Gateways, Corridors and Global Freight Distribution: Transpacific Issues

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Abstract

Transport corridors are receiving a growing level of attention, particularly with the surge of containerized maritime freight and the setting of more efficient - time and cost-wise - freight distribution systems. Global commodity chains, with a strong Pacific Asian component and controlled by large modal and intermodal freight operators, have become an operational reality. Particularly, the role of maritime shipping companies and more recently port holding companies is salient in long distance international transportation. Their commercial decisions in terms of the allocation and acquisition of their assets (modes and terminals) are a significant factor behind the dynamism of hubs and gateways. Consequently, the global economy is characterized by the emergence of maritime and inland transport corridors that are interfacing at gateways. While maritime corridors are flexible and subjects to the fluctuations of trade, inland corridors are fixed entities that command the access to vast hinterlands. This accessibility has been the object of much concern as it is linked with commercial and development opportunities, particularly with the ongoing trend related to the penetration of inland transportation, mainly by the setting of corridors and inland freight distribution centers. Few parts of the world have experienced such a surge in trade than the transpacific and its commodity chains. The functional integration of these chains has placed pressures on West Coast gateways and corridors. For instance major long distance rail eastbound segments, particularly in the United States, are facing acute capacity constraints. An outcome has been the exploration of alternatives such as new corridors (e.g. from Prince Rupert in Canada and Ensenada in Mexico) as well as changes in local terminal operations to increase throughput (e.g. Alameda and the “Agile Port” concept). In such a context of transpacific commodity chains and North American freight distribution, Western Canadian transport corridors are consequently been redefined by external factors which brings challenges but also opportunities.

Keywords: Intermodal Transportation, Transport Corridors, Global Commodity Chains, North America, Pacific.

1. Introduction

The scale and scope of globalization has created an environment where the transport sector is coping to adapt. This is particularly the case for the transpacific realm. Transport corridors are receiving a growing level of attention, particularly with the surge of containerized maritime freight and the setting of more efficient - time and cost-wise - freight distribution systems. Under such circumstances initiatives such as Canada’s Asia-Pacific Gateway and Corridor fit well the emerging reality of global freight distribution.
The process of globalization is certainly a dimension that has been discussed in length and from many different perspectives. Among the most common factors identified are related to the exploitation of comparative advantages, mainly in terms of labor, information and telecommunication technologies, foreign direct investments and technology transfers. All these have helped create a clustered and spatially diffused global economy, particularly in terms of production and consumption. A very powerful and widely acknowledged trend in recent years has been the rapid industrialization of Pacific Asia, particularly China, and the enduring growth in the consumption of foreign goods in North America and Europe. Global trade is thus steadily growing despite the increase in the average distance of trade relations. Parallel to this growth, the need to reconcile spatially diverse demands for raw materials, parts and finished goods has placed additional pressures on the function of freight distribution and logistics.

Freight distribution is a physical activity where the transportation component is of prime importance. Paradoxically, because of its efficiency, freight transportation is almost invisible to the end consumer as the outcome (retailing) is seen, but not the process (distribution). Such a perspective often permeates public policy where the importance of freight transportation is often understated. Still, the global economy is based on the backbone of freight distribution, which in turn relies on networks established to support its flows and on gateways that are regulating them. Networks, particularly those concerning maritime shipping and air transportation, are flexible entities that change with the ebb and flows of commerce while gateways are locations fixed within their own regional geography. The spatial fixity of gateways imposes the usage of corridors. The Transpacific, due to the distances involved, is particularly prone to the setting of maritime and land corridors which enforces a continuity in freight distribution.

