some work on Asian seaports is also represented in the literature. Some of the most noteworthy analyses on North America, where intermodalism is most welldeveloped, include Chilcote (1986), Fleming (1989), Hanelt and Smith (1987), Hayuth (1982, 1985, 1987, 1988), Hayuth and Fleming (1994), Kuby and Reid (1993), Marti (1989), McCalla (1994), Slack (1985, 1993), Starr (1991), and Warf and Kleyn (1989). A second set of research that considers intermodalism and seaport competition and focuses on European seaports includes Charlier (1996) and Kreukels and Wever (1996). A third group provides related research on Asian seaports includes Comtois (1994) and Miyajima and Kwak (1989).

One of the most apparent effects of containerization and intermodalism (which will be discussed in more detail in Chapter 4) has been on the relationship between seaports and their hinterlands. It is widely observed that worldwide these innovations have greatly extended seaport hinterlands and brought a new scale to seaport competition. According to Hayuth, the implementation of intermodal transportation

Vastly increase[d] the geographical reach of favored ports . . . Large container ports [now] compete in an expanded arena, in which their nearest neighbour may not be [the] most serious rival. The once rather well defined tributary areas of a series of neighbouring ports have been heavily invaded by the major container ports, whose vast hinterlands can encompass entire countries or even continents. (Hayuth, 1982, p. 13)

The hinterland concept, thus, has remained important in studies of this new competitive environment. For example, it is central in the various studies listed above that have examined this effect. Hayuth (1987) notes that the growth of land-bridge traffic in North America, which brings seaports on opposite coasts into competition, provides evidence of

a "total" hinterland overlap. Charlier (1996) remarks on the efforts initiated by the port of Antwerp to reclaim container traffic generated by its host city that is lost to the more distant ports of Rotterdam and Zeebrugge. Miyajima and Kwak (1989) examine how smaller peripheral ports have successfully tapped the "captive" hinterlands of the ports of Tokyo and Yokohama.

An interesting variation on the hinterland emphasis has been advanced by a group including Fleming (1989), Hayuth and Fleming (1994), and Starr (1991) (all listed above). Taking a "site and situation" approach, these authors examine what makes for a "strategic location" in the intermodal era and how this affects the relative success of various seaports. As the general argument goes, each seaport possesses two locational attributes vis a vis the origins and destinations of freight traffic, "centrality" and "intermediacy", and these determine a seaport's competitive position. As Fleming and Hayuth explain:

Every major . . . port accommodates two fundamental kinds of revenue traffic flows. One is locally generated and stimulated by the port's nodality or *centrality* with respect to a [local or] regional hinterland. The other is distantly generated . . . and stimulated by the port's *en route* location or *intermediacy*. (Hayuth and Fleming, 1994, p. 188). [Italics added]

Port throughput generated by centrality (i.e. by the local hinterland) is considered to be "true origin and destination" traffic, while that generated by the port's intermediacy is viewed as "extra" traffic because "there was a choice and there were alternatives" (Ibid.). Fleming (1989) and Hayuth and Fleming (1994) both explain that the recent prosperity of US West Coast ports is due to their favourable intermediacy on Asia-North American and Asian-European trade lanes, while Starr (1991) argues that the decline of the port of Baltimore is related to a decline of its "en route" location. Clearly there are certain parallels between this approach and traditional hinterland approaches, in particular between "captive" hinterland traffic and centrality-generated traffic and between traffic from a disputed hinterland and intermediacy-generated traffic.

As new transport technologies are introduced and institutional frameworks are altered, seaports find themselves operating, and competing, in a very dynamic environment. In this environment, argues Slack (1985), the hinterland concept is less relevant to the analysis of seaport competition. Because proximity to port is less useful in explaining traffic levels at a port and the port "user" is no longer the shipper or consignee but the intermodal shipping firm, hinterlands are fluid and hard to define. Thus, it is difficult to explain the relative status of ports – their market shares – by emphasizing hinterland dimensions. More important to port success are the cost and service advantages offered by a port, recalling MacElwee's work on "traffic" advantages (MacElwee, 1918; 1926). In his study of competition between US and Canadian Atlantic ports, Slack (1985) advocates a "location choice" approach that seeks to understand the important criteria in the port selection process. In this article and others (such as Slack (1993)), he argues that decision-makers in the intermodal age are much less constrained by distance when selecting a seaport and can seek out various routes to their advantage. Furthermore, the criteria used in seaport selection were likely altered by the introduction of the new technologies that significantly affected the "competitiveness" of many ports. The validity of this argument is indicated by the emergence of seaport competition as an important topic in mode choice analysis. Murphy, Dalenburg, and Daley (1988, 1991, 1992) are the main contributors to this area of the seaport competition literature, which has as its ultimate aim to identify the relevant "selection factors" and allow seaports to

design appropriate marketing strategies in a competitive context. Other contributors are Hanelt and Smith (1987) and Murphy and Daley (1994). Table 1.1 presents one set of Slack's findings and provides a sample of the selection factors considered by these studies.

The relatively small number of studies listed above on European seaports is misleading. In fact, there is much more published work on seaport competition in Europe, but, though many studies note the effects of intermodalism, this is generally not their focus. While intermodalism is prominent as a means of transport in Europe, the facts of closely spaced, and still very meaningful, national boundaries and the resultant variety of customs and regulatory environments are at least as important in the movement of goods throughout the continent as are new transport technologies. Therefore, most studies on seaport competition in Europe give more emphasis to political and institutional issues. Verhoeff (1981) provides a general analysis of the political aspects of seaport competition, noting the complexity added to the issue by the variety of seaport policies followed by national governments. Another important issue in Europe is the effect of political-economic integration. Deecke and Läpple (1996) provide a look at the changing situation for German ports in a period of German reunification, while Arqued (1996) examines competition within the Spanish port system and the threat presented by Portuguese and French ports during further continental integration under the European Union. The impact of institutional reform on seaport competition is another major issue.

Table 1.1         Which of the following general factors do you consider important in choosing a port?		
Selection Factors	Response Rate (%)	
Number of sailings	89	
Inland freight rates	74	
Proximity of port	52	
Congestion	42	
Intermodal links	39	
Port equipment	38	
Port charges	32	

<sup>I</sup> Slack, B. (1985). Containerization, inter-port competition, and port selection. <u>Maritime Policy and Management</u>, 12(4), p. 297.

competition after deregulation and privatization in Britain. Finally, Kreukels and Wever (1996) consider seaport competition in the context of the changing institutional relationships between seaports and their host cities that have paralleled the emergence of intermodalism.

Studies of seaport competition in North America have also examined issues other than containerization and intermodalism. Talley (1988) looks at the changes in competition between U.S. seaports wrought by the Shipping Act of 1984. Ircha examines the relationship between the nature of competition and institutional structure of the seaport systems in the United States (Ircha, 1995) and Canada (Ircha, 1993). Continental economic integration has also been examined in North America, as Heikkila (1995) and Warf and Cox (1992) consider the effects of the U.S.-Canadian free trade agreements on the competitive situation of various groups of seaports. Finally, regarding the dramatic transformation of the competitive environment, a number of scholars argue for concomitant attitude and policy changes by seaports in North America, Europe, and beyond, including Fleming (1983; 1989) and Frankel (1996) who argue for mergers among regional seaports, and Goss (1990a; 1990b; 1990c; 1990d) and Heaver (1993), who claim the need for different management strategies by seaports. In general, the authors of this group of studies call for seaports to adjust to a new political-economic reality wrought by deregulation and privatisation in transport and the broader economy.

#### **Approaches to Research on Seaport Competition**

It is evident from the literature review that most of the research cited was conducted after the onset in the 1960s of the container and intermodal revolutions in shipping. During the 30 or so years since, the focus of that research expanded from narrow concerns about the extent of a given seaport's hinterland to a broader interest in technological, political, economic, and regulatory factors associated with the new methods of goods movement. While the scope of interest in issues related to seaport competition changed, however, the general approach to research remained the same. To an overwhelming degree, the literature on the effect of containerization and intermodalism on seaport competition consists of a type of research that Andrew Sayer has called "extensive" research<sup>2</sup>—that which is focused on identifying spatial patterns and regularities in large samples in order to produce generalizations and predictive spatial laws. This is not surprising given the fact that extensive research has been the dominant approach in all of social science for most of the postwar period. Nevertheless, despite its

widespread practice, Sayer argues that extensive research lacks explanatory penetration, particularly concerning processes of change (Cloke, Philo, and Sadler, 1991, p. 156). This weakness, in light of the purpose of my research – to explain the changes that produced a "new" seaport competition – highlights the value of an alternative approach to seaport competition. In this thesis, I break from the mold of extensive research in order to examine the causes of those changes. Instead of "extensive" research, my research is an example of "intensive" research. Intensive research is that which examines a smaller set of individuals to identify the causal relationships that produced particular events or objects. The major methodological differences between these two general types of research, which will be discussed further below, are summarized in Table 1.2. I am not aware of any example of intensive research in the geographic literature on seaports in general and on seaport competition in particular. Before briefly tracing the methodological history of seaport geography, I will contrast extensive and intensive approaches to research. Then, in order to situate my research within the literature on seaport competition, I will briefly cover the methodological history of such research. Following that, I will describe my approach in more detail.

#### Extensive Research

The preponderance of extensive research in the geographic literature on seaports and, more broadly, social science is the result of a dominant methodology associated with logical positivism, a philosophy of science that embraces a particular form of explanation

<sup>&</sup>lt;sup>2</sup> Sayer borrowed this term from R. Harre (1979), <u>Social Being</u>, Blackwell, Oxford.

Table 1.2Extensive and Intensive Research			
	INTENSIVE	EXTENSIVE .	
Research question	What produces a certain change? How does a process work out in a small number of cases?	What are the regularities, and common patterns of a population? How widely dis- persed are certain characteristics?	
Type of account produced	Causal explanation of the production of certain objects or events	Descriptive 'representative' generalizations	
Empirical methods Study of individual agents in their causal contexts, interactive interviews, qualitative analysis.		Large-scale survey of rep- resentative sample, standard- ized interviews, statistical analysis.	
Appropriate tests	Corroboration	Replication	
Cloke, P., Philo, C., Sadler, D. (1991). <u>Approaching Human Geography: An</u> <u>Introduction to Contemporary Theoretical Debates</u> . New York: Guilford Press, p. 155			

with which all scientific knowledge claims are expected to correspond. That form is embodied in the deductive-nomological model, according to which the occurrence of an event or phenomenon can be deduced from the conjunction of a set of initial conditions and a set of laws (Peet, 1998, p. 28). In other words, assuming the existence of universal laws that govern world processes, an event or phenomenon can be explained by referencing the relevant law or laws and the circumstances with which it or they interacted to produce that phenomenon. Fred Schaefer was the first geographer to publicly air this view when he wrote in an article that "To explain the phenomena .... means always to recognize them as instances of laws" (Schaefer, 1953, 227). The essence of explanation in positivist approaches, therefore, is the ability to deduce or predict unknown (unobserved in the past or present) or future occurrences of some phenomenon (Peet, 1998, p. 28).

Since laws are necessary to a positivist scientific explanation, the ultimate endeavour of extensive research is to uncover the laws governing processes. Thus, the purpose of positivist approaches, acting on the presumption that laws are manifested as observable patterns of events, is to identify empirical regularities in the relationships between observed events. As indicated in Table 1.2 empirical techniques ("methods") in extensive research are specifically designed to answer questions relating to this quest by accumulating large, representative data sets in which regularities might be identified to provide the basis for generally applicable statements concerning a particular phenomenon. Theories are devised to act as "filing-systems", to give order to the data, and reveal relationships within a population (Cox, 1996, p. 9). The development of theory, therefore, consists of making generalizations based on discerned empirical regularities. Theories generated in this way represent possible laws that can be confirmed as such through replications of the predictive tests by which they were established on different populations (data sets).

Positivist approaches and extensive research have been criticized on numerous philosophical and methodological grounds, but perhaps the most fundamental critique concerns the issue of causality. Positivism views the revelation of empirical regularities in the occurrence of events or phenomena as the ticket to providing explanations of objects or events. On the other hand, Sayer and like-minded scholars believe that causality does not necessarily follow pattern—knowing of a regularity in the occurrence

of two events does not explain how the two are related, yet alone the nature of their effect on each other (Cloke et al., 1991, p. 137). For example, consider Amartya Sen's argument on hunger and national food policies. For years, Sen argues, national governments and international aid agencies have relied on the measure of food output per head as the basis for food policy discussions because patterns of per capita food availability were assumed to correspond to (to explain) the existence of hunger (Sen, 1995). Sen shows, however, that vulnerability to hunger is not explained by the absolute size of the food supply but by the ability of individuals to acquire sufficient quantities of that supply for themselves and their households. Thus, an increase in the food supply does not necessarily mean that vulnerability to hunger in that society will decline, because many people may still lack the means of obtaining a share of that supply. In this case, the positivist approach embodied in extensive research is poorly suited to identify and theorize the mechanisms that determine vulnerability to hunger.

### Intensive Research

Sayer advocates an alternative approach to extensive research that more effectively identifies such mechanisms. Intensive research, as it is generally termed, is underpinned by the philosophy of realism, which rejects the notion that causation occurs at the level of events, and instead discerns the structures, realized as particular mechanisms, in which events are situated as the key to explaining a particular phenomenon. Restating the example above in realist terms, hunger (an event) is not explained by the level of food availability (an event) but by an individual's or household's ability to acquire a portion of food supplies via some form of exchange (a

structural mechanism). The events are causally connected, and thus explained, by an understanding of relevant structures and mechanisms because it is these "that enable [things] to produce or undergo particular changes" (Cloke et al, 1991, p. 136). Structures, in other words, are entities which, through their interrelationships, produce the "causal powers and liabilities" or the "ways of acting" of an object (Peet, 1998, p. 28). Structures are the forces of change because the nature of the object changes when the structures and/or their interrelationships are somehow altered. Prediction in this approach is not a useful test of the validity of knowledge claims. Instead, verification occurs when findings are corroborated by the experiences and understandings of those who are actually involved in the process(es) under examination (Sayer, 1992).

Intensive research is undertaken to identify the structures and mechanisms, which, through particular configurations, determine the "ways of acting" (i.e. the nature) of objects and processes. This endeavour necessitates a set of empirical techniques that differs from extensive techniques because internal logic – the connections or relationships between structures and mechanisms – is not found by looking at general properties over a whole population but through qualitative examinations of a smaller set of individuals (people, firms, seaports) in the context of an unfolding "causal" process. Such techniques, described in Table 1.2, are useful to this task because they allow researchers to get through to "those particular circumstances that are significant to individuals, and permits the corroboration of evidence to ensure that findings really do apply to those individuals actually studied" (Cloke et al, 1991, p. 156).

The role of theory in intensive research is also substantially different than its role in extensive research. In extensive research, theory is used to uncover the laws governing

relationships within some set of data that is representative of a whole population. In intensive research, on the contrary, theory serves to "carve up" the objects of research into structures and relations (Sayer, 1982). The development of theory thus consists not of generalizing, as in extensive research, but of conceptualizing or abstracting in order to identify structural aspects of the object of research. While extensive theory aspires to explain *what* will or did happen, intensive theory aspires to explain *how* it happened. A theory in intensive research is not a predictive device to be used deductively but a system of concepts that is used "suggestively" (Harris, 1997, p. xiv).

The differences in the type of theory generated by extensive and intensive research are related to broader views of the nature of the research process and the issue of "method." Research can be broadly defined as the search for knowledge, a process that is guided by a particular approach, a "way of thinking about problems," that is, a methodology (Relph, 1981, p. 102). According to Sayer, the extensive approach embodies the view that knowledge is acquired through "passive contemplation" and observation of the world. This suggests the detachment of the researcher from the object of study, a position that is attained by rigorous adherence to particular research techniques and the choice of mathematics as the tool and language of research. Through these "methods" human biases are removed from the "fact gathering" stage of research. Theory is used to explain the empirical observations, but it does not affect the data acquisition process. Sayer argues, however, against the "simple opposition or dualism of theory and empirics, for although they have certain contrasting aspects they also presuppose one another" (Sayer, 1992, p. 144). Theories provide us with a way of perceiving and knowing objects and relationships so that "fact gathering is a

hermeneutical process in which we continually negotiate between our inside social world and outside real world" (Barnes, 1996, p. 16). Rather than being a neutral and passive exercise, data acquisition involves the critical examination of how objects are understood or "carved up." In this view, empirical and theoretical research are interdependent—each necessarily informs the other. Empirical observations are "theory-laden," while theories are verified empirically. This circular aspect of research is particularly necessary in the social sciences because social structures and "ways of acting" are not timeless but continuously change, even as they are being examined (Sayer, 1992).

### Methodology and the Study of Seaport Competition

The methodological history of geographic research on seaport competition can be seen to encompass three broad periods: (1) Regional-descriptive, (2) scientificquantitative, and (3) behavioural geography. The regional-descriptive period is noteworthy because it witnessed the application of the hinterland concept to explanations of seaport competition. Positivism and, hence, an extensive approach emerged toward the end of this period and dominated research on seaport geography in the scientificquantitative and behavioural periods.

### Regional-descriptive Geography

The regional-descriptive tradition lasted from the late decades of the nineteenth century until the end of World War II. During this time, the dominant focus within the discipline of geography, particularly among Anglo-American geographers, was to "identify and describe regions of the earth's surface" (Cloke et al., 1991, p. 6). It is

known as regional-descriptive geography because the overarching concern of this broad approach in geographic research was, through orderly description, the careful representation of places in order to contribute to a more complete understanding of the "mosaic of separate landscapes" (Johnston, 1983, p. 43) on the face of the earth.

The examination of seaport competition via the concept of the hinterland, as in Wiegend's 1958 article, has its roots in the regional-descriptive tradition of geography because the hinterland itself is a type of region. In pursuit of the broad goal of identifying individual areas with particular characteristics (regions), geographers had identified two general types of regions, one type called a *formal* region and the other called a *functional* region (Ibid., pp. 43-44). A formal region is one that is characterized by the homogeneity of some particular phenomenon or set of phenomena and represents probably the most familiar conception of a region. Transport and, more particularly, seaport geographers were more interested in the idea of a functional region, which, as Johnston recalls in his methodological history of Anglo-American geography, is one "in which the unity [of the region] is imparted by organization around a common node" (Ibid., p. 44). Thus, the concept of the hinterland represents the spatial expression of the demand for a given seaport. The use of this regional concept enabled geographers to apply the time-honored method of regional-descriptive geography to examine seaport competition—map comparison (Ibid.). As a type of region, the identification and measurement of seaport hinterlands received a fair amount of attention from geographers prior to the scientific-quantitative approach that swept over the discipline following the Second World War. Moreover, the hinterland concept in studies of seaport competition

maintained its prominence even as it was combined with new approaches and techniques during later periods.<sup>3</sup>

#### Scientific-quantitative geography

After more than a half-century as the dominant approach in human geography, regional-descriptive geography eventually encountered serious doubts about its efficacy in research practice and general worth to the academic discipline. Beginning as tremors in the years immediately following the Second World War and fully erupting during the early 1950s, these doubts arose from a concern that geography had become too sterile per se and, more specifically, that the research it produced had little "practical and social utility" (Peet, 1998, p. 19). This critique made way for a more concentrated critique of geography as a regional-descriptive discipline and the emergence of a positivist extensive approach to geographic research that can be characterized as the scientific-quantitative approach.

The fundamental problem of regional-descriptive geography, as perceived by its critics, was its detachment from the goals and methods of modern science. Rather than concentrating on the uniqueness of places and the particular connections that produced that distinctiveness, a more scientific geography would focus instead on similarities between them (Peet, 1998). The focus of geographic research would shift from the description of the earth's particular landscapes or regions to the development of theories (generalizations as potential laws) about the spatial organization of phenomena on the earth's surface. As Peet observes, geographers' collective embrace of the "scientific

<sup>&</sup>lt;sup>3</sup> See Kenyon (1970), Hoare (1986), and Taaffe, Morrill, and Gould (1963) for examples of the use of the hinterland concept in post-regional-descriptive periods.

method" generated a need for and elevated the use of mathematics and quantitative techniques in geographic research. The need to identify empirical regularities, often statistically, in large data sets and the view that the discovery, testing, and validation of universal spatial laws necessitated a language that was detached from the theorist herself or himself made it apparent that "mathematics is the best tool" (Ibid., p. 22).

Seaport geographers readily engaged in the search for universal laws of spatial organization, with the most prominent product being the TMG model discussed above (Taaffe et al, 1963). Indeed, in an article in which he sought to improve this model (also mentioned above), Rimmer argued:

With their emphasis on the uniqueness of individual ports or the peculiar features of groups of centres these studies have paid little attention to the problem of *providing a model against which the various aspects of port geography can be measured*. (Rimmer, 1967, p. 42) [Italics added]

Thus, Rimmer sought to generate an idealized descriptive model based on generalizations of historical data that could serve as the basis for explanations of individual cases around the world. Illustrating his adherence to the deductive-nomological form of explanation, he wrote, "The model is intended to serve as a yard stick for comparing changes in the evolution of seaports" (Ibid., p. 42). In another study of seaport competition in the scientific-quantitative tradition, Sun and Bunamo (1973) explained the changing competitive position of the Port of New York by modeling how the port's market share had declined in relation to several variables, including a shift in U.S. foreign trade from Europe to East Asia. They concluded that, "It is believed that this approach is sufficiently operational and flexible to explain the competitive performance of any U.S. port" (Ibid, p. 162). In both cases, the goal was to provide generalized accounts (i.e.
models) of what should or should have occurred under some specified ideal conditions. Explanations then derived from comparisons between real world events and these hypothesized models.

## Behavioural geography

By the mid-1960s the positivist scientific-quantitative approach had been widely adopted so that geography hardly resembled the discipline it had been a mere 10-15 years before. At the same time, however, a swelling of disquiet began to emerge over the inability of so many of the theories and models to account for spatial patterns in reality (Cloke et al., 1991; Peet, 1998). This produced various types of critics of the dominant approach in geography, including some who called for new approaches guided by different philosophies. Others, on the other hand, still believed in the positivistic goals of scientific or "theoretical" geography – to establish generalizations and theories – and sought therefore to improve on that approach (Johnston, 1983, p. 126). The general solution proposed by this latter group focused on the deductive-nomological mode of explanation favored by spatial scientists. They suggested that instead of deducing the occurrence of phenomena from presumed theories, scientific explanations should be induced from particular instances of a given phenomenon (Peet, 1998, p. 28). By employing an inductive-nomological approach, it was argued, geographers could provide better inputs to better models, thus improving the scientific results of geographic research.

This push resulted in a type of inductive approach that came to be known as behavioural geography. Behavioural geographers sought to "engage directly with the

thoughts and actions" of human decision-makers who do not always behave according to idealized models (Cloke et al, 1991, p. 67). Their research was concerned with the types of, and ways in which, human attributes influence spatial behaviour and how humans perceive their environment and evaluate among spatial choices (Ibid.). Such work included studies of human response to environmental hazards, decision-making in spatial contexts ("spatial preferences"), mental maps, and the development of time-space geography (Johnston, 1983).

The general approach of behavioural geography was very influential on the study of seaports in general and seaport competition in particular. Numerous research projects, such as studies of port selection factors and port development, have followed the inductive scientific approach of behavioural geography. Especially emblematic of this trend in port geography, though not specifically as a study of seaport competition, was a series of articles authored and co-authored by James Bird (Bird, 1982; 1984; Bird, Lochhead, and Willingale, 1983). The articles in the series were based on two large projects in which Bird and his colleagues sought to establish generalizations about the port development process by studying the "real-life decision process" (Bird et al, 1983, p. 144) while maintaining a clear commitment to the positivist mode of scientific explanation. Thus, theirs was an attempt to achieve the goals of scientific-quantitative geography but to take a slightly different route to those ends. Similarly, in the behavioural tradition, Slack argued that "competing ports must be viewed from the perspectives of the exporters and importers. The decisions they make influence cargo flows and port traffic" (Slack, 1985, p. 293). As mentioned above, Slack's 1985 article is one among numerous pieces that approach seaport competition as a location choice

problem that merits an examination of how the location decision-makers evaluate the range of (perceived) available choices (see literature review and Table 1.1 above).

# Post-positivist geography

Alongside, and in the years following, the emergence of behavioural geography, the discipline of geography witnessed the emergence of various additional movements espousing different philosophies and methodologies, including Marxist, feminist, humanistic, post -structural, and postmodern approaches (Peet, 1998). Most, but not all, of these movements recognized inherent weaknesses in positivistic methods and were attempts to provide useful alternatives to this methodology. While a few of these movements have surfaced in seaport geography, they have not produced examples of intensive research on the "new" seaport competition. Indeed, in the 1990s positivistic science remains the dominant approach to research on seaports and the competition between them.

# An Intensive Approach to the Study of Seaport Competition

Since the scientific-quantitative approach emerged in geography in the late 1950s, it has remained the dominant approach to geographic research on seaports. Behavioural geography offered a revised approach, but seaport geographers who adopted it remained committed to the goals and methods of positivistic science. As a result of this methodological inertia, the general characteristics of the "new" competition are well documented, from the spatial extension of hinterlands to the shifting prominence among port selection factors and the pattern of policy changes in the transport industry. My

research is an attempt to complement these accounts by moving beyond the identification and documentation of empirical regularities related to the "new" seaport competition to provide an "intensive" analysis of the structural changes that brought it about. Thus, my research shall emphasize the structural changes wrought by the diffusion of containerization and intermodalism that produced a transformation in the nature of seaport competition. This will complement the existing literature because these structural changes underlie and thus explain the causes of the patterns revealed by extensive research on seaports and competition.