2. Gateways and Corridors

Before going further, a clear conceptual representation goes a long way into insuring that real world processes are properly understood. In the emerging global geography of circulation, gateways and hubs are playing a crucial role:

- **Gateway.** A location that promotes the continuity of circulation in a transportation system servicing supply chains. It is the interface between different systems of circulation and includes terminal facilities, but also the numerous related activities such as distribution centers, warehouses and even insurance and finance. Gateways reap advantage of a favorable physical location such as highway junctions, confluence of rivers, seaboard, and have been the object of a significant accumulation of transport infrastructures such as terminals and their links. A gateway generally commands the entrance to and the exit from its catchment area and commonly imply a shift from one mode to the other (such as maritime / land). In other words, a gateway is a pivotal point for the entrance and the exit of merchandise in a region, a country, a continent. The emergence of intermodal transportation systems reinforces gateways as major locations of convergence and transshipment and has modified their geography with increased locational flexibility. While major terminals have
expanded and relocated to more peripheral locations, namely port facilities, many distribution centers have relocated even further away along corridors.

- **Hub.** A central point for the collection, sorting, transshipment and distribution of goods for a particular area. This concept comes from a term used in air transport for passengers as well as freight. It concerns collection and distribution through a single point such as the “Hub and Spoke” concept. A hub is thus the outcome of commercial decisions linked with a desired level of service in terms of frequency. System-wide the delays imposed by transshipments at the hub (instead of direct services) are compensated by higher frequencies of services between all points.

![Figure 1 Gateways and Hubs as Central and Intermediate Locations](image)

The transport system is subject to remarkable geographical changes even if many of its infrastructures are fixed. Flows, origins, destination and the modes used can change rather rapidly. What remains relatively constant are gateways, which can be seen as semi-obligatory points of passage, while a hub is a central location in a transport system with many inbound and outbound connections of the same mode. Gateways also tend to be most stable in time as they often have emerged at the convergence on inland transport systems while the importance of a hub can change if transport companies decide to use another hub, as common in the airline industry. Thus, gateways tend to be intermodal entities while hubs tend to perform transmodal (within a mode) operations.

Transport corridors are commonly linking gateways to the inland. The functions of centrality and intermediacy are particularly relevant to the emergence of a global nodal space since one focuses on nodes as an origin or destination of traffic while the other focuses on nodes as intermediate locations where transshipment is performed. The functions of centrality and intermediacy are particularly relevant to the emergence of a global nodal space since one focuses on nodes as an origin or destination of traffic while the other focuses on nodes as intermediate locations where transshipment is performed. While central locations obviously correspond to large metropolitan areas, intermediate locations have developed a rather unique geography. Corridors themselves can be understood within three main paradigms.
The first paradigm is the most traditional as far as geographical theory is concerned. The central places theory mainly considers cities as structurally independent entities that compete over overlapping market areas. Under the location and accessibility paradigm an urban region is considered as a hierarchy of services and functions and the corridor a structure organizing interactions within this hierarchy. Transport costs are considered a dominant factor in the organization of the spatial structure as the hinterland of each center is the outcome of the consumers’ ability to access its range of goods and services. Because of higher levels of accessibility along the corridor, market areas are smaller and the extent of goods and services being offered are broader. Thus, differences in accessibility are the least significant along the corridor. This applies well to the consumption based functions of a corridor.

The specialization and interdependency model considers that some cities can have a level of interaction and that transportation could be more than a factor of market accessibility, but also of regional specialization and of comparative advantages. The Megalopolis concept introduced by Gottmann (1961) acknowledges the creation of large urban corridors structured by transportation infrastructures and terminals maintaining interactions. Accessibility and economies of scale, both in production and consumption, are factors supporting the development of such entities where urban areas are increasingly specialized and interdependent. The main assumption is that the accessibility provided by the corridor reinforces territorial specialization and interdependency along its main axis, and consequently the reliance on a regional transport system. This applies well to the production based functions of the corridor.

The distribution/flow model is one where a major gateway of an urban region acts as the main interface between global, national and regional systems. Under such a paradigm, three core structural elements are defining a regional corridor: 1) Gateways regulating
freight, passengers and information flows. 2) Transport corridors with a linear accumulation of transport infrastructures servicing a set of gateways. They provide for the physical capacity of distribution. 3) Flows, their spatial structure and the underlying activities of production, circulation and consumption. The corridor becomes a logistically integrated axis. This is the paradigm I tend to favor while still not discarding the relevance of the two prior interpretations.

Figure 3 Main North American Trade Corridors and Metropolitan Freight Centers

A North American lattice of trade corridors where freight distribution is coordinated by major metropolitan freight centers (MFC) has emerged in the recent decades. While MFCs are significant markets, they also command distribution within the market areas they service as well as along the corridors they are connected to. They thus have a significant concentration and logistics and intermodal activities at specific locations. The ongoing accumulation of these activities has led in many cases to the creation of “central freight districts”. The extent of the market area of a MFC is mainly a function of the average length of domestic truck freight haul, which is around 550 miles (880 km). Like many segments of the North American economy and territory, globalization and integration processes, namely NAFTA, have impacted on the nature and function of continental production, consumption and distribution. For international trade, the gateways of this system are major container ports along coastal areas from which long distance trade corridors are accessed. About a third of the American trade took place within NAFTA in 2000, mainly through land gateways (ports of entry) that are gateways in the sense that they are obligatory points of
transit commanding access to the United States. For truck and rail flows, virtually no intermodal activities take place at land gateways, although several distribution centers nearby borders and along corridors.

Land gateways are dominantly servicing an import function, expanded under NAFTA trade, and connected to corridors of continental freight circulation. These include three main longitudinal (north, central and south) and four latitudinal (west coast, central, NAFTA and east coast) axes. The NAFTA Corridor links the two largest land gateways of North America, Detroit, Michigan and Laredo, Texas. It dominantly relies upon trucking as about 65% of the value of the NAFTA trade is serviced by this mode. However, it is far from being a continuous corridor as northbound flows of Mexican imports and the southbound flows of Canadian imports dwindle as the distance from their respective borders increases. The equilibrium point is around the Tennessee / Kentucky range, past which the respective flows are very small. About a third of the volume involves auto parts produced in Southern Ontario and in the Maquiladoras of Mexico, which are used for low-cost car manufacturing in the Southeast states.

3. Pacific Asia and Global Trade

In the current context, investigating transpacific trade, gateways and corridors is at start an investigation in macro-economic and physical imbalances. Any practitioner and policy maker should be aware of these forces as they substantially shape the transport sector. Considering that freight distribution is derived from, albeit at the same time strongly influence, the sphere of production, the processes that have taken place along the Pacific Rim impacted international transportation and expanded the importance of gateways and corridors. Three main factors are behind macro-economic imbalances, two of which are well known, but the third has become the main force at play in recent years:

- **Comparative advantages** are a well know force as they provide strong incentives to consider new locations, particularly if costs differences are significant. They have permitted to keep production costs low and the price of several consumption goods has actually declined due to the “China effect”.

- **Foreign direct investments** are the means taken to exploit the comparative advantages and involve a transfer of capital and technology and its accumulation as an infrastructure or a mean of production.

- **Debt and asset inflation** is a much less known but more pervasive factor. The deindustrialization of America has been accompanied with stagnating and even declining wages for a period of over 20 years. After the stock market decline in 2001, the Federal Reserve substantially reduced interest rates and flooded the global economy with liquidity (debt), which triggered a wave of asset inflation and massive quantities of debt contracted by the American consumer. This debt is likely to be defaulted on, one way or the other.
The main macroeconomic imbalances have an outcome in the physical world of freight flows. This can be observed in international trade figures, in the flows of containers and in the transportation rates.

Since 2001, the policies of the Federal Reserve have dramatically shifted to extreme accommodation, which is related to the setting of the world’s first “perpetual motion machine” working on the following principles.