Inasmuch as my research involves personal interviews with port officials, I perpetuate one thread of the behavioural geographic tradition in seaport geography by engaging directly with the thoughts and actions of human decision-makers. I do not, however, pursue behavioural geography's positivistic goals, methods, or its mode of explanation. Intensive research attempts to understand and explain a process of change in terms of causal structures rather than merely as a conjunction of separate events. Its goal therefore is to identify those structures and their interrelationships instead of the general pattern of occurrence of particular types of events. To achieve this end, intensive research makes use of abstraction (i.e. theorizing or conceptualizing), interactive interviews and case studies rather than hypothesis formulation, representative samples, formalized questionnaires, and statistical analysis. The structure of this thesis reflects an intensive approach to research. Chapters 2 and 3 present my theoretical effort to identify the structural factors that were fundamentally involved in the change in seaport competition. In order to establish the setting in which a change in competition occurred, Chapter 4 provides a look at the nature and emergence of containerization and

intermodalism, then Chapter 5 examines how these new modes of shipping altered the fundamental structures of competition. The case made in Chapter 5 is corroborated in Chapter 6, which presents the experiences and perceptions of seaport officials at three seaports in the North American Pacific Northwest. In the next and final part of this section I shall present a brief preview of the thesis and explain this format in a bit more detail.

#### A Summary Preview

The technological and organizational revolutions in shipping known as containerization and intermodalism are causally related to the transformation of the nature of seaport competition through a structural change of the regime of competitiveness. The theoretical basis for this account is developed in Chapters 2 and 3. First, in Chapter 2, I theorize about the seaport in order to disclose the structures through which the seaport is able to serve its function within the transport industry. By theorizing the seaport in terms of a production-system, I am able to provide a concept of the seaport that recognizes those structures and the interrelations between them that determine the seaport's ability produce the transshipment product and, therefore, to compete. This is especially important because changes in seaport's structures bear on the overall competitiveness of that port.

In Chapter 3 I move from the seaport to theorize about competition. Competition is a defining and powerful category of analysis in understanding capitalist economy dynamics and it is therefore often theorized as a wider structure that determines the conditions of economic survival. Less frequently has it been viewed as a process – "the

search for advantage by one [economic actor] over another" (Storper and Walker, 1989, p. 44) – whose character derives from the particular qualities of its structural elements. This latter view, however, is better suited to contribute to an understanding of the forces that produced the "new" seaport competition. Expanding on this view, I show how competition is a social process that is defined by particular qualities of time and space. Time and space, in other words, are structures that determine the nature of competition. The act of competing is interpreted, therefore, as a matter of assessing the temporal and spatial character of strategic problems and formulating solutions that address them. The configuration of seaport production-systems, like all production-systems, reflects previous efforts to resolve earlier, different sets of strategic problems in the search for a competitive advantage. Change in the time-space character of strategic problems undermines the competitiveness of the existing configuration of the seaport production-system, i.e. necessary structures, which is locked in a previous time-space regime.

The second broad step in this research was to explain how the particular "spatiotemporality" (Harvey, 1996, p. 244) – the structures – imposed by containerization and intermodalism produced a "new" competition between seaports. First, in Chapter 4, I chronicle the emergence of containerization and intermodalism as revolutionary modes of shipping to serve the postwar expansion of world trade. In the chapter I will describe the defining features of each mode and the prominent technological and organizational changes, and point out several of the basic patterns in shipping that have developed as a result. This chapter shall establish the necessary background for Chapter 5, in which I review and discuss the temporal and spatial dimensions of the strategic problems and solutions that constitute the new competition.

The third step addresses the adequacy of the research findings. Does the explanation of change presented in Chapter 5 apply to the experiences of individuals actually involved in seaport competition? To provide such corroboration I conducted personal interviews with officials at seaports in the Tacoma, Seattle, and Vancouver areas. As individuals who are privy to, and integrally engaged with, the problems and strategies that constitute the competitive situation for each of those ports, these seaport officials have an intimate understanding of seaport competition that can be used for verification. Before providing an explication of the method underlying this component of the research, I should not that the placement of these interviews in the next-to-last chapter does not reflect a marginal role for them. On the contrary, through this interviews I gained numerous insights that clarified theoretical matters, gave me new ideas, and generally informed most everything that has been placed before them. Their position in this thesis reflects an attempt to provide corroboration for the reader of the ideas presented in Chapter 2-5 and a need, for the sake of lucidity, to present a neater and more coherent, if slightly misleading, flow for the reader.

The interviews were largely unstructured – that is, the meetings were not organized around a standard set of questions – and were interactive to allow for the expression of participants' perceptions, insights, and experiences. To get in touch with these officials, I compiled a list of possible interview participants based on the 1996 <u>Containerisation International Yearbook</u> listings for the ports of Vancouver, BC, Seattle, Tacoma, and Portland, OR. I was seeking officials from the port authorities and container terminals at the major ports in the Pacific Northwest in order to discuss the various dimensions of the competitive problems and strategies encountered by seaports serving

containerized intermodal traffic. The selection of these ports was not only pragmatic, based on limited funds for travel, but also because each is clearly significantly committed to serving such freight. During February and March of 1997 I mailed an interview request to each of the 17 officials on the list. By early May I had received 8 responses. No responses were received from the Port of Portland.

The interviews were conducted during May and June of 1997. In the request that was mailed to each participant I attempted to give him (all were male) an idea of the general nature and format of the interview and asked if he would suggest a time when we could meet. The interviews lasted between 55 minutes and one hour 40 minutes. Participants were asked questions based on a list of certain issues related to competition. I allowed the flow of conversation to dictate the order in which these issues were covered, allowing the participants to articulate their perceptions and experiences in their own words. I recorded each interview on tape on the condition that the participant and his (all were males) specific employer would remain anonymous in any presentation of material coming out of the interview. All but two participants indicated that they would waive this confidentiality. Despite the very forthrightness of all interviewees, and in respect of those two who wished to remain anonymous, all responses will be presented anonymously. I will label the source of each response only by the date of the interview and the port to which the official is associated (Vancouver, Seattle, or Tacoma). In Chapter 6, I will present excerpts from these interviews that will corroborate the theoretical findings reached in Chapters 2-5 of the thesis.

# Chapter 2

# Conceptualizing Seaports: From "Knots" to Production-Systems

In an article in 1958, Guido Weigend famously conceptualized the seaport as "a knot where ocean and land transport lines meet and intertwine" (Weigend, 1958, p. 185). Other scholars have repeated Weigend's concept in their own work or found their own terms to similarly conceptualize the seaport—a "node" in a transport network, a "funnel of trade," and a "gateway." These concepts are straightforward and meaningful and, therefore, very popular. While they are useful for many purposes, such concepts are not suitable for intensive research because the concept of the seaport as a knot, for example, does not characterize the essential elements (or structures) and the necessary relations between them that determine the seaport's causal powers or liabilities and potential forces of change. Without a theory (or concept) of these, it is difficult to explain what causes changes in the seaport's ability to gain an economic advantage—that is, its ability to compete. The purpose of this chapter is to develop an understanding of the seaport in terms of its constituent structures to provide the conceptual basis for an explanation of how containerization and intermodalism have changed the nature of seaport competition.

### The Case for Conceptualizing the Seaport

The development of a concept of the seaport that emphasizes its constituent elements and relations is not a well-trodden path. The exercise appears, and often is,

unnecessary for the purposes of extensive research on seaports. The work of two scholars, however, shows a conscious effort dedicated to identifying the essential characteristics that make up the seaport. The first, James Bird, wrote extensively about seaports from the late 1960s to the 1980s, and the second, Roy MacElwee, published two major works on seaports in the decade following the First World War. While neither produced any final explicitly stated concept, their ideas towards that end serve as an instructive beginning.

Bird claimed to be surprised by the paucity of academic studies that "probe deeply" into the subject of seaports, despite their obvious national and international economic importance. His stated objective was to provide a concept that would enhance seaport and maritime studies and make the seaports "for once . . . the stars of the show" (Bird, 1971, p. 11). For MacElwee, like Bird, the "very looseness of port terminology indicate[d] how little scientific thought" (MacElwee, 1918, p. 7) had been given to the topic of seaports, and pointed to a poor understanding of seaports' importance to local and national economies.

To both men, the crucial distinction to be made was between things known as "seaports" and other things known as "harbours." By definition a seaport operates at the land-sea interface and almost always within the protective confines of a harbour, yet Bird felt it important to make the distinction between "port" and "harbour" because of what he saw as a problem of scale. To make the point that scale creates certain "complications" for students of seaports, he noted the issues that arise as seaports grow to become "modern commercially significant enterprises":

First, the growing functions cannot all be carried out at the same location . . . [second], the influence of the port, as well as the

influences affecting it, can be identified over wider areas beyond the port perimeter. (Bird, 1984, p. 21)

Thus, even though "[t]he useful name for the water site is, of course, the harbour . . . this term cannot easily be extended to cover all the components of the water site of a modern port" (Bird, 1971, p. 29). If "ports" are thought of as primarily "harbours", many of the constituent elements that necessarily constitute seaports are likely to be overlooked.

Interestingly, these same points underpinned MacElwee's approach to the seaport concept in Ports and Terminal Facilities, published more than 50 years before Bird's Seaports and Seaport Terminals. The port concept should convey "all those arrangements, mechanical and otherwise, which make easy the transference of passengers and goods" across the waterfront (Ibid., p. 5). MacElwee argued that a conflation of "port" and "harbour" would not adequately represent all of those "arrangements" that arise to provide cargo transfer at that place. He pointed, like Bird, to "scale" as a principal cause of this situation. In Port Development, for example, MacElwee suggested that in addition to the efficiency of the cranes and labour force at the waterfront, the competitive ability of a port derived significantly from sources that were geographically detached and sometimes quite distant from the site where ships were berthed (MacElwee, 1926, p. 43). To consolidate his point he wrote, while "we must never lose sight of the ultimate function" it is necessary to "discuss minutely many details, many component units [that enable] the operation of the whole" (Ibid.). MacElwee thus endeavoured to provide a concept that would not conceptually rub out the system of various, yet all essential, activities involved in providing the seaport with the ability to carry out its function.

The efforts of these two men are instructive because they draw attention to the existence of "structures" of seaports and the arrangements that give seaports the ability to function as "knots" in transport systems. In this chapter I shall expand on their idea of the seaport as a chain of activities in order to conceptualize the seaport as a production-system. Figure 2.1 depicts the basic form of the seaport production-system, including four production cells, each containing its own set of particular necessary activities, and the port authority. These five elements combine to allow the seaport to serve its function in the transport system. In the remainder I shall develop this concept further. I begin with a discussion of the function of the seaport – the technical and economic reasons why it exists – before highlighting the necessary elements (the structures and mechanisms) – what they are and how they are organized – that enable the seaport to serve that function.



# **The Seaport Product**

Before discussing the structures that allow seaports to act as "knots," we need to understand the economic and technological rationale for seaports. We must beg the question, why seaports? The fundamental purpose of a seaport is to facilitate the transfer of cargo between waterborne and land transport vessels. The need for this service arises primarily from the technological limitations of transport modes, namely the surface modes of water, rail, motor, and pipeline, which are physically or economically unable to provide cargo movement across the land-sea interface. Inasmuch as they allow such movement by transferring cargo between land and waterborne transport systems, Suykens characterizes the essential port function as, "transport integration" (Suykens, 1989, p. 437).

In the context of seaport competition, in which seaports vie with one another to lure business, I think it is more helpful to think in terms of the seaport's core *product* rather than its *function*, even though the difference may only be semantic. An appropriate term for this product is *transshipment*, broadly defined as the physical transfer of cargo from one vessel to another. Seaports arise to provide this service at the land-sea boundary and ultimately it is the activity that sustains them, particularly in a competitive environment. And while transshipment is not the exclusive product of seaports—any truck or rail freight depot also provides transshipment—a good understanding of this activity serves as a sound basis upon which to develop concepts of both the seaport and seaport competition.

# Transshipment and the Commodity of Transportation

Transshipment affects the efficiency of goods movement and it is, therefore, a significant matter in the realm of freight transport. Seaports, inland freight terminals, truck depots, and rail yards provide material evidence of the need for and importance of this activity. Age-old efforts to unitize shipments and improve intermodal coordination represent struggles to make the best of this necessary interruption of the flow of cargo. Indeed, containerization and intermodalism represent transshipment revolutions. This discussion begins by framing transshipment as an intermediate transport product and then points out the basic physical, political, and economic circumstances that lead to its use.

Transshipment is an intermediate product of the transport industry, which sells a "change of location" as its product (Harvey, 1982, p. 377). As such, it is important to highlight some fundamental characteristics about the general commodity of transportation, of which transshipment becomes a part when performed. This commodity creates value by improving the "usefulness [of commodities by bringing them in better] relation to other objects, events and activities" (Smith, 1984, p. 83). However, it is only productive of value if it meets the economic requirements of those commodities that it moves. It is said, then, that the demand for transportation is derived from the needs of other economic activities, for it is not a desire for the product itself, but for what can be produced because of it, that leads to its production. This does not apply to all forms of transportation, like, for example, joy rides up and down Main Street or Alaskan cruises; in these cases the demand is for movement itself. In cases of *derived demand*, transportation is needed in order to "overcome the spatial gap between points of demand

and centres of supply" (Hayuth, 1987, p. 98). Freight transport, thus, has no purpose if there is no cargo to be moved.

Derived demand is an important concept because, when it applies, the nature of the transportation commodity is determined by the requirements of other activities, and these set crucial parameters for the production process. As a basic example, transportation always has a specific origin-destination orientation, decided by other economic activities, which significantly constrains the spatial movements inherent in its production. In addition, we can recognize several principal criteria by which a given "change of location" product is valued in a capitalist society: time and money costs, reliability (or risk), and regularity of transportation. These criteria act to constrain or guide the transport industry, which must produce to meet them (Harvey, 1982; Sheppard, 1990). In general, the desire is to reduce time and money costs while maximizing reliability and regularity. In some cases, however, it may be viewed as more important that the "change of location" occur within a defined time window, not simply in the shortest time possible, such as with just-in-time production systems or other "demandpull" inventory systems (Harper and Goodner, 1990). This shifts emphasis to the reliability criterion, which becomes as important as minimizing transportation time. Similarly, regularity of transportation may be the preferred criterion, because production can be more easily managed and designed around routine, dependable shipments (Schoenberger, 1996, pp. 34-40). For the shipper, regular and reliable transportation can improve the efficiency of the firm's production process and may determine product demand in a particular market area (Coyle, Bardi, and Langley, 1995, 318).

As an intermediate transport product, the need for transshipment can be viewed as deriving from the needs of the total movement of a particular shipment. As such, the transshipment process will bear on the transport industry's endeavour to meet the general time, cost, and reliability criteria. The tendency is for transshipment to increase both money and time costs of movement, whether it is provided internally or by paying an outside provider for the service. The owner of the vessel incurs an opportunity cost while the vessel sits at the terminal being unloaded and loaded (Chilcote, 1986), and, moreover, transshipment necessarily delays the movement of the goods being shipped. Transshipment also adds an element of risk to the commodity of transportation, thus potentially threatening the reliability and regularity of transportation. In 1975, by Jansson and Shneerson's estimates, the average waiting time of ships at the Port of Lagos, Nigeria, was 240 days, providing an extreme but poignant example of the overall costs of transshipment (Jansson and Shneerson, 1982, p. 11).

#### Challenges to Providing Transshipment

As the previous section suggested, transshipment is a costly process that usually cannot be avoided. From a different perspective, however, it can be viewed as a necessity that can be used in a way that improves transport. Indeed, the provision of transshipment is critical in the effort to provide efficient and reliable transportation. If the decision to transfer cargo is to be viewed as a strategic option in the provision of a "change of location," there must be an element of certainty that the cargo will avoid both damage and unexpected delays. In every case, transshipment requires several fundamental tasks: (1) vessels must be brought in some proximity to each other, (2) the

cargo must be unloaded and/or loaded, transferred, or stored, (3) and relevant information about each shipment must be transferred along with it. Regarding this third task, Mahoney (1985) argues that transferring information about a shipment is as important in transshipment as the transfer of the cargo itself. It is incumbent on the provider of transshipment, such as the seaport, to make these tasks into a routine process, an endeavour that faces two basic challenges: accessibility and coordination.

The sufficient condition for the provision of transshipment is accessibility. Any two vessels involved in cargo transfer need some degree of physical proximity to each other, not only as a technical prerequisite, but an economic one as well. The mobility limits of individual vessels present a physical obstacle to meeting this condition which, to overcome, requires the development of a suitable site that is accessible to both vessels. In general, site development for transshipment involves the provision of infrastructure, such as roads, rail, runways, and deep-water channels as well as docking installations.

A second challenge in transshipment is coordination, which, at a basic level, involves getting vessels together in space as well as time. An important task is to ensure that each incoming shipment will be provided with outgoing transport for the completion of its journey. For the transshipment provider, fitting together the different physical configurations of break-bulk vessels, their usually odd-sized pieces of cargo, and different shipment sizes presents difficulties, particularly in the sense that direct transfers between vessels are virtually impossible. Many break-bulk vessels carry multiple shipments ("less-than-truckload"), each with its own destination, which need to be separated at some point and placed on different vessels to complete the journey. This significantly reduces the possibility of a direct transfer between two vessels. The task of

coordination is made easier if the transshipment point contains a temporary storage facility. Storage provides "slack" in the system and lowers many coordinative hurdles. In the same way, additional installations, such as loading/off-loading equipment, and drayage equipment facilitate transfers that need not be directly between the principal incoming and outgoing vessels.

### Seaports as Transshipment Providers

Seaports are the primary transshipment points in the international economy. In the late 1980s, nearly two-thirds of all international trade by value, and 95 percent as measured by weight, was transported by ocean carriers (Zacher and Sutton, 1996, p. 38). Seaports provided the means of connecting these trade movements between the exporting and importing economies. Images of the seaport as a gateway, a funnel, a link or a bottleneck attempt to capture the significance of transshipment at the seaport. MacElwee (1918; 1926) wrote two books with the aim to highlight the both the value of efficient seaports to the national economy and the "parasitic" effect of a congested and costly port.<sup>1</sup>

The land-sea boundary presents one of the most formidable challenges to transportation, yet the intertwined world economy depends on the movement of cargo across this boundary. Nowhere, perhaps, is the need for transshipment more important and more problematic. If goods are to be moved reliably between ocean and land transport systems, the first condition that must be met is accessibility. To serve ocean carriers, seaports must provide adequate (deep-water) approach channels and quays or berths where ships can repose securely while being unloaded and loaded. Dredging is an

important process to both of these elements, particularly as ships get larger and require deeper water both through the approach and along firm land. Truck and rail access to the quay is necessary on the landward side, which requires adequate space within the port area and rights of way through urban areas that are at least minimally dependable.

In addition to accessibility issues, the transshipment process at the seaport is infused with coordinative challenges. Even in the simplest cases, transshipment at the land-sea boundary is a multi-task process. The coordination of these tasks, in a general sense, constitutes a constant and major challenge to the seaport. Additionally, many of the individual tasks confront certain coordinative issues. Figure 2.2 depicts some basic port activities, including the arrival and departure of transport vessels, loading, unloading, temporary storage, and drayage (intermediate cargo movements between the principal vessels and storage and processing areas, such as that between port facilities and inland transport provided by yardhorses<sup>2</sup>). In addition to those activities portrayed, transshipment also requires navigation services, information handling, unpacking, sorting, re-packing and consolidation, customs inspection and numerous other vital administrative and service activities, such as port planning and ship repair.

## **Necessary Elements in Seaport Production**

In this section I present my view that seaports are necessarily constituted by two types of elements, production cells and port authorities. Four types of production cells are recognized, each of which consists of various activities that allow, and contribute to

<sup>&</sup>lt;sup>1</sup> For example, see MacElwee (1918), p. 2

<sup>&</sup>lt;sup>2</sup> See Mahoney 1985, p. 96



the nature of, the transshipment process. The port authority relates to a necessity of a public role in seaport production.

# Necessary Tasks in Transshipment Production by the Seaport

The assortment of tasks that are fundamental to port operations can be grouped into four groups or "cells." The first, navigation aids, includes the services provided by lighthouses, buoys, harbour radar, and, most notably, tugs. While this group of services is an often overlooked part of port operations, they serve an important role by reducing both the general risk of calling on the port and the time spent in port by the ship (Imakita, 1978). In comparison, the second "cell" is perhaps the most recognizable domain of port operations. This group comprises the services involved in cargo handling and transfer. These services, which typically rely on the use of giant quayside cranes or spiral conveyors and drayage equipment, provide the "true" interface between water and land transport, which may account for the general awareness about them (Ibid.).

The third "cell" involves the services that make up a seaport's storage system. No coordinative challenge is literally larger than providing temporary storage for the large "pulses" of cargo brought to port by ocean ships. These ships often carry more than 1000 times more cargo than any land vessel, particularly in the container-age (Goss, 1990a, p. 210). Even the most productive ports have neither the technical capacity nor the space to efficiently enact direct transfers from ship to rail and/or truck. Unless the ship is expected to wait for the slower process of loading directly to or unloading directly from the landside vessels, the seaport must provide a storage system where cargo can be held

temporarily. Depending on the cargo, storage may involve a variety of facilities including warehouses, transit sheds, covered bulk storage, or open container yards.

Logistics related services comprise the fourth "cell" of services. Among such services are freight unpacking and repacking, including container stuffing and destuffing, cargo consolidation, customs clearance, information handling, and coordination with inland transport. Regarding the last function, while inland transport per se is outside the scope of port operations, it is nevertheless important because "[e]fficiency in the handling system depends not only on the handling rate at quayside, but also on the extent to which the link-ups between this system and all subsequent ones [such as inland transport] are properly matched" (Imakita, 1978, p. 13). This point is relevant to customs clearance as well, which is often the source of bottlenecks in the port. Hence, it is obvious that logistics services are not secondary concerns in relation to total port productivity. They also provide an area of port operations where seaports can offer differentiated services, such as specialized warehouse facilities and information linkages between shippers and carriers. Indeed, both shippers and carriers covet the availability of useful and on-time information in the era of demand-pull logistics and intermodal transport.

#### The Necessity of the Port Authority

Historically, the existence of these basic accessibility and coordinative challenges to transshipment at the land-sea interface has resulted in various forms of involvement by the public sector in the operation, administration, and ownership of seaports. Such involvement has occurred worldwide and has played such a prominent and oftentimes necessary role that it is elemental to this examination of the seaport concept. Therefore,

this section concludes by discussing the basic form of this involvement and the reasons why this public role acts as a necessary element, a structural feature, of the seaport.

The port authority represents the most widespread form of public sector involvement in seaports (Goss, 1990b). Fair defines a port authority as "any quasiautonomous or quasi-independent agency which has the adequate authority and freedom of action to provide a strong and effective management of a port" (Fair, p. 43, p. 1954). All port authorities worldwide are not identical, so this definition is necessarily vague to accommodate the diversity (Thomas, 1994). Goss (1990b) provides a basic framework with which to organize the various approaches to public sector management of seaports. His framework emphasizes the two main qualities of any port authority: (1) The port authority's administrative status or its "level of control", and (2) the range of activities undertaken by it. Goss recognizes three general levels of control possessed by port authorities—local, regional, or national. Examples of each type can be found in the U.S., Australia, and Canada. In the US, the administrative status of port authorities tends to be at the local level, usually under the control of state- or municipal-level agencies (Ircha, 1995). Australian port authorities are under the control of individual states, reflecting more of a regional-level approach to seaport management (Goss, 1990b). Meanwhile, in Canada, all port authorities report directly to the federal transport ministry (Goss, 1990b).

The range of activities engaged in by the port authority, that is, the extent to which the port authority involves itself in the ownership and operation of port facilities constitutes the second dimension in Goss's framework. This dimension is characterized by two extreme positions, described as "comprehensive" and "landlord". A port authority that directly provides all or most of the facilities, services, and employs the

manual labour is said to act in a "comprehensive" role. At the other extreme, as a "landlord" agency, the port authority limits its involvement to providing infrastructure and essential services, such as security, navigation, and harbour maintenance (Thomas, 1994). In the case of a "landlord" port authority, private operators are licensed to provide traditional functions such as loading/unloading and warehousing/storage. Both of these are extreme positions and, though examples of each can be found, they are not typical (Goss, 1990b). Most port authorities fall somewhere in between the "comprehensive" and "landlord" positions.

Events during the last decade have given indications that public involvement in seaports is undergoing a period of significant change. Indeed, Heaver (1995) and Thomas (1994) note that as part of a worldwide trend towards institutional and regulatory change in transportation, public control over seaports is becoming more localized and more port authorities are moving into "landlord" positions by privatizing certain port functions. Nevertheless, while not directly involved in operations, port authorities remain crucial to seaports. Thomas elucidates this important point:

[The port authority] must monitor and coordinate the activities of the independent companies [that may be] operating in the port, as well as those of other organizations that come into contact with the port, such as customs and health authorities, dock labour boards, trucking companies and railway corporations. Coordinating this wide range of activities is an important and often difficult task . . .. (Thomas, 1994)

Based on Thomas's statements, it can be argued that in a practical sense port authorities, whether their role is in operations, management, or administration, are fundamental elements of seaports themselves. This claim, however, brings into question the reasons for public interest in seaports in the first place, a question that connects to a larger debate over public sector intervention in economic activities in general.

According to Zacher and Sutton (1996), public sector involvement in the economy usually results in the presence of four particular issues or "market failures": natural monopolies, externalities, common ownership of resources, and public goods, all of which may exist in the production of transshipment by the seaport. In fact, according to Goss (1990c), the presence of market failures in the seaport industry is what led to the creation of public sector port authorities. Seaports possess latent monopolistic powers deriving from the limited number of possible sites and the enormous investment required in order to develop a site and establish an adequate superstructure. Examples of such investments that would be required are a deep-water approach channel, substantial quays or berths, and expensive gantry cranes. In addition, monopolistic powers arise from the seaport's "large advantage in its natural hinterland" (Heaver, 1995) over shippers, carriers, and any other activity that is technically bound to that seaport's waterfront location. The control by railroads over public access to the waterfront led to the development of port authorities in the US in order to ensure equitable access to all users (Ircha, 1995). While these conditions draw the public sector into the business of the seaport in order to prevent monopolistic exploitation, public involvement is also needed to promote efficiency as with a *natural* monopoly. Most of the considerable investments made to develop a seaport are fixed costs, which are difficult to recoup under dynamic, competitive conditions. The establishment of a public body to manage the seaport allows the economies of scale present in this situation to benefit both the individual consumers and the investor who may recover costs.

Property rights create various issues that also attract a public interest in the production of transshipment by seaports. A particular problem is created because laws

that govern the market for land are quite different than those for water. In particular, Goss notes that while a proprietary transfer of land between a buyer and seller is usually a straightforward and familiar process,

with areas of water . . . there is usually no recognition of legal title (save that of the state), no mechanism for transfer and, therefore, no market for the surface of the water, the vertical column beneath it, the seabed or anything beneath it. (Goss, 1990c, p. 259).

Thus, not only does any port structure that extends from land to water sit simultaneously in different legal regimes, but also the "aquatorial" regime by itself is complicated in terms of property rights. The flimsy property rights created by these conditions would likely prevent private interest in constructing expensive and large structures, such as quays and jetties needed by the seaport. This solution is overcome such insecurity by establishing a public body with legal status over such property, such as a port authority. A related problem of property rights arises due to the lack of explicit ownership in the aquatorial regime, namely the possible misuse of the harbour. In the absence of harbourwide planning, this common resource may be subject to inefficient and possibly exploitative use by agents acting in their own narrow, short-term interests.

The waterborne activities of a seaport cannot function in isolation of those that occur on land, however, so the need for planned use of the harbour pertains also to activities on the land. A comprehensive perspective is needed to decide how port activities and facilities will be related to other features of the port in their form and location. As Goss (1990c, p. 261) explains, "each port authority has a finite area and, within this, every activity usually has some opportunity costs if only in that it prevents some other activity being carried on." As an example, he considers how the construction of a jetty may disrupt other activities or installations by accelerating siltation beneath a

berth. Furthermore, the activities occurring within the port must be fairly integrated with land transport and neighbouring communities.

A number of the basic elements of the seaport are also public goods, which calls for a public sector interest. Most prominent among these are the navigation aids, such as buoys and radio transmitters, which cost the same to provide no matter how many are using them. It is the same with breakwater structures, which protect the entrance to most ports and allow deep-water berths (Bird, 1971, p. 44).

Finally, externalities are created by the production of transshipment at the seaport. Congestion of port approaches is perhaps the most notable externality, but also significant are safety issues caused, for example, by shipwrecks and fires, the pollution of air, land, and water, and landside congestion created when one person's access to port inhibits another's, as with long unit trains that block roadways. Port authorities are able to confront such externalities by providing pilotage to control ships' movements within the port, by putting out fires, conducting environmental assessments and issuing charges, and making arrangements with local governments.

## The Seaport Concept: From Harbours to Production-Systems

As the preceding sections of this chapter made clear, seaports are constituted by various elements that are fundamental in, and necessary to, enabling it to serve its "function." I agree with Bird and MacElwee that the seaport ought to be understood in terms of the structures and relations, what MacElwee called "arrangements," that give rise to the seaport's ability to provide transshipment. In this section, I should like to firm up this idea by proposing that seaports be thought of as production-systems.

#### Production-systems

According to Walker (1988), production-systems are groupings of "production cells" based on common types of inputs and outputs. Typically, the output of one cell becomes the input of the next, which sends its output to another cell, and so on. Production-systems can also be identified by the technical methods shared among various cells that use them to achieve some commercial objective. As illustrated by Figures 2.1 and 2.2 the seaport readily appears as a production-system in which the activities at each step are connected by the transfer of cargo at the land-sea boundary. Each activity contributes an intermediate service to the overall process, creating inputs for some, relying on the outputs of others. For example, the services of a trucking firm that arrives at port with, say, one 20-foot long container are necessary for a drayage operator, whose movement of the container from the truck terminal to the port area is needed by the terminal operator. Likewise, storage services for unloaded containers become the input for land transport operators that move them to markets inland.

Even though it is simplistic, such an illustration highlights the division of labour embodied in production-systems and the way it benefits the productivity of the individual cells as well as the entire system. Separating out the constituent tasks within a production-system, however, is not by itself sufficient to produce these productivity advantages. As the division of labour becomes more complex, the organization of the increasing number of cells in the production-system becomes the crucial lever to productivity gains. Walker thus argues that productivity is not realized "when the pieces of complex production-systems are . . . divided up and sent their independent ways", but

when the divided up pieces are reintegrated "so that production may proceed to completion" (Walker, 1988, p. 381). Therefore, the ways in which production-systems are joined up constitute powerful productive forces that cannot be taken for granted. Specifically, the integration of the production process must accomplish three tasks: First, the "workunits" of the production-system must be physically linked together to allow flows of materials, information, labour, and money throughout the system. Second, the constituent processes must be actively coordinated in order for the system to function as a "collective worker". Third, the use of machines, materials and labour throughout the system must be regulated in compliance with certain economic calculations.

Satisfying each of these tasks and, in so doing, integrating the production process is accomplished by so-called "means of organization", which, in Walker's words are the "social-technical forces binding together bits and pieces of production" (Walker, 1988, p. 385). As shown in Table 2.1, he identifies five different *means* of organization, which, in turn, are represented by *modes* of organization, the various institutional forms that "regularize social relations in a way that allows production . . . to proceed in a reasonable way" (Ibid.).<sup>3</sup>

# Table 2.1

# The Means and Modes of Organizing Production

Means of organization	Mode of organization
Absolute space	Markets Contracts
Ownership	Firms State Agencies
Spatial Propinquity	Territorial Complexes Cities Regional Complexes Nation-states
Competition	Industries

Based on Walker, R. (1988). The geographical organization of production. <u>Environment and Planning D: Society and Space, 6</u>, p. 377-408.

# The Seaport as a Production-System

Three modes of organization are most relevant to the seaport production-system: workplaces, territories, and state agencies. The workplace institutionalizes the organization of production by means of absolute space. It is the site where the various means of production are brought together thus enabling integration by providing "direct connection and access" (Walker, 1989, p. 388). A related and equally fundamental mode of organization for seaports is the "territorial complex", a means of integrating production by means of spatial propinquity. According to Walker, "The territorial complex is an extensive worksite that brings disparate production activities into advantageous relation with each other" (Ibid., p. 396) by minimizing the costs and efforts of movement between activities, maximizes access between them, and allows them to pool certain resources. It also allows locational fixity of infrastructure and of daily practices, which, in turn, lowers risks of investing in the built environment of resources, channels movement, and lowers uncertainty and the information costs of access. Finally, territories provide geographic boundaries to limit movement, regulate access, and provide easier communication by turning social interaction inward.

Both the workplace and the territorial complex appear as tailor-made solutions for the challenges to transshipment production as pointed out earlier in this chapter. The preconditions for reliable transshipment are accessibility of vessels to each other and coordination between them. In order to provide transshipment, seaports must outlay huge sums of money in "sunk" and fixed capital for infrastructure and various installations (cranes, for example). The impact of these costs is mitigated if various parties or activities are concentrated enough to can share facilities, such as roadways and storage areas. Ports also require ready access to information about shipments that will be dropped off and picked up from their facilities in order to make both operational and long-range plans and to coordinate the use of their facilities with cargo movements to and from port. Additionally, operating costs are less and coordination is easier if activities occur in relatively close proximity to each other.

A third mode of organization fundamental to the seaport production-system is the state agency. State agencies, which institutionalize the organization of production by means of ownership, arise because "[private interests] could not or would not [own or operate production] because of scale, difficulty of collecting revenues, or sustained losses" (Walker, 1989, p. 395). As I pointed out in a previous section of this chapter, these conditions pertain to transshipment production at the land-sea interface in the form

of various market failures such as natural monopolies, externalities, common ownership issues, and public goods. Port authority is the name given to the state agencies designed to regulate these various market failures existent in the seaport's production process and to allow "affairs [to be] conducted in a business-like manner" (Ircha, 1996, p. 283). Conceptualized as a production-system, the seaport can be viewed as more than a static object, such as a node or gateway that serves its purpose by its mere existence. Instead the seaport is understood as a dynamic object, constituted by a variety of different yet all necessary structures, which combine in a way that enables the seaport to provide the product of transshipment (Figure 2.1). The seaport's ability to provide transshipment, and likely the product itself, is changed if the combination of these structures is altered. Moreover, a seaport's competitiveness, its ability to gain an advantage, is found in the combination of these structures. Before examining this point in the context of the container and intermodal revolutions (Chapters 4 and 5), competition itself must be theorized in order to unpack its structural aspects (Chapter 3).

# Summary

In this chapter, the seaport was conceptualized as a production-system whose ultimate output – and *raison d'etre* – is to provide a product defined as transshipment. Transshipment is an intermediate transport product involving the physical transfer of cargo from one vessel to another. Nearly all shipments moved by the transport industry, at some point in their journeys, require transshipment. Transshipment, therefore, is a crucial activity inasmuch as it bears directly on the principal criteria by which the commodity of transportation is evaluated: reliability, regularity, cost, and risk.

Seaports are the most prominent providers of transshipment and, at the global scale, have become increasingly important in the post-war era of expanding international trade, most of which moves by sea and requires transshipment between land and sea transport vessels. Despite the apparent success seaports have had in serving this trade, the provision of transshipment at the land-sea boundary is not easy. Enormous investments in fixed, and often sunk, capital are necessary to provide a site where transshipment can take place, including approach channels, ship berths, storage facilities, loading/unloading equipment, rail and road connections. Such investments meet the problem of providing different vessels reasonable access to each other's cargoes. In addition to infrastructure and superstructure, transshipment across the land-sea boundary entails multiple tasks or, more accurately, a sequence of tasks in which the accomplishment of each task often depends on the successful completion of previous tasks and, in turn, affects subsequent tasks and the overall process. In broad terms, the fundamental tasks that constitute the seaport can be divided into four production cells: navigation, cargo handling and transfer, storage, and logistics related. The challenge of coordinating and monitoring these services, as well as other economic and political factors, is almost universally met by some form of involvement by the public sector in the seaport production-system. In fact, by meeting this coordinative challenge and preventing market failures, port authorities play a necessary (structural) role in the seaport transshipment process.

The idea of the seaport as a production-system effectively represents the multiple services and physical, technological, regulatory-legal features that are fundamental to seaports and in so doing recognizes the relationships necessarily involved in the seaport's

ability to produce transshipment. As discussed in the chapter, a production-system is any chain of activities or "production cells" in which the output of one activity is the input of intermediate activities, all towards the satisfaction of some larger commercial purpose. As Walker has pointed out, however, a production-system represents not only a division of labour into "cells", but also the organization and reintegration of those cells into the overall production process. Thus, each production system reflects certain "means of organization", the different types of which take particular institutional forms called "modes of organization." In relation to seaports, three modes of organization were shown to be important to the transshipment process. The existence of workplaces and territorial complexes integrate the seaport production process by providing easy connection and access within and between activities or cells, facilitating communication among them, and generally regulating what is going on within their geographic boundaries. The port authority serves as the third mode of organization by means of ownership, to address potential market failures and thereby regulating and ensuring the conduct of the constituent activities of the production system.

Thinking about the seaport as a production-system is useful because it does not "black box" the effort to serve contested cargo. Instead, the seaport is understood in terms of the structures that are necessary to its ability to provide the transshipment product and to engage in competition. Thus, with this conceptual basis, an explanation of how containerization and intermodalism produced a new competition can be provided by showing how they affected the seaport's structures.

Theorizing the seaport as a production-system also proved useful because it allowed me to consider the most appropriate seaport actors to contact and interview.

Among the numerous people involved in various aspects of the transshipment process, I focused on those who, more likely than anyone else, participate in seaport competition on behalf of the production-system as a whole. The seaport and terminal officials I interviewed engage with the issues of seaport competition on a daily basis, evaluating the make-up of the production-system, identifying and evaluating problems, envisioning and implementing strategies, and weighing the implications for the seaport's overall competitiveness.

# Chapter 3

# A Time-Space Theory of Competition

Having conceptualized the seaport as a kind of "production system" we now need to focus on the "new" competitive environment that seaports face in the 1990s. In particular, we need a theory of competition by which the nature of the competitive environment should be understood. In this chapter I shall consider Erica Schoenberger's view of competition in which competition, as a wider structure of the capitalist economy, is necessarily interconnected with the structures of space and time. Schoenberger presented her ideas in a recent book in which she argued that the way competition is treated by the prominent views in economics, namely the neoclassical and Marxist views, it is left with little "theoretical weight" (Schoenberger, 1996). Both views produce accounts that push competition "into the background as a kind of general constraint" that either promotes "efficiency and the promise of equilibrium" or "turbulence and constant change" while the nature and outcomes of competition are assumed to be constant and predictable (Ibid., p. 22). This, she concludes, leaves both views with little ability to talk about changes in the nature of competition because its "face" is treated as a constant. In this chapter I shall summarize Schoenberger's alternative view of competition in order to provide the basis for my analysis in Chapters 4 and 5.
#### **Views of competition**

#### Weak Competition

"Weak" competition takes place in the realm of commodity exchange where economic actors "jostle" for the upper-hand by enticing customers through such ploys as underpricing products and advertising their merits. Competitive advantage is gained by capturing market share (increasing revenues) while making efficient use of resources (decreasing costs). According to Storper and Walker (1989), in the "weak" view of competition the struggle to attain a competitive advantage takes the form of adjustments to a given set of technological, organizational, institutional, and historical parameters (Ibid., p. 45). While in practice this requires a "good amount of strategic maneuvering", the neoclassical portrayal treats competition as a "passive" process that moves the economy towards a state of equilibrium marked by prices at which demand and supply are both satisfied and rates of profit are equalized across the board (Ibid.).

#### Strong Competition

"Weak" competition, Storper and Walker argue, reflects an impartial understanding of competition. The tendency towards equalized profit rates ("equilibrium") creates limits to economic growth and circumscribes the power of the maneuvers featured by "weak" competition. Such stasis is inconsistent with capitalist economic behavior as actors are driven to capture larger shares of wealth and, therefore, do not/cannot settle for such limits to growth. This, in turn, gives rise to "strong" competition, which "is not a matter of adjustment but of surviving and prospering by keeping up with, or bettering, one's opponents" (Storper and Walker, 1989, p. 37). In

this Marxist view, competition operates in the sphere of production wherein competitive advantage is gained by altering or "revolutionizing" the conditions of production. For example, "Firms do not merely adjust to market conditions and keep to competitive standards . . . [they] actively search for ways to transform business practices, to do what has never been done" (Ibid., p. 48). The goal of such action is to propitiously sway the distribution of generated surplus by gaining control over the production process through new practices, technologies, and organizational forms. This continuous struggle driven by "strong" competition results in much tumult and agitation that disrupts any move towards equilibrium. Thus, competition is a guarantor of "turbulence".

#### Viewing Competition as Strategic Problems and Solutions

From the "strong" point of view, a theory of seaport competition would focus not simply on the luring of traffic flows (i.e. market share) but on the production of transshipment itself. The production of this service is the basis of any competitive advantage and, therefore, is the ultimate condition of any seaport's economic survival. With a basic understanding of the seaport as a production-system, we are in fairly good position to consider the more specific advantages within that system, but, according to Schoenberger, we might yet be left with an inadequate account. While the neoclassical and Marxist views of competition are widely accepted, Schoenberger (1996) argues that neither of these conventional economic approaches gives "competition" much explanatory strength. Of particular concern to Schoenberger is that neither view deals well with competitive problems and the strategies formulated to confront them, and when they do, the approach is mechanistic and unidirectional. Yet understanding competitive

problems and strategies is the key to understanding the way competition works because it "is constructed in different ways depending on circumstances while, at the same time, the kinds of competitive strategy adopted act to change those circumstances, giving rise to new kinds of competitive problem" (Ibid., p. 24). The upshot is that competitive problems are never permanently resolved and outcomes are indeterminate, a reality not allowed for by the mechanistic and deterministic traditional approaches. In sum, any theoretical approach to competition should recognize that the strategic problems produced by competition always vary with the historical and geographical context in which that competition occurs. Competition is an enduring and defining feature of a capitalist economy, but it is not always wearing the same face.

#### **Time and Space: The Structures of Competition**

Schoenberger provides an approach that grasps the historical and geographical specificity of competition. She asserts that competitive problems and strategies must be viewed in relation to the categories of time and space because "the ways the problems of competition, time, and space are constituted and resolved at different times are interconnected" (Schoenberger, 1996, p. 12). In other words, economic actors must confront basic structural issues of time and space in order to compete, thus giving competitive strategies a distinct time-space character. This argument proceeds from recent assertions in economic-geographic theory and, more broadly, social science that social relations and practices are constitutive of time and space.<sup>1</sup> This view contends that social activities occur not simply *in* time and space, but that they are *inscribed* in certain

<sup>&</sup>lt;sup>1</sup> For example, see Harvey, 1989b, Chapters 12, 13, and 14; and Harvey, 1996, Chapters 9, 10, and 11; and Smith, 1984, Chapter 3.

times and spaces. Stated otherwise, according to Harvey, "Each distinctive mode of production or social formation will, in short, embody a distinctive bundle of time and space practices and concepts" (Harvey, 1989, p. 204). Thus, as structural aspects to human activity, the qualities of time and space are actively produced by social processes at the same time that they affect them. And whereas the meanings of sociality, temporality, and spatiality are, in effect, inseparable, change in one category entails change in the others. This interconnectedness is effectively captured, for example, by Harvey's concept of time-space compression (which will be discussed in more detail below). If the nature of different social practices (such as competition), and changes thereof, can be understood by looking at the times and spaces they embody, it follows that the basic categories of time and space can serve as a powerful means of social analysis. In the next section I will further define these ideas and discuss how Schoenberger applies this line of thinking to competition.

#### Interconnections between Time, Space, and Competition

In a capitalist society, time and space, like competition, present basic problems to any production-system. The particular time and space problems are not unchanging, but derive from the nature of the production and competitive processes. As Schoenberger observes, "This means that time and space are potentially strategizeable . . . [and] firms can attempt to obtain competitive advantages through the management of temporal and spatial dynamics" (Schoenberger, 1996, p. 17). The management of these problems, in turn, feeds into the constitution of the production-system, thereby placing "competitiveness" within a certain time-space regime. Time, space, and competition are

necessarily connected, however, so a change in the production or competitive processes entails a transformation of time and space problems. Looked at from a different perspective, an altering of the time-space conditions of competition generates new competitive problems, which likely require new strategies. Along these lines, Schoenberger writes

Stability in the competitive environment is much to be desired [because].. . When the stable competitive environment is disrupted, many things including the organization of production, its temporal and spatial characteristics, and competitive strategies—must change. The question is how and with what effects. (Ibid., p. 24-25)

The time-space approach allows this question to be addressed, but in order to look at competition in relation to temporal and spatial problems, it is necessary to look more closely at temporal and spatial dynamics under capitalism.

#### Temporal Dynamics

Under capitalism, the general tendency is to minimize the impact of time and space in both production and consumption practices. Indeed, the reduction of barriers to spatial and temporal change is so often paramount in the competitive struggle, as the deciding edge is usually capture by whoever possesses the flexibility to resolve certain issues as they arise. Nothing, however, is forever and one of Schoenberger's main points is that the resolution of one problem is likely to create problems in other areas. A permanent resolution of temporal and spatial problems and thus a constant face of competition is unlikely. The key is to recognize the trade-offs that are made to solve particular problems.

The problem of time, as Schoenberger and others point out, arises in two principal contexts: turnover time and labour time. Under capitalism there is a pressure to reduce

time in both cases, however, the effort to do so produces contradictory "movements" and, therefore, new temporal problems. Labour time refers to the cumulative time that human labour is involved in production. Turnover time signifies

the time taken to produce a completed commodity (the production period) and the time taken to realize its embodied value through sale on the market (the circulation time). . . Compressing the time in which capital is tied up in production and circulation increases the rate at which money can be reinvested . . . Firms with a shorter-than-average turnover time will obtain excess profits . . . (Schoenberger, 1996, p.19)

Yet production and circulation do not operate in perfect concert. Increasing output through an acceleration of the production process is likely to lengthen the time in circulation (the sphere of exchange) as larger markets are sought and more time overall is needed to sell off the product. Decreasing the time taken by the circulation process, in turn, creates a pressure to speed up the production process in order to keep goods on the market. The latter is usually achieved by mechanizing production, which may actually extend the overall turnover time by increasing the proportion of fixed capital involved in production.<sup>2</sup> Until its value has been realized, fixed capital is essentially stuck in the context of the production process in which it is initially placed and it loses value when it is not utilized. Fixed capital thus is particularly vulnerable to changes in technology and production methods that may make it obsolete before its value has been realized. Mechanization may also be used to improve labour productivity, but while this may reduce labour time in one process it may lead to increases elsewhere within the production-system (Schoenberger, 1996, pp. 18-20).

 $<sup>^{2}</sup>$  Fixed capital (plant and equipment) is an investment in capital that is recovered over several production periods.

#### Spatial Dynamics

Space is also the subject of minimizing tendencies and contradictions under capitalism. To begin with, the processes of production and circulation (moving the goods to and from markets) entail spatial movement. The free flow of money and commodities are necessary to reach geographically expanding markets, to integrate larger and more dispersed systems of production, to take advantage of any economic opportunity when the time is right. There is a compulsion, therefore, to eradicate barriers to spatial movement. This can only be accomplished, however, through the production of particular (fixed) spaces, such as railroads, highways and airports (Harvey, 1989b), within which the particular mode of spatial movement is confined. We can also recognize the significance of relatively fixed legal and regulatory spaces to spatial mobility. Zacher and Sutton note how the creation of a stable legal and regulatory environment in international waters ensured the efficiency and reliability of ocean shipping:

The legal norms of freedom of the high seas and innocent passage through territorial waters set a basic pattern of opening the arteries of world commerce. . .The expansion of the global economy would certainly not have taken place as it did if the law of the sea had not assured the free flow of maritime transport. (Zacher and Sutton, 1996, p. 6)<sup>3</sup>

Likewise, Neil Smith (1984) has suggested that the development of territorially defined states, possessing fixed rules within the national boundaries, was necessary for the development of capitalism. These allowed, for example, laws and various "social principles underlying such states [to be] readily mobile" throughout the national territory (p. 80). This, in turn, effected a reduction in barriers to the spatial mobility of the state's citizens and industries, who could always count on basic circumstances anywhere in the

nation-state. The corollary was that this mobility was circumscribed by the national boundaries. Schoenberger summarizes this dynamic:

the compulsion to eradicate spatial barriers to the free circulation of capital [as money and commodities] unavoidably produces [various forms of] spatial fixity and *new spatial barriers* which immobilize and/or channel capital geographically for considerable periods. (Schoenberger, 1996, p. 21) [Italics added]

The tension between mobility and fixity under capitalism is expressed in another form. The production process "necessarily occurs at a particular place" (Harvey, 1982, p. 388). In other words, the elements of production (labour, materials, equipment) must, at some scale, exhibit some coherent spatial configuration in order for production to proceed. The struggle to continually reorganize production is thus a process of seeking out new geographical configurations, either by restructuring the current "place" of production (such as labour contracts and laws, taxes, environmental regulations, outmoded infrastructure) or relocating capital to new places (i.e. new production processes) (e.g. Walker, 1989; Harvey, 1989b, pp. 182-184; 1985; Swyngedouw, 1993). However, the reliance on fixed capital immobilizes the production process until the turnover time of the capital employed runs its course, effectively immobilizing the value of that capital in the land (Harvey, 1982, p. 388). Furthermore, transport and communications, although they provide the means of integrating the process through space, also confine mobility within certain technological, organizational, institutional, and regulatory parameters (Swyngedouw, 1989, 1993). Swyngedouw (1993) has termed this the "spatial problem": when the production process is essentially fixed in relation to economic changes and the need to rapidly innovate production organization or technology. This highlights "the utopian desire of capital to . . . 'shift a lot of space

<sup>&</sup>lt;sup>3</sup> Also see Zacher and Sutton, 1996, pp. 36-80

quickly'" (Swyngedouw, 1993, p. 312) with minimal cost. Furthermore, the "spatial problem" highlights that under these conditions, mobility becomes a distinct competitive advantage. Producers are simultaneously torn by the need for spatial reorganization while realizing a maximum utilization of fixed, immobile capital. On this point, Swyngedouw observes that mobility—the ability to readily relocate capital—is a compulsion borne out of, "The need for continuous technological and organizational (and hence geographical) change in order to innovate and accelerate the [process of value creation and to avoid] creeping or rampant [place-specific] devalorisation process" (Ibid., p. 308).

Fixed capital is not inherently spatially immobile, but because it is bound to a particular context, it must, in general, be treated as immobile (Smith, 1984, p. 89). As Harvey notes, however:

Producers are firmly pinned down for long time periods through reliance upon fixed capital . . . [however] they can be liberated to some degree from such constraints if the state or another faction of capital (property owners, financiers) hold such elements of fixed capital and rent them out to users on a short-term basis. (Harvey, 1982, p. 388)

A good example of this is the provision of roads and other infrastructure by governments, allowing trucking companies, for example, to relocate production rather simply by relocating vessels and to avoid having to write-off unrealized value in current road networks and reinvesting in the construction of new roads. When this situation obtains, we can see how some elements of capital (such as trucks), though they may be fixed investments, can actually increase utilization through mobility (relocation), as long as the remaining pieces of the production process (the fixed capital's context) are externally provided in more than one place. Meanwhile, the immobile capital, which requires the element of mobile capital to realize its own value, must provide an attractive situation to

attract such capital or risk devaluation. Several scholars have thus observed how a "command over space" allows mobile capital to "command place", that is, fixed, immobile capital (Harvey, 1989a; 1989b, Chapter 14; Swyngedouw, 1989; 1993). Moreover, while a command over space results as spatial barriers are reduced, it does not signal an end to the importance of *place*. Thus, Harvey makes the point:

[T]he reduction of spatial barriers has [a] powerful . . . effect; small-scale and finely graded differences between the qualities of places . . . become more important because [geographically mobile] capital is in a better position to exploit them. (Harvey, 1996, p. 247).