![Diagram of the Perpetual Motion Machine]

**Figure 4 The “Perpetual Motion Machine”: The Dynamics of the World’s Most Significant Trade Relationship**

When the United States (individuals or corporations) purchase goods made in Asia, the transaction involves dollars in exchange for goods. So there are flows of capital in one direction and flows of goods in the other. In theory, this unbalanced flow should put strong downward pressures on the US dollar, making Asian exports less competitive. The accumulation of foreign reserves, mainly USD, in China provides a large capital pool that can be used for investing in additional production capacities. The outcome is the creation of jobs, badly needed for the Chinese transition to an industrial society. In addition, the Chinese realize the importance of the American market as the outlet of its export-oriented growth model, so favorable conditions must be maintained for this paradigm to continue. The huge trade imbalance with the US places pressures on the Yuan. To accommodate this pressure, China, Japan and Korea (countries having substantial trade surpluses with the United States) have established the largest buyer financing scheme in human history. By buying American liabilities (mainly bonds, T-bills and mortgage backed securities) the flow of capital from Asia has helped maintain the value of the USD. This in conjunction with low interest rates pushed by the Federal Reserve has helped a significant inflation of American assets, mainly real estate. Consumers, in view of the growing paper value of their assets, have been encouraged to borrow against it and the great share of this borrowed money went into consumption. Bluntly, home equity loans were taken to pay credit cards used to pay for cheap (Chinese) imports. Thus the momentum continues.

The US attracts more than $2 billion per day, about 80% of the world’s savings. The idea of a “global savings glut” is fallacious; it is a global credit creation glut taking the shape of American asset inflation which is recycled in foreign (Asian) markets and comes back as
purchases of bonds, treasuries and other equities. More money (debt) has been created in the US during the past five years than in the preceding one hundred years combined.

It makes me wonder who the greater fool is. The one that produces tangible goods in exchange of promises to pay or the one accumulating debt that is unlikely to be ever paid back in exchange of tangible goods? The more dollars China holds, the more the Chinese economy loses by exporting real wealth in exchange of promises to pay. The dependence of China on foreign trade has reached excessive levels with international trade accounting for 90% of its GDP in 2004. This distorts China’s economic growth as much as asset inflation distorts America’s economic growth.

The US is the consumer of last resort and several strategies were undertaken to keep American consumption going, mainly through the housing ATM. American savings rate are now negative implying that the only factor that keeps the American economy growing is further borrowing against inflated assets. This system appears unsustainable as there is an over-accumulation of debt on one side and over-production on the other. The fact that China’s stock markets (notably Shanghai and Shenzhen) was among the worst performing in the world up to 2005 is an indication that despite all this growth the profit margins of most Chinese enterprises are very low, in the range of 5% in many sectors. A re-equilibrium in such a system is likely to have very serious consequences in international trade, maritime shipping and port hinterlands.

The share of China in global manufacturing, about 7% of its value, may be understated, particularly because the Yuan was kept devaluated compared with other currencies; it lost almost 50% of its value in comparison with the USD between 1993 and 2003. During that period, China mostly focused on the lower range of the added-value manufacturing process in addition to have low labor costs. The share of Japan in global manufacturing has however declined as it moved towards a more knowledge-based economy, from 22% in 1993 to 18% in 2003. A good share of manufacturing activities has been relocated to lower cost locations, particularly to China. Comparatively, Canada accounts for about 2% and the United States about 23% of the global manufacturing output.
In terms of international trade, an overview of world’s largest exporters and importers underlines a unique situation:

- **Market size.** Imports are a good indicator of the size of a national market as well as the flows of merchandises servicing the needs of an economy. The United States, Germany, China and Japan are the world's largest importers and consequently the world's largest economies. Germany has recently become the world's largest exporter, supplementing the traditional position the United States held over the last 50 years. The integration of China to the global economy has been accompanied by a growing level of participation to trade both in absolute and relative terms, improving the rank of China from the 7th largest exporter in 2000 and to the 3rd largest in 2005. China has surpassed Japan both in the total value of its imports and exports.