Places are substituted for other places to the advantage of mobile capital, but places themselves can formulate strategies to counteract to some measure the power of this mobility. Harvey (1989a) and Swyngedouw (1989; 1993) have argued for a "spatial politics" through the formation of inter-urban and inter-regional linkages that give localities some power at the negotiating table with mobile capital.

#### Problems of Time are Problems of Space, and Vice Versa

Problems of time and space do not emerge and get resolved in different universes. Rather the two kinds of problem are intimately related. Indeed, Harvey (1989b; 1996) suggests that it may not be permissible to treat them as separate qualities as, for example, the acceleration of turnover time necessitates an increasingly efficient organization of space. In a similar vein Schoenberger states:

There are very important times in which the problem *is* the problem of space, and vice versa. The costly investments in transportation infrastructure, for example, have as their primary aim not only the reduction of the monetary costs of movement over space, but the reduction of time in circulation. Distance, in this sense, is equivalent to time. (Schoenberger, 1996, p. 22)

Even though it was discussed above in the context of space, geographic mobility can also be viewed as a temporal problem and/or solution as well. After all, geographic mobility is not merely the ability to change location but to do so relatively *quickly*. A firm that runs into *temporal* barriers, as when it is obstructed from quickly implementing a new technology by labour regulations, may resort to *spatial* mobility and relocate its entire works. Or one that relocates in a small amount of time may gain a spatial advantage by its rapidly improving its proximity to vital suppliers or budding markets.

Harvey's (1989b) concept of "time-space compression" captures the relatedness of temporal and spatial dynamics: as the friction of distance is reduced (i.e. the impact of space), the time taken to move through space is simultaneously reduced. Spatial and temporal horizons variously shrink in concert. At the same time, howeiver, other spatial and temporal horizons expand. Thus, Schoenberger suggests as a modification of this idea the concept of time-space *transformation* to emphasize that time and space do not always move in parallel directions, such as with transportation investments that allow faster movement through space but at the cost of an increased reliance on fixed, immobile capital. Nevertheless, the primary objective of these concepts is the same: to show that problems and solutions of time and space, though they may sometimes be contradictory, are closely connected.

#### New Times, New Spaces . . . New Competition

The value of Schoenberger's approach is that it recognizes the essential characteristics – the structures – underlying competition under capitalism but does not explain the dynamics and outcomes of the process according to a deterministic formula.

All competitive situations exhibit a time-space character, but the qualities of the constituent temporal and spatial issues are historically and geographically specific. Schoenberger therefore views competition through the "optics" of time and space: how do economic actors gain advantage through the management of spatial and temporal issues? As an illustration of this framework, Harvey, in a recent book, shows how temporal and spatial conditions fundamentally shape the nature of competition. He tells the story of John Burrows, a successful merchant from Davenport, Iowa, who

perfected business methods to deal with the uncertainties of trading in agricultural products, battling seasonal transportation uncertainties across badly organized space that stretched between St. Louis and New Orleans. . . But by 1857 he is bankrupt, 'a victim of the new economic regime' . . . What drove him under was the coming of the railroad from the hitherto inaccessible Chicago and the *new orderings of time and space* that it imposed. . . [This] changed all the rules . . . The time-space compression wrought by the coming of the railroad squeezed him out . . . [because he] was so wrapped up with a certain form of spatio-temporality that he could not devise a competitive strategy to carry him into a quite different . . . world. (Harvey, 1996, p. 244) [Italics added]

The explanatory power of the time-space theory of competition, as demonstrated by Harvey's example, can be applied to examine the change in the nature of competition between seaports. Figure 3.1A, taken from Chapter 2, shows a seaport productionsystem, which has developed within a certain time-space regime. The structural configuration of the production-system reflects the seaport's struggle to resolve a set of particular strategic problems in order to compete with other producers of transshipment. Its competitiveness is thus calibrated to the time-space regime. In Figure 3.1B, the seaport production-system has been reconfigured in order to remain competitive under a new time-space regime. The shift from one time-space regime to another gives rise to a competition involving a new set of strategic problems, undermining the



"competitiveness" of the production-system in 3.1A. As I will show in Chapter 5, this was the fundamental effect of containerization and intermodalism.

#### **Summary**

In this chapter I discussed a theoretical framework in which to examine seaport competition. That framework is based on ideas developed in geography concerning the constitutive roles of the spatial and temporal conditions of human society. All social processes necessarily exhibit a temporal and spatial character and that character is seen as essential to the social process itself rather than as simply derivative expressions of it. In this light, a variety of geographers have sought to understand social processes by examining the historically and geographically influenced time-space character of those processes. Among these geographers, Schoenberger and Harvey have applied this idea to the issue of economic competition, showing how competitiveness is necessarily situated within a particular time-space regime. Schoenberger developed the approach more explicitly, showing how the competitive process involves the emergence of temporally and spatially distinct competitive problems that are strategically addressed through the formulation of temporally and spatially distinct solutions to those problems. In other words, competition is an everyday process of managing the spatial and temporal dynamics of these problems and solutions. In Chapter 5 I will use this theory of competition to explain the transformation in seaport competition brought about by containerization and intermodalism. These relatively new modes of shipping altered the time-space regime in which seaports operated, effecting dramatic changes in the

structures of the production-system as seaports attempted to fit themselves into the dimensions of the new competitive environment. Before providing this analysis, I will summarize in the following chapter the major technological and organizational factors that have transformed the competitive landscape for seaports.

## **Chapter 4**

# Post-war Developments in Freight Shipping: The Container and Intermodal Revolutions

The development and implementation of container technologies and intermodal concepts dramatically affected – "revolutionized" – the post-Second World War shipping industry. In so doing, the new methods of moving cargo attracted widespread attention from trade journalists, industry analysts, and academics seeking to explain the myriad changes they have produced over the past four decades. Not surprisingly, containerization and intermodalism are often held responsible for the emergence of a new competition between seaports. In this chapter I shall chronicle the container and intermodal revolutions in freight movement, pointing out the technological and organizational features that distinguish them as well as their broader impacts on the shipping landscape. This will serve as a necessary prelude to Chapter 5 in which I examine the causal relations between changes in seaport competition and the new modes of shipping.

#### World Trade as the Impetus for the Container and Intermodal Revolutions

The postwar expansion of world trade was the first sign of a major change to come on the shipping landscape. Between the Second World War and the OPEC oil crisis in the early 1970s, world trade grew rapidly, followed by slower yet steady growth through the next two decades. By 1997, the volume of world trade was 16 times greater

than the volume traded in 1950 (Levinson, 1997). The significance of trade to world economic growth is highlighted when measured against the growth in world production, which, after the same period of time was only 5 ½ times greater than in 1950. Figure 4.1 gives a more detailed illustration of this trend. It is most notable, perhaps, that even during a slight downturn in the early 1990s, growth in world trade outpaced growth in world production during each year. Over the ten-year period depicted, the average yearly growth in world trade was approximately seven percent, while the average yearly growth in world production was around 2.7 percent. Finally, in light of the recent Asian financial crisis, the rate of growth during 1997, one of the highest rates in two decades, is striking. The effects of this event, however, are yet steadily rippling across the globe and are likely to show up in subsequent years.



International trade is not merely important to most of the world's national economies; it is increasingly vital. Figure 4.2 shows the increasing contribution of exports to the Gross Domestic Product (GDP) for selected countries and the world. Trade has become central in the quest of many developing countries to improve their economic lot within the world economy. While it is not a sure formula to stake development on trade growth, it is a policy that receives steady support.

The transport industry bears the weight, literally, of the increasing significance of trade to the world and national economies. Indeed, so much of the demand for transportation derives from international trade that the growth and patterns of world trade are profoundly consequential to the providers of goods movement. This is particularly so for ocean shipping firms and seaports. In the late 1980s, nearly two-thirds of all



international trade by value and 95 percent as measured by weight, was transported by ocean carriers (Zacher and Sutton, 1996, p. 38). The U.S. Bureau of the Census reported nearly identical figures for the United States in the mid-1990s (U.S. Bureau of the Census, 1998). Seaports provide the means of connecting virtually all such waterborne movements with land transport systems. This points to the intimate relationship between international trade and transport, specifically seaports and the various waterborne modes. If the need for transport arises from trade, the possibilities for trade are largely constrained by the capabilities of the transport industry. According to Hayuth, in fact, the growing demand for international trade following the Second World War was initially stymied by a shortage in the supply of transport units and facilities on the world's oceans (Hayuth, 1987). Indeed, world trade required a revolution in shipping technologies and institutional arrangements, followed by a series of regulatory changes in the transport sector, in order to realize the overall growth since around 1950. The integral role seaports played during this period of dramatic change serves to illuminate their importance to world trade.

As the shipping industry sought ways to meet the demands of international trade, it became clear that cargo-handling inefficiencies in all modes including seaports constituted the greatest obstacle to increasing shipping capacity. The primary effect of such inefficiencies, which frustrated the rising demand for both bulk and breakbulk goods, was tremendous congestion at seaports around the world as both ocean- and landborne transport vessels, along with their shipments, lingered there for weeks and even months (Hayuth, 1987). The consequent slow turn around of ships at seaports, in turn,

discouraged the most immediate and obvious solution to the capacity problem: fleet build-up by increasing either the number of ships or vessel size (Chilcote, 1986). The root problem clearly was cargo-handling and it was thus the aspect of transport targeted for improvements.

#### **Containerization: A Technological Revolution**

The cargo-handling problem for bulk cargoes was resolved rather spectacularly by the straightforward application of new technologies. Efficiency breakthroughs were achieved for crude oil by the substitution of automatic pumping into and out of sealed compartments for the carriage of oil in barrels (Chilcote, 1997) and for grain and other certain dry bulk products as pneumatic unloaders were replaced by higher capacity spiral conveyor systems (Hayuth and Hilling, 1992). While the bulk cargo-handling problem was resolved rather directly by the application of new forms of mechanization, the answer for breakbulk cargoes, which were accounting for a larger share of world trade, was not as relatively simple (Boschken, 1988).

#### More Breakbulk Cargo, More Problems

Breakbulk cargo, also called general cargo, is characterized by goods of all shapes and sizes, packaged in myriad forms, and moved in relatively small shipments from many different shippers to many different consignees. Thus, in contrast to bulk cargo, the heterogeneous nature of breakbulk cargo is not amenable to larger vessels. For one thing, numerous and smaller shipments between many origins and destinations are required to meet demand, so it makes sense to distribute them among smaller vessels rather than

using one large vessel to make each move. Even more counteractive to the realization of economies of scale through greater capacity ships is the time- and labour-intensive nature of break-bulk handling. Due to the irregularity of breakbulk cargo, both the loading/unloading and sorting processes, for example, are too slow under "manpower" to support larger vessels. These processes, thus, could not be directly mechanized in the way of break-bulk handling. Breakbulk shipments required some degree of homogenization, that is, a way of "bulking" or "unitizing" smaller consignments into larger, standard-sized units.

#### Hail the Container: The Unitization of Breakbulk Cargo

The history of shipping is littered with attempts to unitize breakbulk cargoes by various means, including pallets, barrels, barges, and "flats", however, it was the tractor trailer-sized box or container that provided the best solution to the postwar cargo-handling problem (Mahoney, 1985; Hilling and Browne, 1992). The use of standard-sized containers in freight movement, a practice known as containerization, greatly enhanced the efficiency and productivity of seaports and waterborne transport, and later land transport, and enabled the postwar growth in trade. By the 1990s it was the dominant method of breakbulk, and some bulk, cargo-handling on virtually all of the world's major trade lanes. The containerization idea is rather simple: At its origin cargo is unitized into standard-sized containers, whereupon it is moved to the port by truck or rail. At the port the unitized shipment is left intact while it waits to be loaded in one swift move onto a waterborne vessel (or airplane). Once moved by such means to its destination port, the shipment is transferred in a second move to either rail or truck to be

hauled to its final destination. Only at this point are the contents of the shipment "destuffed" from the container.

The sailing of the first fully containerized vessel, Sea-Land's *Galveston*, on April 26, 1956, ignited the now famous "container revolution," so called because of the farreaching effect it had on both domestic and international shipping. For example, Kuby and Reid (1993) provide an explicit record of the impact on the United States, the world's largest importer and exporter. According to their analysis of data published by the U.S. Bureau of the Census and the U.S. departments of Commerce and Transportation, the share of containerized cargo (both imports and exports) in U.S. trade increased greatly between 1970 and 1988. While in 1970 only 6.2 percent of U.S. general trade was containerized, the share increased to over 27 percent in only six years. By 1988 over 74 percent of the cargo in U.S. trade was containerized. Taaffe, Gauthier, and O'Kelly (1996) provide more recent data that show a continuance of this trend. By 1990, according to these authors, containerized traffic accounted for at least 75 percent of all U.S. liner trade and close to 100 percent of all U.S. trade with Europe and the Far East. The acceptance of containerization is also reflected in the increasing types of cargoes that are moved in this fashion. Whether economic changes or technological modifications in container design are to credit, in the 1990s most general freight that can be packaged (dry cargo) is considered "containerizable", particularly manufactured and processed goods (Wood, Barone, Murphy, and Wardlow, 1995). Additionally, many agricultural commodities, including grains such as rice, sugar, and beans are increasingly shipping in containers, as well as lumber and paper products, liquids that can be moved in drums, and cars (Ibid.).

The efficiency and productivity improvements brought about by containerization were not simply the effect of packing cargo into standardized boxes. In addition to the development of the modern container, containerization involved significant technical innovations in ship design and seaport facilities (and later specialized rail cars).

#### Going Cellular: Innovations in Ship Design

Perhaps the most consequential innovation in ship design was the introduction in the early 1960s of "cellular" ships bearing slots or cells specially designed to hold containers. Such vessels as that pictured in Figure 4.3 featured significant capacity increases over converted tankers and general cargo ships previously used to move containers and greatly improved the efficiency of the loading/unloading process at seaports. Preceding the new design a ship's TEU capacity was limited to the number of



Photo by Andy Walter, 1997

containers it could stack on its deck, but, as the diagram in Figure 4.4 shows, with cellular ships it became possible to store containers in the ship's hull. In addition, the cellular design contributed to productivity increases at port terminals because it improved the accessibility of containers within the hull, particularly after the introduction of hatchless cellular ships in 1986 (Wood et al., 1995). Figure 4.3 depicts how this innovation allows containers to slide relatively easily into and out of the ship's hulls and does not require extra crane movements to remove and replace hatch covers. According to one analyst, a 50 percent savings in both time and cost is possible with the cellular design (Chilcote, 1986).



Wood, D.F., Barone, A., Murphy, P., and Wardlow, D.L. (1995). <u>International</u> <u>Logistics</u>. New York: Chapman & Hall, p. 67

### "Gantrification"<sup>1</sup>: Innovations in Seaport Technologies

The new cellular ship design was complemented by the development of specialized, shore-based container cranes at seaports. These new cranes, generically called gantry cranes, mechanized the on and off loading process and greatly increased labour productivity. Indeed, the practice of hand stowing cargo by human labour would no longer be possible given the sheer size and weight of containerized units. Gantry cranes, like the one pictured in Figure 4.5 unloading a 5,000 TEU capacity Hyundai containership at the Port of Seattle, are typically fitted with wheels, allowing them to make linear movements along the quay in order to work different areas of a ship or to move from one ship to another adjacently berthed ship (Mahoney, 1985). The



Photo by Andy Walter, 1997

introduction of this technology greatly improved port productivity. According to Hayuth and Hilling (1992), before containerization, the average productivity of labourers handling break-bulk cargoes was from 1 ½ to two tonnes per hour. In contrast, at the Tilbury container terminal in London, labour productivity was over 65 tonnes per hour in the early 1990s. Gantry cranes improved the load capacity of lifts per hour and the introduction of the hatchless containership made the containers readily accessible and greatly boosted the rate of lifts per hour. Hayuth (1985) reported, for example, that in the mid-1980s in an eight-hour shift, 2,500 to 3,000 tons of containerized cargo could be loaded/unloaded compared to 100 to 200 tons of breakbulk cargo during the same time period. As a result of these productivity gains, the number of labourers working the docks made a precipitous decline.

The greater efficiency of gantry cranes greatly reduced the loading/unloading time and thus the time and money ships spent in port. Chilcote (1997, p. 2) notes that prior to containerization, ships spent approximately half of their lives in port while, according to Hayuth and Hilling (1992), that figure was closer to 80 percent. Nevertheless, with containerization a ship's time in port greatly declined to about 15 percent of its lifetime. At the same time, the increase in port productivity lowered port costs of shipping lines.

Due largely to the reduction in labour hours, the cargo-handling portion of total ship operating costs dropped from 55 percent to 15 percent (Chilcote, 1986). As well, containerization reduced pilferage, because the containers were not only secure, but didn't sit on the quay for long periods of time. Finally, the use of gantry cranes reduced potential damage to cargo by decreasing the number of times it is handled at the seaport.

<sup>&</sup>lt;sup>1</sup> This term was suggested to me by Dr. Phil Steinberg

#### The Bigger the Better? Containerization and the Growth in Vessel Size

The efficiencies produced by the combination of these innovations precipitated a massive build-up in the world fleet which, like the growth in the bulk fleet capacity, occurred in the form of larger vessels. Figure 4.6 shows the growth in the container capacity of the world fleet between 1968 and 1996. Following a year of extraordinarily high growth, the annual average growth rate from 1969 until 1977 was nearly 25 percent, reflecting the considerable rate at which methods of containerization were implemented. By the 1980s containerization had matured as a method of cargo handling, but its prominence in world trade continued to rise. The first years of that decade witnessed an 80 percent increase in container capacity. Following this sudden rise and into the 1990s, the growth of the world fleet's container capacity persisted at a slightly slower pace.



Between 1982 and 1996 the average two-year growth rate was just less than 20 percent. By 1996 the total TEU capacity was 4.8 million TEUs, a 17 percent increase over the capacity in 1994 (<u>Containerisation International Yearbook</u>, 1995; <u>Containerisation</u> <u>International Yearbook</u>, 1997).

As Figure 4.7 shows the added capacity arrived in the form of larger vessels. Of the three vessel size classes represented in the figure, the class of largest vessels increased its share of the world fleets total capacity from six percent to nearly 30 percent over the ten-year period. Compared to the dramatic enlargement of bulk vessels, the growth in the size of containerships has been considerable but not stunning.

Nevertheless, increasing the volume of container vessels required only marginal increases in labour and fuel and thereby significantly decreased unit costs. The first generation of containerships, those built in the early 1960s to replace converted tankers



and general cargo vessels, held between 600-800 TEUs. In the 1970s, second generation vessels, carrying 1,000-2,000 TEUs were introduced, followed by third generation containerships that were put into use in the early 1980s. This latter class of container vessels, with capacities between 3,000 and 3,5000, reached the limits of the Panama Canal and, like so many bulk vessels, were dubbed "Panamax" because they are generally the largest ships that can fit through the Panama Canal. In the 1990s, containership sizes continued to rise as post-Panamax vessels, which can hold 5,000-6,000 TEUs, emerged on some routes (Hayuth and Hilling, 1992; Wood et al, 1995). During the summer in 1996, Hyundai introduced the first of seven "superships", each capable of carrying 5,551 TEUs, that were built to operate on the line's busiest routes ("First," 1996, p. 22). Maersk followed by launching a slightly larger vessel, the *Regina Maersk* with a 6,000



TEU capacity (shown in Figure 4.8) ("Maersk," 1996). Not to be outdone,P&O/Nedlloyd recently placed orders for several 6,674 TEU vessels (Letteney, 1997).

The build-up of the world fleet and enlargement of vessels have both been driven by the growth of fully cellular vessels. Figure 4.9 shows the increasing share of the world's total TEU capacity accounted for by fully cellular vessels. This share rose from 42 percent in 1984 to nearly 66 percent in 1996. As depicted by the figure, the growth in fully cellular TEU capacity was responsible for virtually all of the growth in total TEU capacity over the 12-year period represented. At the same time, fully cellular vessels were largely accountable for the increase in vessel size. In 1996 fully cellular vessels



accounted for all 4,500 TEU and larger vessels, 98 percent of all 3,000-4,499 TEU vessels, and almost 92 percent of all 2,000-2,999 TEU vessels (<u>Containerisation</u> <u>International Yearbook</u>, 1996).

The responsibility of fully cellular vessels for the growth in vessel size is supported by a comparison of average vessel sizes of fully cellular and non-cellular vessels. While the average size of fully cellular vessels grew from 1,032 TEU in 1984 to 1,450 in 1994, the average size of non-cellular container vessels declined during the same decade from 445 TEU to 415 TEU (Containerisation International Yearbook, 1985; 1995).

#### The High Capital Costs of Containerization

There is no doubt that containerization solved post-War congestion problems related to seaports and significantly reduced port costs in terms of both time and money. It made, however, "an already capital-intensive business even more capital intensive" (Mahoney, 1985, p. 22), which created a pressure to fully maximize asset utilization. Shipping firms incurred costs in vessel construction and daily operating costs, while gantry cranes and other specialized equipment required huge outlays of public money by seaports. The cost of Hyundai's seven "superships", for example, was US\$560 million and the per-day operating cost of such large containerships is about US\$50,000 (Eyre, 1987). Meanwhile, the cost of gantry cranes, which also increased in size as Panamx and post-Panamax ships came online, exceeded \$6 million in the early 1990s (Chilcote, 1994, p. 2). In the late 1970s, the rising costs of freight shipping coincided with a worldwide over-supply of container capacity which was exerting a forceful downward pressure on

rates, revenues, and profits (Containerisation International Yearbook, 1986). These circumstances developed into a near crisis with the "massive injection" of new capacity in the early 1980s (Chilcote, 1994, p. 5). In response, shipping lines attempted to fill their ships by further reducing freight rates and reconsidering the conference arrangements to which they belonged (Slack et al, 1996; Fabey, 1998c). Nevertheless, the constant squeeze created by large capital requirements and modest profits led shipping lines to search for alternative means of survival in the increasingly competitive container shipping business. One attempted solution is reflected in the change in the distribution of ship tonnage registered in different groups of countries. According to Zacher and Sutton (1996), between 1970 and 1989 nearly half of all tonnage registered in developed countries shifted to developing countries and "open registry" states as shipping lines attempted to lower operating costs by avoiding higher taxes and more stringent regulations. While this strategy was beneficial for many ship owners, it could not guarantee full container loads. Another solution with more long-term promise was the development of intermodal transport systems through which shipping lines would exercise control over cargo before and after it left their own ocean carriers. In the latter part of the 1970s, therefore, many shipping lines with hopes of improving asset utilization and inventory (assets) management enthusiastically began to promote new intermodal services. By the mid-1990s nearly every "container" shipping line had become an "intermodal" carrier and these were joined by a host of new faces.

#### **Intermodalism: An Organizational Revolution**

The technological developments in the shipping sector coincided with a series of

institutional, organizational, and regulatory changes that altered the shipping landscape. These changes were crucial to the development of intermodalism and will thus be discussed in the context of intermodalism. Once again seaports were central players in this unfolding drama.

#### Defining Intermodalism

Yehuda Hayuth, who has provided perhaps the most important work among geographers on intermodal transport, gives the following succinct description of the intermodal concept:

Intermodality . . . is simply defined as the movement of cargo from shipper to consignee by at least two different modes of transport under a single rate, through-billing, and through-liability. The objective of intermodal transportation is to transfer goods in a continuous flow through the entire transport chain from origin to final destination, in the most cost-and time-effective way. This means capitalizing on the relative advantages of various transport modes in every segment of the journey. (Hayuth, 1987, p. 15)

Because intermodalism arose at the crest of the container revolution it is often misperceived as primarily a technological achievement. In actuality, according to Hayuth, while containerization facilitated its development and implementation, intermodalism reflects an *organizational* upheaval in the freight transportation industry that transformed contemporary thinking about goods movement (Hayuth, 1987, p. 14). In other words, intermodal transport is not distinguished by the technical ease of cargo transfer between two vessels—this was containerization's accomplishment. Intermodalism is characterized by the organization of the total cargo flow (from shipper to consignee) into a single or integrated or unified service. It is often noted, therefore, that intermodal transport provides a "seamless" movement, not because cargo transfers between two or more modes of transportation have been eliminated, but because it has conceptually erased that transfer from the standpoint of both the shipper and the carrier.

In order to illustrate the roles of shippers and carriers in an intermodal transport system, Hayuth contrasted the main features of "segmented" and "integrated" transport systems. In a segmented or single-mode system, cargo movement is fragmented among different carriers who are involved with only one segment of the total movement. Typically, a given carrier would be responsible for the cargo until a given intermediate transfer point is reached; once the cargo is off-loaded, that carrier is no longer involved and another carrier becomes responsible for the next segment of the movement. It is the responsibility of the shipper to make arrangements for pick-up and delivery by this latter carrier, oftentimes including the choice of the transshipment point. The upshot is that the shipper must contend with numerous functionally- and geographically-bound carriers, multiple rates, and various service contracts for a single shipment. The carrier's concern (its responsibility for the cargo, marketing strategies, etc.), meanwhile, is limited to only a portion of the cargo's entire journey.

The concept of intermodalism seeks to substitute an "integrated" shipping for the fragmented single-mode approach of a segmented transport system. Compared to the multiple rates, arrangements, and the fragmented involvement of carriers in this latter system, an integrated transport system presents the shipper with a through-service from the point of origin to the final destination. This means that a given shipment does not incur new rates and carriers at each transfer point; instead, it moves through these intermediate points under the charge of one "multimodal" carrier or joint control of several carriers in close cooperation. The shipper is charge a single rate for the entire

journey, a "through-bill", and is relieved of the need to make multiple arrangements with different carriers. The intermodal carrier, at the same time, accepts "through-liability" for the entire movement, minding over the intermediate tasks involved up to the final destination.

#### The Benefits of Intermodalism to Shippers

Intermodal transport thus is not only a "seamless" movement, but also a "door to door" service, and the successful operation of such a system holds benefits for both shippers and carriers. For shippers, intermodalism expands the available shipping/distribution alternatives, allows greater flexibility, and provides a more reliable service at a lower cost (Mahoney, 1985; Eyre, 1987). The ideal intermodal transport system provides "one-stop shipping" even when multiple transport modes will be involved, disentangling the shipper from the numerous dealings previously involved in arranging transportation. Costs are lowered because shippers have more bargaining power against one versus many transport providers, and the emphasis on coordination inherent in an "integrated" movement makes for a more reliable service (Coyle, Bardi, Langley, 1995). The marked improvement in service reliability has encouraged many firms to focus competitive strategies around transportation, such as with just-in-time inventory (JIT) management. Finally, intermodal transport promises a more flexible service. Illustrating this point, a recent article in Traffic World reported on the use of intermodal transport to help shippers cope with the uncertainties of the meat trade (Cottrill, 1998). The meat cargo must reach its consignee before it perishes, a time window of about 40 days. Demand, however, is volatile and frequently necessitates last

minute diversions to new customers that are often thousands of miles from the shipment's initial destination. Flexible transport is, therefore, a must, particularly for the long-distance trade between the U.S. and Australia/New Zealand that accounts for more than 90 percent of the meat imported to North America (Ibid., p. 26). The article points out that several shipping firms have offered intermodal services that "reduce costs and provide shippers with as much flexibility as possible when routing their cargoes . . . and [more precisely] when scheduling the delivery of meat consignments" (Ibid., p. 27).

#### The Benefits of Intermodalism to Carriers

Intermodal transport also presents advantages to carriers. In addition to providing new service alternatives, intermodalism can improve utilization and management of fixed asset and lower both overall and per shipment operating costs (Hayuth, 1987; Wood et al., 1995). These benefits derive largely from a "total system" perspective and an expanded control over cargo shipments. From the carrier's standpoint, the goal of "door to door" integrated transport, which is to maximize the efficiency of the entire system, relegates each individual segment of a given journey to secondary status vis a vis the total movement. As Hayuth writes, therefore,

the relevance and effectiveness of seagoing vessels, trucks, railroads, and ports are evaluated in relation to their roles as individual elements within a total system. Almost any new decision made by [intermodal] carriers . . . takes full account of the whole picture of an integrated transportation-distribution system. (Hayuth, 1987, p. 15).

Putting this total system perspective into practice promises to greatly improve the coordination of the various elements involved in goods movement and, thereby, reduce wasteful costs throughout the system, and improve the reliability and flexibility of service. It also entails more control over cargo for the entire movement, allowing carriers
to match cargo flows with their own assets and synchronize their movements to achieve economies of scale on high-volume routes.

This advantage is reflected in the emergence of high-volume corridors or "trunk lines" for all transport modes. The unit train serves as a good example. A unit train consists of "permanently connected cars that [carry] only one product nonstop from origin to destination. It can be thought of as a conveyor belt" (Johnson, 1993, p. 99). Before intermodal transport, unit trains, which offer less expensive, more dependable service to the shipper and achieve higher equipment utilization for the carrier, typically carried bulk cargoes (Thuong, 1989). The heterogeneous nature of breakbulk cargoes – the various sizes, myriad origin-destination pairs, and small shipments – precluded the use of unit trains. The implementation of intermodal transport systems, however, made it possible to harmonize different networks and consolidate flows into "trunk lines" served by unit trains and still satisfy multiple origin-destination pairs. As a related comment I would add that the ability to maximize load factors of post-PANAMAX containerships is also enhanced by the coordination and control realized in intermodal systems.

#### Containerization: The Technological Basis for Seamless Transport

The significant role of the set of innovations associated with containerization in the emergence of intermodal transport is readily apparent. Containerization facilitated the rise of intermodalism by providing a "common denominator" for the entire system (Hayuth, 1987). This ensured that transfer points were "minimized, cheap, and efficient" (Eyre, 1987, p. 180) and allowed the carrier to organize the best "combination of all possible modal arrangements [and provide] many feasible methods for moving freight"

(Holcomb and Jennings, 1996, p. 6). Furthermore, containerization greatly reduced the need for human labour and made the cargo transfer process amenable to automation.

#### Deregulation: The Disappearance of Regulatory Barriers to Seamless Transport

While containerization established the technical basis for integrated transport it did not by itself lead to the development of intermodalism. Regulatory barriers prevented the close cooperation, control, and service alternatives needed to make intermodal transport work. The "total system" concept implies a single carrier or several in close cooperation that are able to make decisions based on the "big picture". It also draws carriers away from their traditional roles and conventional tasks into other areas of transport and logistics, as when a shipping line organizes the inland movements of its cargo or when it manages a terminal warehouse for a major client. Inasmuch as the effectiveness of integrated systems is measured by their weakest link, by paying attention to these other functions intermodal providers are able to "lubricate all components of the system" (Hayuth, 1987, p. 106) and offer more creative service packages (Harper, 1995).

In the late 1970s the regulatory environment for transportation began to change, characterized by a relaxation of regulations governing ocean shipping, seaports, railroads, and trucking. This general movement towards deregulation gave carriers in each mode more freedom to establish and market intermodal services, and it initiated a period of institutional change in all modes that saw the creation of intermodal carriers and alliances. Over the last 20 years, deregulation has greatly altered the "playing field" in the U.S., Canada, and Europe and many other countries (Hayuth, 1987; Hershman and Kory, 1988; Charlier and Ridolfi, 1994; Heaver, 1995; Turnbull, 1991). In North

America, the passage of three pieces of legislation made the U.S. the first to deregulate ocean shipping, rail transport, and trucking: the Motor Carrier Act of 1980, the Staggers Act of 1980 (deregulated rail), and the Shipping Act of 1984 (Frankel, 1986; Hayuth, 1987). With the passage of these acts carriers gained flexibility in the services they could offer. It became possible to negotiate private contracts covering rates and specialized services, select routes (and ports) with greater ease, and carry a wider array of cargo. As carriers gained these new prerogatives, seaports lost a large measure of their legal rights to cargo from their "natural hinterlands" (Hershman and Kory, 1988). Further, the Shipping Act specifically broadened antitrust immunity for carriers who set intermodal rates (i.e. through-rates) and made it easier to consolidate services under a total systems concept (Frankel, 1986). Canada followed suit beginning in the late 1980s with the passage of the National Transportation Act 1987, followed by a "modernized" version in the National Transportation Act 1995. These bills led to a loosening of the regulatory environment for Canadian carriers in order to "let the private sector do what it does best" (Canadian Transportation Agency, 1998). This change began to expand the scope of options for Canadian carriers.

## Mergers and Strategic Alliances: The Institutional Basis for Seamless Transport

The wave of deregulation emanating principally from North America and the United Kingdom sparked a wave of institutional changes in all transport modes. In general, this period of change has been characterized by consolidation in the ocean shipping, rail, and trucking sectors and localization of port policies. The consolidation trend has occurred through mergers and strategic alliances in all surface modes, but it has

been most dramatic in ocean shipping and rail.<sup>2</sup> It reflects a significant reduction in the distrust that historically marked relationships between modes. Seaports, meanwhile, experienced a round of commercialization and privatization with the aim to make them more entrepreneurial.

In general, institutional change in ocean shipping, rail, and trucking occurred as a response to capacity problems (balancing inbound flows with outbound flows), high capital costs, and meagre earnings. The first impacts of institutional change in ocean shipping were felt by the shipping conferences. In the early 1980s, the rigidity of these agreements led to the beginnings of a decline in their membership as container lines sought more flexible arrangements that would allow them to be more responsive to market changes and to be innovative on rates and services. With container technologies, both independent shipping lines and new strategic alliances competed successfully against even the strongest conferences and by the mid-1990s, the shipping conferences' share of ocean trade had plunged from 90 to 50 percent (Zacher and Sutton, 1996, p. 65). On some shipping lanes, particularly for Mediterranean and Central American trade, shipping conferences disappeared entirely (Fabey, 1998d, p. 30). Moreover, while formidable conferences still exist on the transpacific, transatlantic, and North America-South America trade lanes, many analysts anticipate the end of shipping conferences altogether (Fabey, 1998c).

Increasingly, shipping conferences have been replaced by mergers and the formation of strategic alliances between container/intermodal carriers. Strategic alliances, like shipping conferences allow lines to collectively shoulder costs by sharing

<sup>&</sup>lt;sup>2</sup> For an example of the consolidation trend in trucking see J. Schulz (1998, March 23). Consolidation Galore. <u>Traffic World</u>, pp. 15-16.

equipment, space, vessels, terminals, containers, offices, and people (Fabey, 1998c). There are, however, two important differences. Strategic alliances are much more flexible arrangements in which the members' operations and marketing schemes are more closely connected than those in conferences. Secondly, the scope of strategic alliances is global, that is, they are not like conferences which were defined according to one or two particular trade lanes. Thus, while a line can be a member of more than one conference, or of an alliance and a conference, it can't be part of more than one strategic alliance. Strategic alliances have greatly contributed to the consolidation trend. For example, between 1985 and 1993 the number of "carriers" serving the Northern Pacific trades declined from 42 liners to 10 consortia (Zacher and Sutton, 1996, p. 73). By 1998 that number had declined to four key global alliances—in the entire world. They included the Grand Alliance, the newly formed New World Alliance, Tricon, and Maersk/Sea-Land. By 1998 analysts were envisioning a world of shipping left with 6 or 7 large lines (Fabey, 1998c).

Strategic alliances have proven to be quite volatile arrangements versus the conference structure and in practice have begun to resemble a "musical chair approach to ocean shipping" (Fabey, 1998c, p. 31). The constant reshuffling has been driven in large part by several rounds of mergers between container lines, many of which have occurred between members of different alliances. The first round occurred from the mid- to the late-1980s, followed by a new round that begin in the early-1990s through to the present (Hayuth, 1987; Fabey, 1998c). The most dramatic of these recent mergers was the acquisition in June, 1997, of American President Lines (APL) by Neptune Orient Lines (NOL), of Singapore. NOL paid around \$US 825.8 million to buy APL, which at that

time was the largest container line under the U.S. flag ("Neptune Orient," 1997, p. B10). One container line executive commented on the likely effect of this merger, "This is just the beginning. I believe that . . . up to a third of the capacity in the Pacific could be under new management, so to speak, in the next two years" (Johnson, 1997b, p. 11). The most immediate impact of the NOL-APL deal, however, was not a spate of mergers by other lines but a considerable rearrangement of strategic alliances. Upon its purchase by NOL, APL, which was a member of the Grand Alliance, became a member of the New World Alliance, causing a major shake-up of both of these alliances (Fabey, 1998c).

Mergers have also dramatically altered the railroad industry. In 1995 the Burlington Northern and Santa Fe railroads merged, forming BNSF, followed the next year by the Union Pacific-Southern Pacific (UP-SP) merger. This restructuring left only two railroads serving the entire U.S. West Coast, BNSF and UP-SP. More recently, in late 1996, CSX Corporation and Norfolk Southern Corporation, two eastern U.S. rail carriers, squared off over the purchase of Conrail (Mathews, 1996, p. A3), a purchase that would give either railroad exclusive coverage of many northeastern U.S. freight routes, including New York. When this deal was completed in the spring of 1998, only four Class I railroads remained in the. Canadian railroads have also explored opportunities through mergers. The most significant has been the proposed buyout of the Illinois Central Railroad (CI) by Canadian National (CN), which gave the Canadian carrier single-line access through Chicago (Gallagher, 1998).

Mergers and alliances have also occurred between modes, allowing the creation of truly "multimodal" carriers. Nearly all container lines and alliances have partnered with rail companies to expand their control over cargo flows. Many lines have purchased their

own rail equipment (double-stack cars, for example) and contracted with rail companies to provide dedicated services using this equipment. A merger between modes is a less called-upon strategy but these have occurred, as when CSX Corporation (rail) purchased Sea-Land (Wood et al, 1995).

#### Shifts in Port Policy

At the same time that ocean and rail carriers were increasing their scale of operations, the "regime of ports" became more "localized". Heaver (1995) has used this terms to describe the institutional trends in the seaport industry, highlighted by efforts to privatize or, at least, commercialize seaport operations and changes in the traditional coalition between seaports and their host cities, because they act to enhance the seaport's "local autonomy". Frankel (1992) identifies six factors behind port privatization: (1) improve responsiveness to user requirements; (2) easier access to new sources of funding; (3) reduction in public expenditure (for large capital projects); (4) improvements in intermodal transport integration and coordination; (5) improvements in port and transport marketing; and (6) reduction of port costs. As more port services get privatized, public port authorities take on a "landlord" role, signifying that they usually own and administer seaport facilities but do not operate them (Saundry and Turnbull, 1997). The commercialization and privatization of seaport activities makes terminals within the same port relatively independent of each other and often enables intermodal carriers to have a more direct hand in their management, a control desired by these "total-system" carriers. The "entrepreneurial spirit" resulting from "localization" in port policy enabled intermodalism by allowing carriers and seaports to make specialized arrangements

involving issues of control, directions of port development, and other conditions that facilitated "seamless" goods movement.

## The Shipping Landscape in the Containerized Intermodal Era

Deregulation and institutional shake-ups considerably transformed the freight shipping landscape. New cargo flow patterns emerged as freight carriers rationalized their global networks, substituting land routes for water routes in long-distance moves of non-bulk cargoes and sending more cargo through fewer ports. Indeed, in 1995 the top 30 ports handled 61 percent of all TEUs handled worldwide (<u>Containerisation</u> <u>International Yearbook</u>, 1997). These new patterns reflect the establishment of three distinct intermodal subsystems: (1) loadcentres, (2) landbridges, and (3) inland container terminals.

#### Loadcentreing

Loadcentreing is the name given to the relatively recent concentration of cargo at a limited number of seaports (Hayuth, 1987; Slack, 1994). Operating on the same basic principles as hub and spoke systems, loadcentreing enables intermodal carriers to realize the economies of scale in huge containerships, certain "trunk" routes, and the use of particular seaports (the "loadcentres"). As the heart of a hub-and-spoke system, load centre ports must operate extremely efficiently and, while this typically requires expensive high-tech equipment at each hub location, such investments over the total system are less.

Various technological and organizational changes, which were discussed earlier in

this chapter, allowed the application of the hub and spoke concept to intermodal transport systems. First, the integration of land and ocean movements enabled carriers to control large blocks of cargo, making the seaport a link within the system rather than a terminus (Marti, 1988; Hayuth and Fleming, 1994). With this control, carriers were able to rationalize their networks to establish high-volume flows on certain routes and lower per unit shipping costs. Secondly, the introduction of cellular "mega" ships and double-stack liner or block trains (discussed below) to serve loadcentres and provide service along "trunk" lines lowered per unit transport costs. Loadcentre ports were equipped with highly efficient gantry cranes and intermodal access to handle the large "pulses" of cargo that arrived and departed by such means. The use of loadcentres meant that ships and trains no longer had to follow cargo in order to make a full load (Chilcote, 1986). Vessels could attain high levels of utilization with on a few port calls and thus reduce the opportunity costs accrued while tied at berth.

Loadcentreing relies on the ability of land transport systems to collect widely dispersed cargo at one or two hubs and to operate feeder services to places not served by trunk lines. Unit trains, often carrying double-stacked containers, are able to serve this function but a more important improvement to this end was the development of equipment specially designed for double-stack unit trains (Thuong, 1989). Designed specifically for containers and operated for or by shipping lines, double-stacking technology exemplifies the railroad industry's acceptance of intermodalism. This new technology doubled the carrying capacity of trains with only marginal increases in labour, car and locomotive requirements and resulted in a per container cost reduction of up to 40 percent (Hayuth; 1987, p. 29). Double-stack cars are usually used in "liner" trains whose

schedules are coordinated with ship arrivals and departures. Like unit trains, liner trains are pre-assembled and can thus bypass intermediate reclassification and marshalling yards, an evasion that decreases transit time and improves service reliability (Thuong, 1989).

#### Landbridge

The principal benefit of double-stack liners was to extend the economies of scale of container hauling further inland, such that long-distance overland haulage became comparable in cost to water haulage. This provided intermodal carriers with a new range of options. By the mid-1980s it was therefore increasingly common to take advantage of this (cost savings and service advantages) by substituting land routes for water routes, an intermodal subsystem called the landbridge (Hayuth, 1987). In the mid-1990s, landbridge systems are most well-developed in the Canada and the U.S., but carriers also make use of them in Europe, Russia, Mexico and South America. Figure 4.10 illustrates the different types of landbridges as operated in North America. Most familiar is the socalled "maxi-bridge" service whereby containers originating in Asia and bound for European destinations are off-loaded at a U.S. West Coast port, shipped cross-country by double-stack rail, and loaded onto a containership for continued movement to Europe. A use of this landbridge service for such shipments generally shaves around 8 days off of the total transit time (Hayuth, 1987). With any landbridge, rail services are synchronized with vessel arrivals and departures and it is the carrier who selects the intermediate routing between ultimate destinations, including the seaport.



# Inland container terminals

Inland container terminals provide many services traditionally associated with seaports, such as container stuffing/destuffing, customs clearance, and sometimes train assembly. Whether they are several miles or several hundred miles from the port area, like the inland terminal in Butte, Montana, more than 600 miles from the ports of Seattle and Tacoma, the purpose of inland terminals is to eliminate potential bottlenecks at seaports. The potential for such bottlenecks arose principally from the greater space needs of container-based intermodalism, space that is particularly hard to come by on the urban

waterfront. The handling and storage of containers, the large "pulses" by which they arrived, and on-dock intermodal rail connections demand far more space than traditional breakbulk activities. Inland container terminals allowed other port functions to be relocated out of the waterfront in order to facilitate the throughput of containers and not prevent the stall of containerships or trains. Furthermore, intermodal terminals typically feature cheaper labour and land and are not under the same environmental scrutiny as waterfront activities (Hayuth, 1980).

#### Summary

In this chapter I recounted the emergence of containerization and intermodalism in freight transport. Both innovations were described as broad solutions to several basic yet formidable obstacles in the transport industry's ability to serve the postwar expansion of world trade. Containerization, which appeared commercially in the late 1950s, addressed the choking congestion at seaports caused by technological inefficiencies, poor labour productivity, and an absolute lack of capacity in the handling cell of seaports at a time when shipments of breakbulk cargoes were on the rise. The unitization of such cargoes in standardized "boxes" and the introduction of cellular vessels and gantry cranes greatly enhanced the efficiency, productivity and handling capacity of seaports and the shipping industry as a whole. In the decades since the birth of commercial containerization, containerized shipments, the container handling capacity of the world's seaports and ocean carriers, and the size and number of container vessels have increased

steadily in all cases. The rising commitment to containerization, reflected in adoption of its associated technologies, has resulted in a much larger proportion of fixed capital in the shipping industry. In order to meet these capital costs, let alone realize a profit, carriers sought to maximize asset utilization by acquiring greater control over cargo shipments. Intermodalism emerged in the 1970s as a logical and effective solution. Intermodalism was realized as technological (i.e. containerization), regulatory and institutional barriers diminished, leading to mergers and the formation of strategic alliances within and across modes to create large, single multimodal carriers. With the implementation of the intermodal concept, these carriers gained the ability to control shipments from the doors of the shippers to those of consignees. A "seamless" cargo movement system replaced one in which control, responsibility, liability and pricing were "segmented" among different modal carriers. The expansion of control, from one segment of a shipment's movement to the entire journey itself, allowed intermodal carriers to coordinate the various segments (rails, trucking, ocean carriers, seaports) according to total-system, versus individual shipment, goals, thereby improving the overall utilization and management of fixed assets. This allowed the emergence of inland container terminals, landbridge services, and loadcentreing as viable shipping strategies. Intermodalism also allowed carriers to provide services for shippers that were more innovative, flexible and often specialized to particular needs.

A worldwide commitment to containerization and intermodalism is reflected in the nature of technological investments and organizational-institutional arrangements by the shipping industry, particularly in Asia, Europe, and North America, but also Middle and South America and some places in Southwest Asia and Africa. Chapter 5 examines

the impact of these technological (containerization) and organizational-institutional (intermodalism) revolutions on seaport competition by showing how they dramatically altered the time-space regime in which seaports operate.

# Chapter 5

# The Times and Spaces of Seaport Competition in the Era of Containerized Intermodal Shipping

The maturation of the container and intermodal revolutions gave shape to a competitive environment for seaports that was, by the mid-1980s, causing ports to "call for a new hand and even a whole new deck," (Fabey, 1998b). The technological and organizational changes embodied in these new modes of shipping transformed the nature of seaport competition by altering the temporal and spatial (i.e. structural) dimensions of strategic problems facing seaport production-systems and the solutions they implemented to confront them. Figure 5.1 is a diagram showing this new time-space regime. It summarizes the principal strategic problems and solutions that define competition in the containerized intermodal era, the temporal or spatial dimension of each problem in relation to the seaport production-system, and the temporal or spatial aspect of each solution. This diagram serves as the focal point for the larger part of this chapter and will be considered further below. First, however, I will discuss the issue that is greatly responsible for the emergence of new strategic problems: the emergence of global intermodal carriers as the seaport's primary customers. Then I will consider the new "orderings of time and space" (Harvey, 1996, p. 244) as they relate to strategic problems and the solutions to maintaining and achieving seaport competitiveness.



#### Changing Times and Spaces in the Realm of the Seaport Customer

Significant among the major events of the container/intermodal era is the replacement of local/regional shippers by global intermodal alliances as the seaport's primary customers. This phenomenon is typically understood in spatial terms, as a geographic expansion of the seaport's hinterland and service area. When local shippers were "the customer," seaports generally handled exports and imports generated by the regional economy, but when global alliances supplanted local shippers as the seaport's primary customer, seaport hinterlands became much more extensive and fluid, if they were definable at all. The implications for the competitive environment in which seaports operate include an expanded "arena" encompassing once-too-distant competitors, an all-or-nothing contest versus regional neighbours, new determinants of port selection, and overall larger stakes—more to gain, more to lose. In this section I shall explain why global intermodal carriers became the seaport's primary customers and then discuss the implications of that phenomenon.

#### The Emergence of the Global Intermodal Carrier as Seaport Customer

The changeover from local shipper to global carrier as the seaport's primary customer occurred when carriers gained intermodal, total-system control over cargo shipments. In essence this reflects the globalization of the shipping industry. The spatial control acquired through global scale operations allowed carriers to offer "one stop shipping," a service combining all transport and intermediate terminal services for the entire cargo movement into one package. Hence, carriers acquired decision-making authority over the routing of individual shipments and, of course, the choice of which ports to use. As Chilcote (1994, p. 4) observes, with shippers less directly involved in cargo routing, "The [shipping] 'firm' has become more important than the commodity [shipper]" in the seaport's marketing plans. In the pre-intermodal era, a port's throughput was largely comprised of commodities originating or terminating in the port region, and by diversifying its traffic base, a seaport could protect its standing from downturns in demand for particular commodities. In the intermodal era, however, a locally-generated commodity's success in markets tends to have less impact on a port's fortunes. Containerized intermodal cargo often originates in, or is bound for, places distant and typically moves under the control of a single, "global" carrier. The producers and consignees in the seaport's region are likely to use such a carrier, whose total-system coordination and technologies (e.g. cellular containerships, double-stack trains, high-tech terminals) would allow it to send and receive shipments through a wide range of ports. Seaports thus do not possess spatial monopolistic powers over local and regional shippers that they once did. Yet, just as shippers are not necessarily tied to the nearest seaport, a given seaport is not solely reliant on its local shippers for its entire throughput. The net result, according to Chilcote, is that when "assessing the big picture," seaports have realized that carriers are the main generators of port throughput and should therefore to be considered the primary customer. The shift from local shipper to global carrier as the seaport's "customer" affected seaport competition by increasing the scale, altering the determinants, and raising the stakes.

## The Expanding Scale of Competition

Competition became much more intense as the spatial monopoly that seaports once possessed over their local and regional hinterlands all but disappeared. Containerbased intermodalism greatly expanded the potential reach of a seaport, often to the continent's extremes, with the reverse effect that others could reach back into its own local hinterland to tap what was once a source of guaranteed business. According to Gillen and Cooper (1995, p. 18), before containerization a seaport could expect to derive over 80 percent of its traffic from only its "local" hinterland, i.e. the area within 200 miles of its docks. Now, a large multimodal container port can view virtually all of North America, for example, to be one transportation market. This phenomenon introduced a new scale to competition, as widely separated seaports, some in different countries and others on entirely different coasts, were drawn into competition with each other as never before. For example, ports all along the North American west and east coasts now compete for container traffic moving between Asia and places east of the Rocky Mountains (including Europe). According to Hayuth and Fleming (1994), in the early 1990s, this traffic accounted for over 70 percent of all imports through the ports of Seattle and Tacoma, 50 percent for the Port of Oakland, and over 30 percent for the ports of Los Angeles and Long Beach. As these authors note, this traffic constitutes a considerable share of each port's business and, therefore, generates lively competition between them. Recent findings by McCalla (1998), reproduced in Figure 5.2, illuminate the competition for containerized intermodal cargo between seaports separated by an entire continent. An analysis of data collected in 1996 on imports and exports through the ports of Vancouver



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and Halifax, suggests an active competition between these ports for traffic between Asia and central Canada. Traffic generated by the central Canadian provinces of Ontario and Quebec makes up a significant component of the throughput for both ports. East Asia is clearly the most frequent origin/destination for this traffic when it is handled by the Port of Vancouver and, while it is a less likely origin/destination for that handled by the Port of Halifax, it is still an important flow to the latter port. Thus, not all East Asia-central Canada trade is moved through the Pacific Coast port of Vancouver, as Halifax has captured its own appreciable share (See map in Figure 5.3).

#### Providing the Best Fit: New Determinants of Port Selection

An expanded geographic sphere presented new opportunities to seaports but at the cost of a reduced status in the global service networks operated by intermodal carriers. As the status of seaports declined, new determinants of port selection emerged as, recalling Harvey's observations on spatial mobility and the importance of "minute differences" between places, carriers were able to opportunistically compare the advantages of including one or several among many ports in their itineraries. At the global scale, a host of possible routes enable cargoes from the same origin to be "shipped over different oceans for the same destination" (Slack et al., 1996, p. 291). From the many options now available to them, intermodal carriers are able to design service networks that offer the best overall transport product. Their primary concern in this endeavour is "the selection of an efficient and marketable general transport itinerary" (Hayuth and Fleming, 1994, p. 189). The port choice is a matter of secondary importance, as the qualities of specific seaports are evaluated in relation to this itinerary in order to determine how well the choice of a given port will serve the entire intermodal product rather than an individual leg of the journey. The result of this development, reflected in part by the appearance of "hub and spoke" type routing networks, was a "declining status" for seaports that had once acted as regional gateways but were now "just one set of links in multimodal transportation chains" (Slack, 1993, p. 587). Ports in the container/intermodal era could no longer stake their success on lowering costs, proximity to a given market, or physical characteristics but on how well they "fit" into the global designs of large alliances of carriers.

#### All or Nothing: The High Stakes of the New Competition

As this suggests, containerization and intermodalism not only expanded the scale of seaport competition, they increased the overall stakes. The consolidation of ocean, rail, and motor carriers into global intermodal alliances presented seaports with a smaller set of much larger and more mobile customers. According to Frankel (1996), these large alliances sometimes account for 20-30 percent of a seaport's container throughput and "can easily make or break a port" (p. 30). The huge potential for losses and gains embodied by these carriers sparked a wave of unprecedented port development as seaports threw money at customer requests for new facilities and services. Indeed, even Long Beach, the largest port in the U.S. in 1996 faces this untenable situation. Over 10 percent of its massive yearly throughput of more than 3 million TEUs is under the control of China Ocean Shipping Company (COSCO) ("Judge orders," 1997, p. 25). Not surprisingly, the port recently sought to develop a 145-acre terminal for the shipping line with the promise to expand the site if and when needed. Similarly, the Port of Seattle, in a similar predicament at about the same time, planned a US\$250 million terminal expansion for Hyundai. The container line turned down the project, however, and chose to move its Seattle operations south to the Port of Tacoma, a move which cost Seattle over 13 percent of its annual throughput (Solomon, 1996).

Ironically, despite the enormity of the costs involved, these investments have proven to be no guarantor of success. As Slack (1993) has suggested, such customerrequested development can be likened to a game of "lotto":

Ports have to make significant investments without any degree of assurance that traffic will increase. The only guarantee they have is that

unless there is a container handling facility available there will be little or no container traffic. This is somewhat analogous to a lottery, where only those who purchase tickets have a chance of winning, however small those odds may be. (Slack, 1993, p. 582)

Moreover, as in a lottery, the more participants, the lower an individual's odds of winning. Slack's analogy connects nicely with the space-time theory of competition, particularly in relation to the greater spatial mobility produced by the "homogenization of space." As more seaports develop facilities to handle large container vessels, for example, the potential mobility of carriers grows because there are simply more places to go. Routing changes that result from the frequent rearranging of global alliances show how seaports take advantage of these alternatives. Exhibiting more loyalty to their alliances than to a particular seaport, it is not uncommon for a carrier to suddenly reconfigure its port rotation to satisfy its commitment to an alliance, while a seaport that undertook substantial investments recommended by that carrier often finds itself suddenly abandoned (Fabey, 1998c).

#### The Times and Spaces of Strategic Problems

The shift from shippers to carriers as the seaport's "customer" transformed the temporal and spatial dimensions of the seaport product, giving rise to a new set of strategic problems for competing seaports. Whereas local/regional shippers had desired that the seaport serve as a "regional gateway," global intermodal carriers sought a seaport that would serve as a "link" in a seamless, wide-reaching system. As the left-most column in Figure 5.1 indicates, serving as a "link" entailed the provision of four basic service products and/or features by a seaport: (1) Fast, low-cost, loading/unloading of containers, (2) efficient intermodal exchange, (3) mega-terminals that could

accommodate the large-scale operations of global intermodal carriers, and (4) greater managerial and operational control for carriers over those terminals. The second column from the left in Figure 5.1, headed "Temporal/Spatial Dimensions," and the schematic in Figure 5.4 both summarize the general time-space character of each of the four basic strategic problems. In order to gain an advantage over a competing "link," a seaport was compelled to decide how to shrink the time taken in the handling, storage, and logistics production cells of the seaport so that it could provide rapid loading/unloading as well as



a swift throughput of each shipment. At the same time, the customer required a spatial expansion in these same production cells to meet the needs of its hub-and-spoke type system and the possibilities of growth through alliance formation. Furthermore, a spatial contraction was required of the port authority in order to grant the customer greater managerial and operational control over its port operations.

In this section I will discuss further the time-space transformation in the character of the seaport product and, thus, basic strategic problems faced by seaport productionsystems before moving on to review the time-space implications for the realm of strategic solutions.

# The Temporal Dimensions of the Seaport Product: Fast, On-time, and Reliable

Carriers covet the first element of the seaport product – fast loading/unloading of containers (see Figure 5.1) – because it reduces the port time of ocean vessels and allows the carriers to provide regularly scheduled services. Indeed, the huge operating costs of a large containership, which can reach US\$50,000 per day, necessitate less time in port and more time at sea, because such vessels only generate money when they are on the move. As well, container lines increasingly offer their services on a scheduled basis, which has upped the demand for greater reliability from seaports (Figure 5.5). The ability to offer and maintain relatively frequent, regular service is an advantage promised by intermodal transport and is one of the primary objectives behind the formation of large multi-modal shipping alliances. Service regularity promises price stability, the potential to lower shipping costs and, for the intermodal carrier, it facilitates the effort to coordinate a "continuous" flow of cargo through the system (Zacher and Sutton, 1996). As a





reflection of the importance of scheduling, recent surveys of shipping lines have revealed the importance of equipment availability. As Figure 5.6 illustrates, ports have begun emphasizing such availability in their major advertisements.

Intermodal carriers offering "continuous" cargo flow also require efficient intermodal exchange. Before carriers offered through-service they were usually not concerned about the movement of cargo through transfer points; the scope of their service was limited to a particular segment of the total journey. With the emergence of intermodal transport, however, the entire cargo movement is provided by a single carrier as a single service that takes responsibility for a shipment over its entire journey. Thus, unlike conventional modal carriers, intermodal carriers have a keen interest in the throughput efficiency of the seaport. Since a clog at the port will directly affect intermodal through-service ports are pressured to ensure a swift movement of cargo out of the port. In the words of Jack Block, Port Authority president of the Port of Seattle, "We sell the ability to quickly transfer cargoes from ships to trains" (Crowley, 1996, p. 5).

#### Spatial Dimensions of the Seaport Product: Expanding Space, Expanding Control

Seaports also sell an expansion of space in the handling, storage and logistics cells of the seaport production-system. Shipping firms desire the ability to exploit economies of scale in larger terminals and to exert primary control over the management of such terminals. Third and fourth generation container vessels discharge thousands of spaceconsuming<sup>1</sup> containers at each call, creating "freight tidal waves" for loadcentre ports. A fundamental component of the port product, then, is the ability to absorb incoming

<sup>&</sup>lt;sup>1</sup> See Hayuth (1985) and Chilcote (1997) for approximate space requirements of containerized cargo.

"pulses" of cargo while holding ready large amounts of outgoing cargo. The port that can provide adequate capacity allows the container line to achieve a higher rate of utilization of its large containerships. Additionally, larger terminals are attractive to carriers that may wish to pool their terminal operations with alliance partners.

In addition to physically larger spaces, carriers desire more decision-making control over the spaces within the seaport in which they operate, particularly in terminal management and operations. Greater control over larger terminals is an important element in a line's ability to provide flexible, "seamless" cargo movement. The realization of this degree of control is reflected in the institutional "localization" of seaports that has occurred through deregulation and privatization (Heaver, 1995). The result has been a widespread shift from "comprehensive" to "landlord" port authorities, which are more commercially attuned, responsive to customer needs, and more flexible in service offerings.

#### **Changing Times and Spaces of Strategic Solutions**

The emergence of global intermodal carriers as the seaport's primary customer and the set of strategic problems to which that gave rise compelled seaports to reevaluate the production-systems and decide how they could compete. Figure 5.1, in the third column from the left, lists five major solutions pursued by seaports in the new strategic environment. The arrows in the diagram show which solution(s) generally address the four strategic problems discussed in the previous section. As the furthest right column in Figure 5.1, the reconfiguration of the seaport production-system resulting from the implementation of these strategies has involved a temporal expansion in the handling



cell, a spatial expansion in the storage and logistics cells, and a spatial expansion in the scope of planning and development by the port authority. This reconfiguration, which is illustrated in Figure 5.7, reflects an adjustment by the seaport production-system to a new regime of competitiveness. In this last section of the chapter, I will discuss each of the

general solutions listed in Figure 5.1, pointing out both how they address strategic problems and how they affect the time-space character of the seaport production-system.

#### Compressing Time, Stretching Time: The Seaport and the Gantry Crane

In Chapter 4 I discussed the introduction of specialized container cranes called gantries. These cranes improved cargo loading/unloading by every measure and greatly improved labour productivity at the seaport. They enabled the seaport to *compress* transshipment time involved in the handling cell of the seaport production-system. As was also pointed out in Chapter 4, the introduction of these cranes greatly increased the capital-intensity of seaport operations. A recent study on the gantry crane market indicates a growing commitment to this technology by ports. According to the study, between 1990 and 1995 seaports made orders for cranes that were increasingly faster, heavier-load, and large enough to work post-Panamax containerships (<u>Containerisation International Yearbook</u>, 1995, p. 16). The increasing role of gantries greatly increased the proportion of fixed capital in the handling cell of the production-system, thus an expanding overall capital turnover time and raising the pressure to achieve maximum rates of crane use.

#### The Land Grab: Spatial Expansion in the Seaport Production-System

Investing in gantry cranes alone is not sufficient to produce more efficient loading/unloading and swift cargo throughput. As cited earlier, the productivity and efficiency of these cranes is dependent on an adequate supply of land which can be developed as larger terminals, storage yards, or sites for rail connections (Hayuth, 1985). Thus, a spatial expansion in the storage and logistics cells of the seaport productionsystem is elemental to producing the seaport product.

The rate at which gantries discharge the cargo from enormous containerships easily outpaces the rate at which land transport moves the containers out of the port area, necessitating a sizable tract of land to absorb this surge. At the same time, ports need room to "pre-build" outgoing loads, a process that requires much more time than the gantry crane needs when loading the ship. In all, container terminals must provide much more back-up space than did their predecessors, often as much as 700% more area. (Chilcote, 1997). Figure 5.8 compares the layout of a traditional breakbulk port with one that handles containers.

The provision of land for terminal operations is certainly not a small nor a simple matter. According to Chilcote (1997, p. 4), the "container storage yard is usually the primary constraint for container terminal throughput capacity." Yet adding more land to keep up with vessel sizes and crane efficiencies is difficult for most container ports, which are often hemmed into a cramped waterfront tract by large urban areas. Moreover, seaports in such situations can no longer develop this land at their discretion, but must consider public values that often contest with those of the port (Kreukels and Wever, 1996).

The scramble for land is increasingly vital for ports that wish to retain large clients. In 1996, at the request of APL, the Port of Seattle began a 188-acre expansion of its Terminal 5 to be completed in 1998 at a projected cost of US\$260 million (Watson and White, 1997; "Expansion," 1996). Down the coast, the Port of Los Angeles also



Figure based on Chilcote, P. (1997). Planning and development of on-dock intermodal rail: The Port of Tacoma case study. Unpublished manuscript. Port of Tacoma. Tacoma, Washington.

commenced a US\$270 million terminal expansion of Pier 300 that was dedicated to APL (Brady, 1995, p. 24). As in the storage cell, a spatial expansion in the logistics cell is also prominent in the realm of technologies. This typically takes the form of on-dock rail, which improves the vessel-to-vessel transfer of containers by eliminating intermediate drayage movements. In addition, on-dock connections improve the rail and marine interface by encouraging cooperation between the modes, which enhances cargo throughput. In many cases on-dock rail proves to be a deciding factor in the competition for intermodal clients.

The development of an on-dock intermodal yard, for example, was a major factor in securing Sea-Land for the Port of Tacoma, which previously operated at the Port of Seattle. Shortly thereafter, in 1985, Tacoma captured Maersk Lines by promising to develop another on-dock rail yard (Chilcote, 1996, p. 2). Figure 5.8b shows a diagram of on-dock intermodal rail. More recently, the seaport approved US\$3.5 million to fund the first phase of another on-dock rail yard (Johnson, 1996b, p. 33). In Europe recently, major concerns about the sufficiency of their rail connections to handle block trains have spurred ports such as Rotterdam to invest heavily in on-terminal rail links (Carding, 1998).

Expanding space in the logistics cell by developing on-dock rail solves not only the problem of throughput time, but reduces the need for larger tracts of land in the storage cell. Indeed, existing land can be made more productive with the provision of on-dock intermodal rail connections. By eliminating the need for intermediate transfers between containerships and unit trains, on-dock rail reduces the terminal's space requirement by nearly 30 percent (Chilcote, 1996). Thus, except for the area needed to

accommodate the rail links, on-dock rail improves terminal capacity without adding more space.

#### Spatial Expansion of the Port Authority

In terms of land acquisition and development, seaports clearly face Swyngedouw's "spatial problem" (see Chapter 3). The ability possessed by carriers to relatively quickly shift from one port to another and the time required to acquire and develop the sought after facilities places the seaport in a serious pinch. With each project, it takes time to raise the money, convince the public, receive governmental authorization, conduct an environmental impact analysis, and finally to construct the facility. An advantage is held by any port that can decrease the time involved in any of these steps and thereby offer the new development to a given carrier. To meet this condition, seaports have embraced strategies for planning and development that are more effective, if not necessary, in the time-space regime of the "new" seaport competition. At the same time, however, the construction of high-volume, high-efficiency facilities is no guarantee of success. As more seaports develop in this way, the alternatives for carriers expand, giving the latter greater mobility as they seek out an advantageous location. In some cases this has encouraged seaports to form loose alliances with their regional neighbours. In summary, even as institutional "localization" diminishes the port authority's control over terminal operations, seaports have expanded their involvement in planning and strategic management beyond the port area, the traditional scope of these activities. Indeed, this type of spatial expansion of the port authority reflects a countermovement to the "localization" phenomenon, as port authorities refocus their strategic
attention and resources from operational and management issues to planning and development at the scale of the entire production-system.

# Regional Transport Planning as a Spatial Strategy

In the containerized intermodal era the spatial scope of seaport planning has broadened and is evident in a growing interest by seaports in landside cargo movements beyond the port area. One author has called this "logistical thinking applied to port planning" (Chilcote, 1994, p. 2). Above I noted that landside (urban, regional) transport systems are vital ingredients to on-dock rail and storage efficiency and, therefore, seaport productivity. As it is fundamentally important to a port's success, Chilcote (1994) argues that regional cargo movements and landside access to the port must be integrated into overall port planning.

This concern for landside access is reflected in the active role taken by seaports on the U.S. West Coast to improve their landside transport linkages. A dramatic example is the Alameda Corridor in Southern California, a 20-mile below-grade truck and rail link between the ports of Long Beach and Los Angeles that allows cargo flows to avoid the congested urban routes. The impetus behind the Corridor, whose US\$2 billion price tag makes it the costliest intermodal project in the U.S., was provided by the ports, which formed the Alameda Corridor Transportation Authority to develop the freight link (Johnson, 1997a). In the Puget Sound, the ports of Seattle and Tacoma are spearheading a similar effort to develop what has been dubbed the "Consolidated Transportation Corridor" (CTC). The CTC would create a grade separated corridor to overcome constraints on port access caused by worsening urban congestion of both roads and rails

("A vision," 1996). According to a report to the Port of Tacoma Commission, the port's role in landside access projects must extend beyond planning and include "direct Port funding contributions" ("Regional," 1996).

#### Port Cooperation as a Spatial Strategy

Cooperation between ports can be viewed as an attempt by seaports to improve their strategic position in relation to highly mobile customers. One form of interport cooperation involves the joint planning and development of landside transportation corridors. Looser forms of cooperation involve the coalition formed among the Tampa Bay ports of Manatee, Tampa, and St. Petersburg, to jointly market the bay to international shippers (Plume, 1995); the leasing to the Port of Houston of a container terminal owned by the neighbouring Port of Galveston ("Houston", 1997); and the creation of an alliance between the ports of Seattle and Tacoma to develop trade (Beer, 1997).

Several scholars argue that cooperation between seaports, such as in the cases above, signals a beneficial trend towards the creation of formal port alliances or even institutional mergers. Like the regional alliances advocated by Harvey (1989) and Swyngedouw (1993), spatial alliances by ports offer a way for seaports to reduce the command over seaports wielded by carriers because of their mobility. Frankel (1996) argues that port alliances could promote better customer service by "coordinating their developments and services to match [the customer's] needs" (p. 30). Fleming also argues for port alliances because "microlevel competitive postures . . . no longer make much sense" (Fleming, 1983, 209). Fleming's argument, which he continued in a more recent

article (1989), is that regional ports, sharing basically the same local market and inland linkages, engage in "destructive competition" by duplicating the enormous capital costs required of "link" seaports. Thus Fleming writes, "The ports need to elevate their rivalries to higher geographical levels, championing the region, not the local port" (Fleming, 1989).

## Summary

The fundamental transformation of the temporal and spatial conditions of competition beginning as early as the 1960s left seaports in the 1990s to face a new type of competition. Containerization and intermodalism combined to bring about a timespace convergence in the seaport industry, bringing far-ranging seaports in competition with each other. This occurred as large, often global-reaching carriers acquired totalsystem control over cargo and the routing of it through an enlarged set of alternatives. Seaport competition intensified as a larger share of the cargo handled by a particular port was generated in and headed for distant locations, cargo that was often under the control of only a few large and relatively mobile carriers seeking only one or two port calls per region. At the same time, the new methods of cargo movement required a different kind of seaport product, one involving a temporal compression in the handling and logistics cells and an expansion of intermodal carriers' control over terminal-space. Intermodal carriers, the seaport's customer, sought not only a shorter overall transshipment process, but also one what was more reliable and precisely scheduled. Compressing time in the handling cell of the production-system resulted in an increase in the capital turnover time in that cell and an expansion of space involved in the storage and logistics cells. The

efficiency and productivity of larger, capital-intensive terminals centred on gantry cranes created a need for larger storage areas and additional space for on-dock rail connections. Seaports that could expand spatially in the storage and logistics cells, therefore, possessed a crucial advantage. Moreover, seaports broadened the spatial scope of planning and development by taking an active role in urban and regional transport planning and forming various cooperative arrangements ("spatial alliances") with other ports.

As trade journalists endlessly point out, seaport competition in the 1990s is enormously "intense" and "volatile." This chapter explained how containerization and intermodalism produced a competition of such character by transforming the time-space conditions in which seaports operated. The validity or adequacy of these findings can be determined by analyzing the experiences of individuals, whether institutions or people, actually involved in competition. In the next chapter I will corroborate them with data acquired through interviews I conducted with officials from seaports in the Vancouver, Seattle, and Tacoma areas during the spring and summer of 1997.

# Chapter 6

# In Their Own Words: Interpreting the Seaport Competition of Seaport Officials

In Chapter 3, I presented the view that competition "is constructed in different ways depending on circumstances" (Schoenberger, 1996, p. 24) and that time and space, which are constitutive of all "circumstances," represent forces of change in the nature of competition. In Chapter 5, I explained how containerization and intermodalism produced a "new" seaport competition by altering the spatial and temporal dimensions of the strategic problems and solutions seaports faced in the struggle to gain an advantage. This chapter presents a form of corroboration for the ideas put forth in Chapters 2-5 and a measure of whether the time-space theory provides a useful framework for understanding the nature of change in seaport competition. I will present excerpts from interviews I conducted during the spring and summer of 1997 with officials, including the official quoted above, working for seaports in the Vancouver, Seattle, and Tacoma areas. This allows the officials themselves to literally speak of their own experiences with and understandings of competition and the most relevant issues involved in the change in competition in the containerized intermodal era. In the next section I shall illustrate the importance of container/intermodal traffic to each of the seaports, followed by the presentation of interview results.

# Containerization, Intermodalism, and the Growth of the Pacific Northwest Seaports

All three of the Pacific Northwest North American ports represented by the interviewees aggressively compete for containerized intermodal cargo in the late 1990s. This is exemplified by the substantial investments made by each during the last three years in handling facilities for such cargo. As Figure 6.1 shows, container throughput has increased at each of these ports and their regional neighbour, the Port of Portland. These four seaports handle virtually all container traffic on the North American Pacific Coast north of California and are among the largest seaports on the continent. Seattle, as it has been throughout the postwar era, is the largest port of the group. In 1995 it handled 1.47



million TEU, the fifth highest throughput in North America and 21<sup>st</sup> highest in the world. Tacoma, the second largest in the group has experienced the fastest and largest growth of largest container port in North America and 29<sup>th</sup> largest in the world. Vancouver, the third largest in the group, finally surpassed Portland in 1995 with a total of 496,365 TEU handled. The port began targeting container traffic near the mid-1980s but its relative growth in market share has been minimal. Nevertheless, in 1995 Vancouver was the 17<sup>th</sup> largest container port in North America and the 63<sup>rd</sup> largest in the world. Portland, the furthest inland of all the ports, has experienced steady growth in container freight flows and in 1995 was the 81<sup>st</sup> largest container port in the world.

Figure 6.2 shows the relative growth of the four ports. Among them Tacoma has clearly made the most improvement to its relative standing, having increased its share



from less than 4 percent to more than 32 percent. This growth by Tacoma was clearly at the expense of Seattle, whose share of Northwest container traffic fell from around 76 percent to 46 percent. Vancouver and Portland both made slight increases in their shares with Vancouver's going from 13 percent to more than 14 percent and Portland's increasing only 2 tenths of a percent from 9.5 to 9.7 percent. Overall, after Tacoma's growth spurt in the early 1980s the situation has remained remarkably constant over the past 10 years.

Containerized intermodal freight is widely recognized as a "growth market" for all parties in the freight transport industry. Each year more resources are committed to this method of goods movement, new types of equipment are developed, and different ways of containerizing bulk and breakbulk cargo are continually introduced.

Containerized intermodal is advantageous for carriers and shippers alike because of the potential shipping alternatives that it creates, including an expanded variety of available routes and port alternatives. For seaports, tapping into the containerized intermodal trade creates an opportunity for growing beyond the port's local and regional market. Indeed, Seattle and Tacoma have openly embraced this trade and in the mid-1990s only 30 percent of the throughput at the ports derived from points within the Pacific Northwest. The remaining 70 percent was generated by points east of the Rocky Mountains (see Chapter 4). Vancouver has also tapped into the containerized and intermodal trades. In the early 1990s approximately 50 percent of its "box" traffic was generated outside of the port's host region (Matthews, 1990). Each of these ports has invested resources in this trade by developing new container/intermodal terminals and by attempting to improve the inland transport links to them.

I argued in the previous chapter that the emergence of containerization and intermodal transport transformed the face of competition between seaports by altering its spatial and temporal conditions. Given the substantial role of containerized intermodal cargo in their recent growth, this argument would appear relevant to the seaports of the Pacific Northwest. Inasmuch as this is true, the validity of the time-space theory of seaport competition can be either supported or undermined by assessing how seaport officials understand and have actually experienced the changes in competition – the management of new competitive problems and strategies in the struggle to gain an economic advantage.

## **Understandings of Competition and Competitiveness**

The literature on seaport competition is littered with analyses in which competitiveness is explained in terms of a seaport's relative share of a given volume of traffic (i.e. the "market") (see Marti, 1982, for example). While such analyses are sometimes useful, they necessarily convey a sterile, simplified understanding of competition. For example, consider the following comments of an official from the Port of Seattle:

Our competitiveness is measured by how well we get cargo across our docks . . . [I]n a sense we can't, although we do, worry too much about outside factors . . . If we don't [handle cargo] efficiently, it will go elsewhere . . . [because] there's not that much loyalty out there. And the fact is, if we aren't passing goods through, we shouldn't be here. The questions is how do we get [cargo] to our docks? And how do we provide efficient service across them? I guess, in a competitive situation, they are one and the same problem . . . (Interview, May 16, 1997)

Where is "market share" discussed in this passage? Indeed, it isn't. As Schoenberger has argued, a more useful view understands competition as the struggle to manage strategic

problems and related, though not pre-ordained, solutions. Underneath the market shares, competition between seaports plays out on the "docks" while competitiveness is fundamentally measured by the ability of the production-system to provide a particular transshipment product, "how well [it] get[s] cargo across" those docks. These are important distinctions in light of the objective of this thesis. After all, how can a change in the nature of competition be explained in the framework of "market shares?" Consider again another comment from the same port official when asked to discuss what a change in competition means for the port:

There are definitely new gauges of success . . . In the long run, from our viewpoint, that's not good or bad, but in the short run, depending on our competition, it is a problem in terms of rearranging our current way of doing things . . . For a seaport . . . land constraints, governmental constraints, labour, issues of technology—expensive technology, infrastructure, and so on . . . we have to contend with these in a new way. (Interview, May 16, 1997).

Change in competition, in other words, is understood as the emergence of new problems and new solutions defined by a dynamic, inconstant set of "gauges of success." Overwhelmingly, port officials discussed the impact of containerization and intermodalism on competition in this way. What ultimately emerges from the comments presented in this chapter is that the true source of the "new" competition's intensity is the uncertainty created by the strategic necessity to alter the "current way of doing things" to remain competitive. As is clear from the following sections, this has involved both physical and "cultural" adaptations by the seaports to a new time-space regime.

## New Customers (wink, wink), New Times, New Spaces

#### From Serving the Local Shipper to the Global Carrier

As explained in the previous chapter, the shift in the realm of seaport customers from shippers to large container and intermodal carriers was a major force in the timespace transformation of the competitive environment in which seaports found themselves operating in the 1990s. It is not surprising, then, that all but one port official I interviewed brought up this issue in a conversation about "competition." These port officials were unanimously hesitant to speak in definitive terms about this shift, which one official from Tacoma called a "controversial" direction of change. Nevertheless, several officials made comments that can be useful in understanding the experience of the seaport in a changed competitive environment. According to that official from Tacoma:

[This] is one of the more controversial elements taking place in the port industry . . . because many shippers want to think that they are still important customers and ports don't want them to know that these days they really aren't . . . the primary focus. But this isn't openly spoken about by anybody. (Interview, June 3, 1997)

An official from Vancouver added a similar view but one that he subsequently qualified as "one side of the matter":

We vigorously market ourselves to shipping lines. For all practical purposes, they are the real customers . . . [and] our direct interest is what we can do for them. Shippers and consignees don't make demands of ports as much as they used to . . . (Interview, May 26, 1997)

A different official from Vancouver more vaguely explained that the customer is

"whoever is the target" of the port's marketing efforts. The meaning of this statement

was clarified later on in the interview when he conceded that "anybody who benefits

from the goods brought through [the] port" is the port's ultimate customer, but from a

"marketing standpoint" the customer is the person or entity who controls the port-choice decision in cargo routing and is thus most likely to effect an immediate "sway" in the port's competitive standing (Interview, June 12, 1997).

As intermodal carriers gained door-to-doorcontrol over shipments they became the targets of seaport marketing schemes (see for example Figure 5.3). Port officials' comments on the changing relationship between seaports and their customers illustrate that the nature of this change can be understood as an acquisition by the customer of a greater "command over space" and, thereby, a distinct advantage over the seaport itself. Prior to the development and diffusion of containerization and intermodal transport there was no doubt that seaports directly served shippers, as the comments of an official at Tacoma illustrate:

Most ports developed their marketing efforts much differently in the [19]60s and '70s than they do now. The strategy then was to reach out and touch as many shippers as you could. As a port, you had to do whatever was necessary to court their favour so they would choose to ship through your port. Literally, the strategy was to wine and dine them. (Interview, June 3, 1997).

A port official from the Vancouver area described the pre-container port's marketing

strategy as a more complex matter, but still noted the distinct focus on the shipper:

It was . . . [basically] a dual marketing effort. A port had to offer shippers good [shipping] connections to their markets. At the same time, it had to attract the steamship lines to provide this service, but it could only do so by guaranteeing sufficient business from shippers in its hinterland . . . [but] the emphasis was on the shipper. (Interview, June 12, 1997)

By making direct contacts with shippers, according to this Vancouver area official, ports

felt they gained a certain loyalty from their customers and could count on their business.

To some degree this loyalty stemmed from the complicated task of organizing the various

segments of a shipment's journey; if a particular port worked out for a shipper, he or she

generally maintained the relationship with that port:

[The shipper] found that sticking with a port was frankly easier than shopping around each shipment to a new port for a better price, or service or whatever . . . The ocean carrier was often chosen on the basis of [and after] the port choice, since the shipper or his agent was the one charting how the goods would be moved. (Interview, June 12, 1997)

In other words, as this official pointed out, it was actually convenience that drew shippers

to particular seaports not an emotional allegiance to one or another. Moreover, as an

official from Seattle explained, loyalty was really a matter of geographic necessity:

Rarely could the average-sized shipper look beyond this scale for export options . . . the port's market was rather well-defined [geographically]. [Thus] when ports would sell themselves to [shippers], competition between ports was mostly regional . . . Shippers generally sent cargo through the nearest port. (Interview, June 5, 1997)

As seaports were replaced as the central pivot around which shipping itineraries were

built, seaports nevertheless perceived it as the result of a decline in customer loyalty. As

an official from Tacoma pointed out, however, in today's environment a shipper's loyalty

to a certain seaport is actually a moot issue:

The shipping lines now control [cargo routing]. Nobody [i.e. shipper] in their right mind would care how the cargo goes. Nobody should have an allegiance to any port because they shouldn't care which port it goes through. With the sheer size of the shipping lines, and the volume of cargo they handle, it is ridiculous that any one shipper would sit down with [American President Lines], for example, and say, "I want my cargo to go through Tacoma." What the line will do is take the cargo through wherever they [the shipping line] choose and will rail it to the port preferred by the shipper. This happened on a mega-scale in Southern California, between [the Port of] Oakland and [the ports of] L.A. and Long Beach. (Interview, June 3, 1997)

Seaports, as this reflects, have become more concerned about the wishes of large

container lines and not individual shippers and with this shift they have entered a new

realm of competition. The customer now calling the shots is not a locally- or regionally-

based shipper but a continental- or global-reaching container/intermodal carrier. These new customers desire a particular seaport product, as all officials observed, and as recent actions by the ports of Tacoma, Seattle, and Vancouver suggest, they have the power to see that they get it.

# The View from the Bottom: Seaports in the Intermodal System

The sense of uncertainty expressed by seaport officials about their own port's position in an environment produced by mobile cargo flows reflects what Slack (1993) has observed as the "declining status" of seaports. An official at the Port of Tacoma provided a graphic description of this situation, wherein:

[T]he port is at the bottom of the food chain. When costs need to be controlled or some other advantage pursued [by the port's customer]... it is often the port that loses ... [because] it's sometimes the most available opportunity... (Interview, June 3, 1997)

As an example, this official explained how the spatial oligopoly achieved by both the

U.S. railways and the large container lines has affected the position of seaports along the

North American West Coast:

That [the recent railroad mergers in the U.S.] leaves two companies in control of the West Coast, which gives BNSF and the UP leverage against the container lines . . . [which] had been able to play one railroad off of another somewhere else in order to get a some kind of a favourable contract [to move intermodal traffic] . . . Anyway, this leaves ports more in the middle than ever. (Interview, June 3, 1997).

Seaports thus acquired a new role in cargo movement with the shift from local shipper to

global carrier and to remain competitive have been compelled to discern the type of

product that would make them competitive in the container/intermodal era. At the same

time, as the next section shows, new competitors appeared from distant places while the

stakes rose between regional neighbours.

#### Competitors Near and Far: A New Intensity in Competition

Overall, officials at each of the seaports appeared to understand that the more intense and competitive environment in which they operate is related to the spatial mobility of high volume cargo flows. As an official from Seattle commented, "It certainly appears that, especially in the last 10 or so years, no shipping pattern is stable. The business environment is as dynamic as ever . . . [and that includes] flows of freight" (Interview, June 2, 1997). This sentiment was repeated by an official from Vancouver who remarked that, "Intermodal cargo is port-blind; it doesn't care where it is, as long as it gets where it wants to be" (Interview, May 26, 1997).

There was a clear awareness of a time-space compression in the seaport industry and that it was produced by the increasing spatial mobility of cargo flows or, as more than a few officials termed these mobile flows, "discretionary" cargo. As a result, the three seaports found themselves confronted by new competitors from which they were previously shielded by spatial monopolies determined by shipping costs, technologies, routing concepts and industry structure. An official from the Port of Seattle summarized the consequent situation for North American West Coast seaports:

The field of competitors has extended to a national and even continental scale . . . For a large share of containerized cargo, any port along the West Coast is arguably suitable. This means not only Seattle, Tacoma and down to Long Beach and Los Angeles, but [also] Vancouver [Canada] [and] the Panama Canal . . . compete for such discretionary cargo. (Interview, June 2, 1997)

Another official from Seattle also mentioned the extended scale of competition, hinting at an association between the shift in scale and a new type of competition: Discretionary cargo is a growth market that we have done well in but it is also the most contested . . . I don't want to exaggerate but [discretionary] traffic can go through almost any major port along the seaboard as easily as it could remain here." (Interview, June 5, 1997)

Most officials expanded on such remarks, observing how the time-space compression experienced by seaports has contributed to an intensification of seaport competition during the past two and a half decades. The comments of a third official from the Port of Seattle represent one dimension of this understanding:

As a [port official] I've always kept up with what others [ports] were doing [because] they might be doing something that we could learn from . . . Now, I keep a close eye on far away ports because they may be new competitors with this port . . . [and] I will need to assess what these others are doing in a different light . . . [I ask] should we be doing the same thing for our customers? (Interview, May 16, 1997)

Yet, as an official from Tacoma pointed out, oftentimes under these circumstances it is

impossible for a port to follow this "keeping up with the Joneses" approach because, for

example, "we can't provide a desert [route] through to the Midwest" like the ports of Los

Angeles and Long Beach but "they can't provide naturally deep harbours like we

[Tacoma and Seattle] can" (Interview, June 3, 1997). An official from Vancouver also

commented on the difficulty of countering the advantages possessed by a wider range of

competitors:

The fact is, U.S. ports can raise money by levying separate taxes . . . [and] even then many of their capital improvements are heavily subsidized by the government . . . Meanwhile, we can't raise our own money through taxation and we pay full price for dredging, infrastructure and other projects . . . Obviously this tips the . . . balance in their favour. (Interview, May 16, 1997)

Port officials also frequently observed that the greater prominence of

"discretionary" cargo that has drawn widely separated ports into the same competitive arena has also intensified intra-regional competition. The ability of container lines to rationalize their widely dispersed networks around a few major collection points, such as loadcentres, has resulted in fewer and larger vessels making fewer ports of call. As one Seattle port official pointed out, it is the need for only one port per region that has taken regional competition to a new level of intensity:

From an Asian perspective, Puget Sound is one port. There is no rationale for stopping at both ports in the region. The two ports, Seattle and Tacoma, compete directly for this customer with one port losing out . . . (Interview, May 16, 1987)

An official from Vancouver echoed these words, adding that the reduction of yet another

barrier to spatial movement – restrictions on cargo movements across the border between

Canada and the U.S. – would reinforce these circumstances:

Vancouver's success hasn't been in the way of directly stealing a big customer or a lot of business from Seattle or Tacoma . . . [but] I would say there is competitive pressure on them because of the possibility these days of container lines making only one call to each region, particularly as the economic and regulatory playing fields become more leveled between Canada and the United States. (Interview, June 12, 1997).

The mobility of large carriers compels seaports to be sensitive and diligently

responsive to their desires. This draws seaports into a type of competition in which

specific, often relatively minor, differences between them may determine which seaport

attracts a given carrier. Nevertheless, in this environment, small differences can have

large consequences, a point not lost on the port officials I interviewed. An official from

Seattle, for example, noted that:

A lot of [competition] is perception . . . like simply doing things that give the port a good name, such as keeping crime low or maintaining a handle on labour concerns . . . These are very substantial ways to compete. [Overall] we have to be very customer-oriented. (Interview, June 2, 1997)

Another official from Seattle commented more specifically on the importance of seaport

responsiveness to their highly mobile customers:

Shipping lines are at an advantage . . . we are easily convinced to seriously consider their demands . . . If I get wind that Hyundai, for example, is prodding around for a certain type of facility [or arrangement], then I've got to take it seriously. In fact, this is just what [Hyundai] has been doing this past year. (Interview, May 16, 1997)

As the weight of small differences in seaport competition has increased, the formulation and implementation of strategies that are appropriate in the new time-space regime is an especially crucial task for seaports in the 1990s. The precondition of such a strategy, however, is an assessment of competitive problems. As the next section shows, seaport officials in the Pacific Northwest have, in general, a solid understanding of the problems of the new time-space regime.

#### **New Competitive Problems**

As discussed in the previous chapter, the growth of containerized intermodal cargo movement produced the need for a particular seaport product that contributed to globalizing transport services. For seaport officials, this signaled the appearance of a host of new strategic problems. As the words of these officials show, these problems can be viewed as related issues of time and space which, as Schoenberger (1996) observed, are often solved by trading one for another, often by shifting the problem elsewhere within the production-system.

## Temporal Problems

A statement made by a Vancouver area port official introduces one set of prominent problems that confront contemporary seaports:

Basically... this is what the container line wants: to stay on schedule and faster throughput of freight. That means a lot of things . . . [First], container lines offer scheduled services, so we know when they are

supposed to arrive. [They] have windows in their contracts, within which they are guaranteed cranes . . . [Secondly] then loading and unloading is done within a pretty strict time-frame . . . In the past, after [loading and unloading] ocean carriers left port and really didn't care what happened to discharged cargo. But now they have made a contract with a shipper to the final destination, so [thirdly] they want to see the cargo not just unloaded to the terminal but on its way to the [final destination] within hours. (Interview, May 23, 1997)

The increasing emphasis by container lines on fixed weekly schedules was a great

concern for nearly all port officials because, as a port official from Vancouver put it,

"The fact that container lines run scheduled services . . . makes the activities in the port

very time-sensitive. The ships need to be in and out" (Interview, May 23, 1997). There

is little slack in an intermodal system run around strict schedules, so a bottleneck or

missed connection at the port will have a system-wide impact, as the comments by one

Vancouver official illustrate:

Everyone, including the port, is really put into a bind if a ship arrives later than scheduled. If [the container ship is] late at either end of the call [to port] then another ship will likely miss its scheduled window [at the port]. And then both ships will be late to their next window, possibly, and thus cargo will be late and so on . . . Often it is the port that looks bad [so] we do our best to keep all of them on schedule. (Interview, May 22, 1997)

Port time is an age-old problem for seaports and vessel owners, but one that is

particularly serious in a carefully scheduled system. One official from Vancouver

described the general problem of port time:

Large ships, like any capital asset not utilized, essentially lose money while in port . . . It's often said that warehousing [at the port] is "transportation at zero miles an hour" . . . you don't earn revenue on goods going nowhere. It's a roughly similar principle with ships in the port (Interview, May 23, 1997).

Another Vancouver official explained the urgency produced at the port when fixed

weekly scheduling is combined with the need to reduce a vessel's port time:

The [containership] loading and unloading process is so important . . . the customer can actually clock you doing it . . . [and] can possibly say that it hurt their schedule. You don't want them saying that about you (Interview, May 22, 1997).

As indicated in the quotation above, a third and related temporal issue is the seaport's throughput efficiency. As mentioned in the previous chapter, intermodal carriers are responsible for their shipments *through* the port. Thus, in addition to compressing port time and keeping *ships* on schedule, seaports are compelled to see that individual *shipments* stay on schedule. An official from Vancouver discussed the nature of this issue in rather abstract terms, "Ideally, intermodalism requires . . . [the port] to make loading and unloading a continuous, if not simultaneous, process . . . The cargo literally passes through the port with no pause" (Interview, May 23, 1997). Another official, from Tacoma, put the issue in more specific terms to explain its effect on the seaport:

A problem we run into is that the container lines go out and make contract arrangements, which are secret, with the railroads, which they've been able to do since the Staggers Act in 1980. What that did, it actually forced the railroad and the shipping line to sit down and make a deal. In many cases it specifies so many hours between when the ship docks and when the container has to be in Chicago, for example. This leaves us in a pretty tight position . . . it shifts our focus to how effectively the loading and unloading [of ships and rail wagons] is coordinated. (Interview, June 3, 1997)

### JIT and the Problem with Success

The decision by many carriers to offer international, longer-distance JIT movements is an indication that seaports in general have effectively addressed these temporal issues. Nevertheless, this generalized success has increased the temporal pressures involved in cargo handling by the seaport. A Tacoma official described how a slight error in port will have huge consequences a day or two later, and these are magnified when the error affects a JIT shipment. Therefore, he noted, "JIT is prioritized cargo . . . If there is a 2 to 4 hour delay in port . . . the containers will be almost 24 hours late getting to Chicago" (Interview, June 3, 1997). Another official, from Vancouver, pointed out that JIT shipments require ports to be not only perfectly reliable but perfectly accurate under the clock as well:

Most of our cargo is JIT for auto plants back east in Ontario. So after it is off-loaded, most of it moves out [of the port] by rail within two shifts of the ship arriving . . . Because of JIT, [the cargo] has to be loaded onto the right [individual] cars. Accuracy is as important as speed with JIT . . . [so] there isn't room for error. (Interview, June 12, 1997)

The uncertain environment created by the expectation that seaports will meet these

temporal conditions amid a spatially widening range of competitors is summed up by an

official from Tacoma:

With JIT cargo the port has to be more reliable . . . A lot of [it] is longhaul, and because it is JIT there can be no lax in any part of the system, even at the port. We've lost business because the flooding the last couple of years caused train delays of up to five days. So more shippers are saying to, say Sea-Land, listen, put my stuff through Long Beach, because Long Beach is linked to Chicago by desert and it's more reliable and that makes it cheaper. My point is, this is how important the issue of reliability as come. (Interview, June 3, 1997)

In more concise terms, as an official from Seattle put it, temporal reliability is so

crucially important that, "It is hard to sell reliability if equipment break-downs halt the

throughput operation . . . [Therefore] if things break down we get panicky" (Interview,

May 16, 1997).

# Spatial Problems

At the same time that seaports are focused on managing the temporal problems, they are equally challenged by a set of spatial problems. As the remarks of various officials indicate, these problems arise largely from the need to compress the time taken by the loading/unloading and throughput processes.

### Providing Room to Move: Larger Customers, Larger Spatial Needs

The most prominent spatial problem, perhaps, is the need for more storage space to accommodate the large pulses of containerized cargo brought to port by containerships. The rapid unloading of these vessels easily outstrips the ability of land transport systems to remove the cargo from the port area and necessitates temporary storage. Providing adequately sized berths and room for cranes to manoevre is also space-intensive. Land area is needed as well to hold outgoing cargo in ready position so that it might be loaded swiftly onto the waterborne vessel. Moreover, on-dock rail, which is crucial to throughput efficiency, further adds to the space requirement of containerized intermodal cargo. A Vancouver terminal official's comment introduces the need for space in the storage and logistics cells of the seaport production-system:

For a container port there are serious space constraints . . . [The port] need[s] an area to hold cargo ready for the arriving ship. We need to make sure loading and unloading finish at equal times, so cargo needs to be in a reverse-fit before the ship reaches the port. We need room to do this, to organize the storage yard, to spread things out, and figure out the sorts. (Interview, May 23, 1997)

Thus, an absolute lack of space can act as a significant constraint to terminal productivity, while the ability to provide adequate space can serve the port very well against its competitors. A series of comments from several officials make this point clear.

According to an official from Seattle, "The creation of . . . mega-alliances results in a consolidation of operations [for those lines] . . . The shipping firm gets larger [and] requires larger terminals" (Interview, June 2, 1997). His comment echoed those of another official from Seattle who suggested the importance of larger terminals to carriers and, thus, to seaports:

When two lines merge, it means they merge at the terminals too. This is a very important aspect of mergers for both the ports and the lines that are party to the agreement. The whole point of forming alliances is to share costs, and that includes terminal costs. (Interview, May 16, 1997)

The ability to provide and develop larger and higher capacity terminals, with room for container storage, cranes and other equipment, and rail access has thus become an enormous competitive advantage for a port. The comments of an official from Tacoma reflect an understanding of this element of seaport competitiveness:

[I]f we could [provide] necessary terminal expansion, we [could then] facilitate . . . and provide an element of stability to our customer who might want to restructure their operations . . . Alliances need room for larger-scale operations and being able to accommodate [them] when they expand . . . gives them more business options. (Interview, June 3, 1997)

As explained in the previous chapter, providing larger, modern spaces is only one spatial element of the "new" seaport product. Also recognized by several officials is the desire by carriers to gain more control over those spaces than in the previous era. The ability of a container line to operate its own port terminals or choose the terminal operator, was characterized in the previous chapter as a strategy to rationalize totalsystem costs and allow carriers to be flexible in a dynamic business environment. As an official from Tacoma explained, relinquishing control over terminal operations has become an important determinant in a seaport's competitiveness:

As [firms] got larger they wanted more vertical control and to do their own stevedoring . . . Many lines set up subsidiaries as stevedoring companies, but if they don't do their own stevedoring, they still want to be able to choose who will do it. Hyundai is a good example. They came down to [Tacoma from Seattle] because they wanted control of their own terminal. Seattle, I believe, was willing to expand the terminal they occupied, but SSA [Stevedoring Services of America] was under a longterm contract to operate it. Hyundai's new Tacoma terminal . . . they may turn around and bid [its operations] out to a separate stevedoring company but they will be in control of it. (Interview, June 3, 1997)

A Vancouver official discussed a different a different form taken by this issue. At the Port of Vancouver, instead of making a contract with the port for the use of a specific terminal, a shipping line enters into a contract directly with one of two separate terminal operators who already hold a contract with the port authorizing them to operate certain port facilities. According to that official, while they don't have the choice of operating their own facilities – unless they own shares in one of the terminal operators as some do – carriers have a similar degree of control because they have "intra-harbour freedom to choose" between different operators (Interview, May 23, 1997).

#### Strategies in the New Time-Space Regime

This section concerns some of the broader strategies the ports have pursued in order to confront both the temporal and spatial problems identified above. These strategies are both spatial and temporal in character and provide examples of time-space issues trade offs, which, as Schoenberger observed, inevitably gives rise to new types of problems and a new complexion to the competitive process.

### Waterfront Re-development: New Spaces for New Times

Perhaps the most obvious strategy pursued by the ports of the Pacific Northwest has been to develop large, modern terminals dedicated to handling containerized intermodal cargoes. The comments of an official from Seattle provide an overview of this strategy:

In almost every sense, as a container port, our service product has changed . . . To compete as a container port, seaports have had to engage themselves in major redevelopment of their waterfronts (Interview, June 5, 1997).

The development projects undertaken by Tacoma, Seattle, and Vancouver are similar to others at seaports on both the East and West Coasts of North America and are clearly understood as fundamental to seaport competitiveness. They represent bundling of both temporal and spatial solutions into a broad strategy. Therefore, I will briefly describe the projects most recently completed or nearly completed by these three ports and then present perspectives on the ways they are expected to help each port compete in the new century.

# Deltaport (Port of Vancouver)

The Deltaport container terminal at the Port of Vancouver is the most famous of the port development projects undertaken in the Pacific Northwest. Deltaport, which officially opened on June 8, 1997, consists of two berths adjacent to a 52-feet deep basin, five gantries, and four rail tracks served by Canadian National and Canadian Pacific railroads, both of which provide double-stack service from the terminal (Deltaport, 1997b). The project was completed at a total cost of \$Cdn 224 which was shared between the Vancouver Port Corporation, Terminal Services International (a terminal

operator) and the two railroads (Deltaport, 1997a). It doubles Vancouver's annual container handling capacity to over 1 million TEUs (Ibid.) Deltaport was envisioned in 1991 when it became clear that a lack of space in Burrard Inlet constrained the port's growth potential. The "greenfield" site chosen at Roberts Bank, 25 miles south of the port's downtown Vancouver facilities as shown by Figure 5.3, allowed the construction of the 100 acre terminal which increased Vancouver's land inventory dedicated to container handling more than 75 percent (Port of Vancouver, 1997).

# *Terminal 5 expansion (Port of Seattle)*

The Terminal 5 expansion, with a cost around \$US250 million, is the biggest project undertaken by the Port of Seattle for decades (Port of Seattle, 1997). The expanded terminal consists of two berths on a 45+-feet deep basin, five gantries, and six loading tracks served by BNSF, which operates double-stack service from the terminal. The project was initiated to provide American President Lines (APL) with a larger terminal and expanded the line's existing space from 83 to more than 160 acres (Ibid.). A portion of the new space will not be put to use immediately and is designed to serve APL's long term needs (Watson and White, 1997). The port has also planned a similar expansion of its Terminal 18 for China Ocean Shipping Company (COSCO) and Hyundai Lines. That project is expected to expand the site from 106 acres to 199 acres and will include improvements of the on-dock rail connections (Port of Seattle; Putzger, 1996).

# Blair Waterway (Port of Tacoma)

Tacoma's Blair Waterway project has occurred with much less fanfare than Deltaport and Seattle's expansion projects. The major accomplishment of this project will be the removal of the Blair Street Bridge, a drawbridge that had provided limited access to the waterway. The opening of the waterway, which is 300 feet wide and 48-feet deep, will essentially add 300 developable acres to the port's already 300 acres of land area (New, 1997). Construction has already begun on the West Blair Terminal for Hyundai Lines. When completed, the terminal's development will have cost nearly \$US65 million and will consist of between 50 and 100 acres (Ibid, 1997).

# Space and Competitiveness

Primarily, these developments can be viewed as a spatial solution to the temporal problem of providing a faster, more efficient, and increasingly reliable transshipment process. An official from Vancouver explained how Deltaport would accomplish this goal:

Adding new cranes and with the potential to someday add another one or two if needed . . . will allow Vancouver to serve the larger container vessels and put us into position to serve as a first or last port of call on the West Coast. (Interview, May 23, 1997)

When discussing the Terminal 5 expansion, an official from Seattle echoed this perception, explicitly viewing it as a strategy undertaken distinctly to solve a variety of temporal problems faced by the port:

Terminal 5 and the Harbour Island site [Terminal 18] will allow an increase in the number of working cranes, rail access right up to the docks . . . and [the added space] should reduce the potential for congestion as the port grows. (Interview, June 2, 1997)

Another official from Vancouver explained the benefit of Deltaport in very similar terms:

[Deltaport] will draw some of the [flow] from this harbour [Burrard Inlet] and . . . make things a little better congestion-wise on land. That's one of its main benefits—it adds to our capacity without clogging up the inner harbour or rail connections through the city. (Interview, June 12, 1997)

In light of the promise of success held by these facilities, a perception emerged

among the seaport officials that an absolute availability of "developable" space

constitutes a major element in a seaport's competitiveness. For example, several officials

described the Deltaport project as a "spatial fix" to Vancouver's limited growth

possibilities within Burrard Inlet. One Seattle official noted:

We've been able to sufficiently develop the container capacity of the port within the harbour . . . [and] haven't needed to find an outport site. Vancouver evidently figured they didn't have the room or sufficient possibilities for a project of that size [in the harbour]. (Interview, May 16, 1997)

Later in the same interview that official, commenting again on Deltaport, observed that "Tacoma has always had land [on which to expand] over [Seattle] and Vancouver, now Vancouver is moving out of the harbour to give itself more of a Tacoma-like situation" (Interview, May 16, 1997).

Land availability, and a vision of how to put it to use, have worked wonderfully for the Port of Tacoma over the past 15 years. The port's ability to rapidly develop and expand its terminal facilities enabled it to acquire such large container lines as Sea-Land from Seattle in 1983, Maersk in 1985, K-Line from Seattle in 1987, Evergreen in 1991, and Hyundai in 1997 (Port of Tacoma, 1997). As an official from Seattle understated, "[Terminal 5] is the kind of project Tacoma has been able to undertake over the last decade and it has been a clear-cut advantage [for that port]" (Interview, June 2, 1997). An official from Tacoma noted, it is still a fruitful advantage for the port:

Hyundai was interested enough in a new terminal [which Tacoma could provide] that they're only a signature or two away from moving most of

their Puget Sound operation down here [to Tacoma]. (Interview, June 3, 1997)

As evidence that Seattle's Terminal 5 expansion has matched Tacoma's spatial

advantage, a Seattle port official noted the immediate gains it has produced for that port:

As shipping alliances shift around the port isn't always taken into account as the first or even second or third consideration. But the [recently merged NOL-APL], I know, highly regarded [the Terminal 5] expansion [and] it may have kept them here. (Interview, May 16, 1997).

While a seaport's available land and terminal facilities are necessities of the

present, seaport officials also considered space to be a source of long-term

competitiveness. Speaking on the future competitiveness of his port, an official from the

Port of Tacoma emphasized this:

Your land inventory is a potential asset, but can that land be developed? We've certainly got the land and with the removal of the Blair St. bridge, we'll be able to develop that land into container terminals and maybe extend [one of the] rail yards. (Interview, June 3, 1997)

An official from Seattle expressed a similar view, noting that Terminal 5 represents a

good investment in the port's future:

In my view, sites like Terminal 5 are the future . . . There might come a time in the future when this port consists of three or four mega-terminals, like that one . . . with some access to them for small players . . . That tells you something about the efficiency of the facilities in use today. (Interview, May 16, 1997).

As Slack (1993) has observed, in today's environment, nothing a seaport does is a

guarantor of success. Yet while even huge developments like Terminal 5 and Deltaport

do not guarantee a successful outcome for the ports of Seattle and Vancouver,

"competitiveness" only becomes a possibility if the seaport holds a lotto ticket. This, the

officials I interviewed clearly seemed to understand.

# Temporal Challenges to the Development of New Spaces

Acquiring that "lotto" ticket, the common denominator of "competitiveness" in the era of containerized intermodal shipping, is a formidable challenge, as it entails a fundamental time-space reconfiguration of the seaport production-system. Deltaport, for example, increased the capital-intensity in the Port of Vancouver's handling "cell," while increasing the amount and value of space in the storage and logistics "cells." As most officials noted, the primary challenge in this arises from the urgency of providing such a "reconfiguration" for spatially mobile customers who might not wait around for the project to get finished, yet alone underway, as the development planning process becomes temporally stretched from two or three years to seven or ten. According to these officials, raising the enormous sums of money, conducting environmental impact analyses, and winning public approval for almost any development of the waterfront takes much more time than it did one or two decades ago. An official from Seattle summarized this situation:

The time horizon for providing this space is pressurized. Planning is normally a long-term process, but we are under pressure to make immediate room for terminal expansion, and do it at a time when it is harder to do that because the planning process is taking longer and longer. We're being stretched incredibly. Take the recent NOL-APL merger. They are going to want a much larger facility before long . . . and in some cases, the only way we would be able to expand a site—to literally give them more room in terms of acres—is to reclaim land. But how do we do that in any realistic time frame? We would need 7 to 10 years to go through the process . . . But we don't feel like we have the time to do this . . . Most shipping lines could take most of their operations elsewhere and still serve the customers they do through Seattle (Interview, May 16, 1997). Given these straits, several officials proposed as general strategies to seaport

development the need to think ahead while cultivating relationships with local and

regional government. In the words of an official from Seattle:

[If] there is a need for development . . . political issues, environmental issues, economic issues abound over land-use, dredging, [land reclamation] . . . so we are working 10 years ahead of ourselves . . . Sea-Land left Seattle for Tacoma because in Tacoma it had immediate room to grow. And plenty of it. (Interview, June 5, 1997)

Another Seattle official also discussed this approach, advising that in order to remain

competitive seaports must:

Keep the local and state governments informed . . . [because] decisions take long enough to implement . . . if we want to move in a particular direction, it is [immeasurably] helpful to keep them informed. In coastal waters everyone needs to go that route [and] we do especially for reasons of funding. (Interview, May 16, 1997)

While both officials make what seem to be obvious points, their comments must be

heeded on two counts. First, the significance of "working 10 years ahead of ourselves"

for seaport competitiveness should be recognized because it reflects the lack of flexibility

possessed by seaports in responding to "market demands." Second, the need to keep

local and regional governments informed of development involving "coastal waters,"

which is virtually always the case with seaports, points to the effort gain some degree of

control over the timing of seaport development. In both cases, these comments portend

another broad strategy, one that is institutional rather than technological, to which

seaports are turning in order to remain competitive.

# Thinking Beyond the Port: Competitiveness and a Regional Vision

In order to contend with new competitive problems, seaports have combined the development of large intermodal terminals with several types of institutional strategies:

(1) An active role in regional transport planning and (2) various forms of port cooperation. Both of these, according to several port officials, address the need to extend the strategic vision of the seaport beyond the boundaries of the port area.

#### The Regional Approach to Improving Intermodal Connections

On-dock rail is a central feature of the new terminals at each port, but this strategy also involves an expansion in the scope of seaport planning, namely one that encompasses the development of the urban and regional transport systems. The words of an official from Vancouver summarize the rational for this new strategic approach:

We get surges of containers and need to get them off-loaded and out ... This requires the port to be far more involved in understanding the whole package than ever before. We therefore actively study inland infrastructure and other elements in land movements ... and think of ways to make it better. (Interview, May 23, 1997)

Likewise, every official commented on the efforts being made to work with local, regional, and state/provincial transport planners in order to identify ways of reducing urban congestion and improving the flow of freight into and out of the port and city areas. A port official from Tacoma said, "It's necessary to have a regional vision" (Interview, June 3, 1997) of transport accessibility to the port. As this clearly indicates, this too represents a spatial strategy aimed at improving temporal issues. One example of this strategy is the effort to locate areas in need of road/rail grade separation and to understand where and when in the transport networks port freight traffic conflicts with other transport uses (Interview, June 3, 1997). A regional vision to transport planning addresses the seaport's objective to ensure that each shipment, such as a JIT import, will move swiftly and reliably from the docks to its destination. The ability to improve

throughput efficiency also provides a possible fix to the problem of providing larger

tracts of container storage space by reducing the pressure on storage services (Ibid.).

The "logistical thinking" behind this particular strategy represents a new way of

thinking that, as an official from Tacoma bluntly stated, is essential to a seaport's

competitive advantage:

We've got to be involved in other areas of the broader movement of the cargo passing through the port. This is increasingly important in the last couple of years. As a port, your world has always been how to build a great marine terminal, how to build a great navigation channel, etc. That is now only 2/3 of the problem. Now you have got to figure out the land side and put as much energy in that and make sure you have connections and navigation on that side. If you do only two of these, you are dead. (Interview, June 3, 1997)

A Seattle port official reiterated this understanding of the importance of adjusting to this

new reality:

If there is a problem with [our] rail [connections], we can technically say that it isn't our fault, but it certainly is our concern . . . It doesn't do any good to have off-loading area if the containers can't get out of the yard. With so much of our throughput being discretionary cargo, we've got to have connections that are as efficient and reliable as everybody else down the coast. This is one of Southern California's big advantages. (Interview, May 16, 1997)

The proposed Seattle-Tacoma Consolidated Transportation Corridor (CTC)

serves as evidence that officials at Tacoma and Seattle are not merely paying lip service

to this strategy. Loosely modeled after the Alameda Corridor in Southern California, the

CTC was conceived by officials at the Port of Tacoma in early 1996 and officially by the

Port of Seattle in October of that same year. According to a draft memo from the Port of

Tacoma, the CTC project would "consolidate numerous surface transportation plans into

a common corridor . . . that could provide a single grade separation solution to solve

several congestion concerns at the same time" (A vision, 1996, p. 1). The backbone of

this project would be the creation of a rail mainline corridor between Seattle and Tacoma (Proposed, 1996, p. 1). Funding is a major challenge to the project which could cost between \$US850 million to more than \$1 billion (Strategic, 1996). An official from Seattle noted the major obstacle to such cooperative projects:

The CTC will affect many different parties . . . the hardest part will be to get all of those affected parties to understand that it is in everybody's interest . . . [because] it improves the efficiency of transportation [for all], improves safety, and is good for the economy. (Interview, June 2, 1997)

While officials from Vancouver clearly shared the views of those from Tacoma

and Seattle, no such project was in the works during the time of the interview. As one

Vancouver official noted, this may be due to the present adequacy of the urban and

regional transport systems:

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Our rail service is good . . . Other than a number of physical problems – tunnel clearance has been one and winter weather another – and a fairly tight situation [in] downtown [Vancouver], things are fine . . . [And] Deltaport [with no urban traffic] will enhance rail movements to and from the container terminal. (Interview, May 22, 1997).

# Port Cooperation: Spatial Power and Competition

Geographers have analyzed the plight of fixed places caught in a world of spatially mobile flows of capital, flows needed for the survival of those places and several, including Harvey (1989), Swyngedouw (1993), and Fleming (1989), have advocated for such places to form regional alliances in order to counteract possible exploitation by spatially mobile interests. I have suggested that cargo flows represent such flows to seaports and that port cooperation represents attempts to ameliorate the disadvantage of seaports versus carriers. As well, as one official commented earlier, cooperation between ports and local and state governments may facilitate port development.

While none of the seaports examined in this chapter was considering an institutional merger, all have sought to design certain types of alliances between their regional neighbours. Officials at the ports of Seattle and Tacoma appeared to have a sense that finding common ground could enhance competitiveness. As an official from the Port of Tacoma remarked:

We have about . . . sheathed our swords. Our hands are still on the handle, but we've agreed that . . . we should cooperate with each other and put our view in terms of the mutual problems we have. (Interview, June 3, 1997)

Later, the same official rationalized this view:

On both sides of the port, [shipping firms] have the ability to play one port off against the other . . . In this day and age, only one of us will get Sea-Land, for example, but that doesn't stop Sea-Land from going over to the other at the end of each year and checking it out, asking around, "What can you do for me?" In some cases it would make sense if the ports had a way of curtailing such behavior . . . [because economically] we're already kept honest by the ports in Southern California. (Interview, June 3, 1997)

Similarly, an official from Seattle commented, "Despite our history, I would really like to

see more real cooperation between the ports [of Seattle and Tacoma]" (Interview, May

16, 1997). Indeed, the joint effort by ports to develop the CTC is certainly an example of

"real" cooperation between those ports. An official from the Port of Tacoma explained

the common link between the ports:

Seattle's trains come through Tacoma on the way to their destination and ours go through there. In other words, we share the same connections . . . and this should draw us to the same table. (Interview, June 3, 1997)

Moreover, an official from Seattle noted that the region's congestion problems reflect badly on both Tacoma and Seattle and that "this is a formidable problem [that] we should [both] marshal our forces to solve" (Interview, May 16, 1997).

The ports in Vancouver, represented by the Vancouver Port Corporation and the Fraser River Harbour Commission, have also exhibited "real" forms of cooperation. The most prominent manifestation of this cooperation has been the formation of the Greater Vancouver Gateway Council consisting of the two ports, three railroads, two airlines, the British Columbia Employers Association, and the Chamber of Shipping of British Columbia (Greater Vancouver Gateway Council, 1995). The Council "represents the collective will of the major transportation interests in the Gateway" and is charged with developing and pursuing a "unified competitiveness strategy" (Ibid., p. 1). The Council has addressed various issues related to the competitiveness of its member ports, mainly in comparison to Seattle and Tacoma. In particular the Council has sought expanded borrowing powers for its ports and to reduce the municipal tax burden on the ports. According to one port official the Council will work toward "making the playing field less even . . . [versus] the American ports" (Interview, May 26, 1997). He asserted the need for not only cooperation between seaports but all elements of the region's transport system, such as the railroads:

The performance of the railroads [serving the region] are tied to the performance of both ports . . . [Therefore] we have to work toward the same goals anyway and Council is exciting because it works specifically for those goals. (Interview, May 26, 1997)

Furthermore, none of the terminal officials from Vancouver mentioned the Greater Vancouver Gateway Council, but as an example of cooperation each of them mentioned the partnership between the Vancouver Port Corporation, TSI, and CP and CN that developed the Deltaport container terminal.
#### Summary

The purpose of this chapter was to corroborate the adequacy of the analysis provided in the previous chapter by presenting the results of interviews conducted with seaport officials. In addition, the chapter was intended to check usefulness of the theoretical framework for understanding how the process of change occurred. The interviews were informal and interactive to allow the officials to speak to any issues they viewed as relevant to an understanding of seaport competition and the changes it has undergone in the past two or three decades. Both the theoretical framework and the explanation it gave rise to were generally coherent with the issues raised by seaport officials, particularly concerning the process of change (as opposed to particular "competitive advantages") through which the competitiveness of the seaport productionsystem was transformed by the time-space structures of containerization and intermodalism.

The chapter began by showing that each of the seaports analyzed, and their nearest neighbour, Portland, is actively engaged in containerized intermodal shipping and, thus, is subjected to the time-space structures of that mode. Seaport officials repeatedly acknowledged the time-space compression caused by a shift in the realm of "seaport customer" from local shipper to global carrier. With this shift, far-flung seaports were drawn into competition with each other even as regional competition intensified. Seaport officials I interviewed devoted considerable time and care to discussing this phenomenon, reflecting a general uncertainty over their own seaport's prowess in an environment in which the carrier is able rely on its global reach to exploit even slight differences among seaports. Competing for the growing share of cargo under the control

of global intermodal carriers presented new strategic problems to the seaport. Port officials generally viewed time as the substance of the seaport product, necessitating a compression of the overall transshipment process even as it was expected to be more reliable. Ironically, as almost half of the port officials observed, a seaport that accomplishes this is likely to attract just-in-time shipments, which raises the temporal sensitivity of the seaport product. While time is the major selling point, officials also pointed out that seaports are expected to provide their increasingly large volatile cusomters with sufficient port space, mainly in the storage and logistics cells.

The recent completion of large development projects at all three seaports, according to the port officials, allows them to provide such a product. The projects represent a temporal-spatial reconfiguration of the seaport production-system, as discussed in the previous chapter. The need to expand the space involved in the storage and logistics cells favoured Tacoma in the 1980s because of its plentiful land base. Vancouver met its spatial needs by constructing Deltaport 25 miles south of its cramped, urban site. Seattle, meanwhile, reclaimed land within the harbour. Tacoma's advantage was further highlighted by remarks on the increasing time that it takes to plan and construct large intermodal terminals, especially when, as in Seattle's case, new land must be created by landfill. Since the mid-1980s, Tacoma has captured business from Seattle because it can develop larger sites while having less environmental and cost hurdles to clear. Carriers, as Seattle officials all pointed out, have often jumped to Tacoma before their port gets the plans onto the drawing board.

A less costly, if less flashy, strategy adopted by the seaports involves a new vision of the role of the port authority. Port authorities have generally expanded their role in

urban and regional transport planning and, in different forms, have established spatial alliances with other seaports. The more active role in urban and regional transportation, according to one official, embodies the idea that seaport productivity in the new time-space regime is spatially-sensitive, because urban congestion ripples immediately to the seaport, rendering moot the high-capacity, highly-efficient intermodal terminals. Port cooperation represents a means of counteracting the power carriers possess due to their "command over space" vis a vis seaports. Anyway, as one official pointed out, regional neighbours increasingly share problems, such as the capability of the regional transportation system.

# Chapter 7 Conclusion

#### Summary

This thesis began with the premise that while containerization and intermodalism are widely acknowledged to be responsible for a fundamental change in the nature of competition between seaports, the causal connections between those technological and organization revolutions and the change in the nature of seaport competition has been generally overlooked. The purpose of the thesis, therefore, was to provide a framework for explaining those connections to use it to examine *how* those relatively new modes of shipping brought about a "new" competition between seaports. I deviated from the standard "extensive" approach to research on seaports, taking instead an "intensive" approach in which the goal of theoretical and empirical research is to identify structures that produce change and explain how they work out in particular situations.

Chapters 2 and 3 were devoted to a theorization of the objects of research, seaports and competition, in order to "unpack" them and reveal their structural aspects. In Chapter 2, seaports were conceptualized as production-systems that necessarily consist of four sets of production "cells" – navigation, handling, storage, and logistics – which are organized by means of a public agency generally termed a port authority (see Figure 1.2). The nature of the production process, the seaport product ("transshipment"), and, therefore, the seaport's competitiveness are shaped by the configuration of that system.

Chapter 3 developed a theory of competition based on Schoenberger's argument that competition should be understood as "constructed" by the changing and

unpredictable strategic problems and solutions faced by individuals (people, firms, seaports) as they struggle to gain an economic advantage. Time and space represent structural aspects of competition and are therefore constitutive of the nature of problems and strategies. Strategic management of the problems of competition necessarily involves coping with their particular spatial and temporal dimensions, with the result that "competitiveness" becomes "wrapped up with a certain form of spatio-temporality" (Harvey, 1996, p. 244).

The joint product of Chapters 2 and 3 was a theoretical framework for explaining how change occurs in the nature of seaport competition. The configuration of the seaport production-system embodies strategic solutions implemented over time to solve or, at least, counteract competitive problems of a particular temporal-spatial character. A change in the nature of competition is caused by the time-space transformation of those problems, undermining the bases of the seaport's competitiveness and creating a need for new types of strategies. Thus, I was able to show how containerization and intermodalism produced a "new" seaport competition by altering the temporal and spatial dimensions of strategic problems and solutions.

After describing the principal features, emergence, and impact of the container and intermodal modes of shipping in Chapter 4, I presented an argument in Chapters 5 and 6 based on the theoretical ideas of Chapters 2 and 3. The latter chapter (Chapter 6), based almost entirely on the views and observations of seaport officials at seaports in Tacoma, Seattle, and Vancouver, showed the validity of the argument presented in Chapter 5 in the context of those seaports. The following is a summary of the fundamental changes that resulted in a new seaport competition..

- (1) In the container/intermodal era, seaport hinterlands expanded as "global" indermodal carriers replaced local/regional shippers as the seaport customer. This shift occurred because intermodal carriers gained door-to-door control over shipments, including cargo routing. This control combined with container technologies to produce efficiency gains and led to concentration in the shipping industry and the emergence of fewer but much larger customers. These carriers sought to minimize overall port time by reducing port calls and could search far and wide to assemble a smaller yet more advantageous set of seaports. The spatial mobility, great size, and loadcentreing strategy of the seaport customer greatly intensified competitoin by bringing distant ports into competition with each other and creating an all or nothing scenario between regional neighbours.
- (2) Competition also intensified in the container/intermodal era because it was centreed on a new seaport product which translated into a host of new strategic problems for seaports. Large, global intermodal carriers desired less but more precise time in handling and logistics and more space in the form of larger storage facilities and greater control over terminal operations. The seaport product thus became sensitive to these dimensions. Seaports were expected to load/unload, store, and transfer larger "pulses" of cargo not only in less time but also within windows determined by the carrier so that each vessel and individual shipment (e.g. just-in-time) could stay on relatively strict schedules. Larger tracts of land were expected to accommodate additional

gantry cranes, container storage, on-dock rail, and other intermodal operations.

(3) The need to address the changing temporal and spatial dimensions of the transshipment product compelled the seaport to re-evaluate the competitiveness of its production-system and reconfigure it by implementing appropriate strategic solutions. The most conspicuous strategy has been the development of large intermodal terminals, expanding capital turnover time involved in the handling cell, and space involved in the handling, storage, and logistics cells. The pressure to provide such facilities is exacerbated by an increase in the time taken in planning and development because the mobility of carriers allows them to readily seek other port alternatives. A second broad strategy involves the expansion of the port authority's role beyond the port area. Port authorities have begun to actively participate in urban and regional transport planning to improve the productivity of the "intermodal" seaport and have also formed alliances with neighbouring seaports to solve common, regional problems and counteract the spatial mobility of their customers.

#### **Contribution to the Literature**

This research complements previous research on seaport competition by addressing the lack of intensive research on the change in the nature of competition produced by containerization and intermodalism. This lack has resulted in a literature devoid of (1) a theoretical framework for explaining *how* change occurs, i.e. what are the

causal connections between events or phenomena, and (2) approaches that engage with seaports. The first void relates to the nature of theory in extensive research. Theories are applied to data in order to reveal relationships between observed events. A good theory is one that produces successful predictions of *what* will occur given particular starting conditions. Intensive theories reveal the structures, which, as the determinants of an object's causal powers and liabilities (its "nature"), are the causes of change. A good theory is thus one that adequately explains how a particular process occurs. Previous research on seaport competition has not addressed the structural connections between the organizational and technological changes of containerization and intermodalism and the change in the nature of seaport competition. My thesis makes those connections by showing how the new modes of shipping altered the time-space regime on which the competitiveness of the breakbulk seaport production-system was based. The second void involves the emphasis in seaport research on demand-side issues, such as hinterland/market share and selection factor studies. Few pieces of research on seaport competition collect data from the seaports themselves, yet alone integrating qualitative, narrative data that can be deeply informative. In part, this is likely a result of the "scientific" need of extensive research to quantify relationships and analyses of phenomena. Quantitative data on various aspects of the seaport production-system, such as crane usage rates, loading/unloading times, and container turnover in storage yards is available but difficult to assemble into large, representative sets. Furthermore, in addition to being incredibly time consuming to collect and organize, qualitative analyses involving interviews with individuals working for the seaport (port authority officials,

labour, etc) are not conducive to the need for large, representative samples, statistical analyses and the discovery of universal laws.

#### **Policy-based Suggestions for Seaports**

In this period of intense and fierce competition, it is increasingly important that seaports consider their public role. What is the benefit of competition to the public or environment, for example, if two neighbouring ports duplicate each other's effort to provide large, high-capacity, specialized facilities to serve a carrier that will need to call on one but not the other? Through mergers and strategic alliances, intermodal carriers continue to decrease in number while increasing in size. If this trend continues or, at least, does not reverse, there will be a relatively small number of carriers relying on fewer port calls. What is the possibility that a region's public will find itself owning redundant facilities in the form of "Disneylands" built specifically for large intermodal carriers? If so, does the service provided by these carriers outweigh the cost to the public of such redundancy? What are the benefits of local/state control versus national/federal control? From whose coffers should public funds be dispensed? In order to make such critical assessments of true costs on a region-wide basis, seaports will have to adopt "identities" more relevant to the contemporary spatial-temporality and see themselves, as several officials in the previous chapters did, not only as competitors to regional neighbours but as cooperative parties as well. Seaports must wrestle some measure of control over the direction of changes in competition. At present seaports have generally reacted to the large carriers, but while this has encouraged public investment in new port development, port authorities must also participate in the process with the public's interests clearly in

hand. The public should have some participation in the production of the new time-space regime in shipping.

I would also suggest that seaports must, in their public role, consider the impacts of "Disneyland" facilities not only when they are unused but also when they are used. The port authority must assess the impacts of such facilities on local/regional communities in general and transportation systems in particular. Or is the port's only interest in development that serves private carriers? Among the port officials I interviewed I detected little consciousness of the non-monetary costs to the public. Corridors like the Alameda Corridor in Southern California and the CTC in Seattle/Tacoma benefit the public by separating port traffic from urban traffic, but again, at what cost to the public coffers, communities, and the natural environment?

### **Future research**

Further research on seaport competition must examine the role of labour. Developing new terminals also creates an issue involving labour and turnover time. The high-tech intermodal terminals represent, in essence, a trade-off between labour time, which is greatly reduced and turnover time, which increases as fixed capital in the form of gantry cranes and other equipment are built into the transshipment process. Herod (1994, 1997) has produced several excellent pieces on strategies by port labourers in the changing times. Research is needed to examine on a port-by-port basis how seaports and labour have adjusted to the replacement of labour by capital, namely gantry cranes and containers themselves, and the reconfiguration of the workday. How do such struggles figure in to the emergence of a new competition and seaport competitiveness?

Another useful topic of research would be on the effect of natural hazards on the new competition. What is the relationship between natural hazards and the globalized transport system? Cargo flows that are controlled and coordinated at a global scale seem to occur at some abstract level, beyond the reach of the vagaries of physical processes. However, as geographers have shown, time-space compression necessarily occurs through the production of particular spaces, such as intermodal seaports. What happens when those spaces are shut down, such as during a blizzard in Seattle? How do such vulnerabilities factor into seaport selection? What are the prospects for the system as a whole?

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