- **Trade imbalances.** Some countries, notably the United States and the United Kingdom, have significant trade deficits which are reflected in their balance of payments. The United States has reached a staggering trade imbalance, which accounted to more than $800 billion in 2005. This aspect is dominantly linked with service and technology-oriented economies that have experienced a relocation of labor-intensive production activities to lower costs locations. They are highly dependent on the efficient distribution of goods and commodities. Conversely, countries having a positive trade balance tend to be export-oriented with a level of dependency on international markets. Germany, Japan, Canada and China are among the most notable examples. China has a positive trade balance, but most of this surplus concerns the United States. It maintains a negative trade balance with many of its partners, especially resources providers.

Container flows are quite representative of global trade imbalances, which have steadily been growing since the 1990s. For instance, there are 3 times as much containers moving
from Asia to the United States (13.9 million TEUs in 2005) than there are from the United States to Asia. This implied a combined American imbalance of 9.6 million TEU with Asia and Europe. By 2005, about 70% of the slots of containerships leaving the United States were empty with major container ports, particularly along the West Coast (e.g. Los Angeles and Long Beach) handling large amounts of empty containers, 2.3 million TEU alone were exported in 2005. The Asia-Europe trade route is facing a similar imbalance, but at a lesser level; a total of 4.3 million TEU. Thus, production and trade imbalances in the global economy are clearly reflected in imbalances in physical flows and transport rates. For Transpacific trade, it costs more per TEU for eastbound flows than for westbound flows, making freight planning a complex task for container shipping companies. For Asia-Europe flows, westbound rates are higher than eastbound rates. Thus, production and trade imbalances in the global economy result in imbalances in physical flows and transport rates. Even if eastbound trans-Pacific rates are lower than westbound trans-Pacific rates, in theory conferring an advantage to American exports, costs differences are so in favor of Asia (China) that the American economy does not take much advantage of this benefit.

Figure 6 Containerized Cargo Flows along Major Trade Routes, 1995-2005 (in millions of TEUs)

Significant imbalances in containerized maritime freight rates have emerged along major trading routes. Prior to 1998, the "spread" between eastbound and westbound rates used to be relatively narrow, a couple of hundred USD per TEU. Rates were overall declining as economies of scale in the form of larger containerships being introduced to long distance shipping routes. From 1999, the rate spread increased to about a thousand USD per TEU, a reflection of the substantial global trade imbalances. On one hand, the Asian financial crisis of 1997 created a substantial devaluation of their respective currencies (with the exception of the Chinese Yuan which was pegged to the USD until 2005), which made exports cheaper. On the other hand, the same period was characterized by significant economic growth in North America with its associated consumption and a level of deindustrialization. American imports thus increased at a rate which was significantly faster than exports. While rates between Europe and Asia and the United States and Asia have steadily declined and then remained constant, rates in the opposite direction (from Asia)
have increased and are subject to some volatility mainly linked with periods of growth and recession. A similar trend exists in air cargo transportation as eastbound rates across the Pacific are more expensive than westbound rates.

The structure of long distance transport services has adapted to the realities of trade and production. Pendulum routes are very representative of intercontinental maritime shipping networks, such as the above serviced by the Hong Kong shipper OOCL (Orient Overseas Container Line). These routes take advantage of transpacific trade, but also have a component servicing intra Pacific Asian trade. The common network structure involves a series of port calls (5 to 7) within Pacific Asia and a couple of calls along West Coast ports that are in proximity. The cycle time for such services is between 35 and 50 days, depending on the number of port calls and the region serviced. There are also a few direct routes, gateway to gateway, that complete the cycle in about 25 days. There is little trade between the ports of the West Coast and cabotage regulations forbid foreign owned container shipping companies, so intra-coastal port calls are limited. The goal is to service a gateway from which the hinterland is accessed through rail corridors and also some long distance trucking. Pendulum services thus reflect very well the structure of production, distribution and consumption. For instance, the Northwest Express route (NWX) links Japan, Central / Northern China and South Korea. These economies have become closely integrated with a growth in the trade of parts and finished products. Japanese parts are shipped to coastal China manufacturing clusters and are assembled in finished or semi-finished goods which are then shipped across the Pacific with a stop in South Korea where Korean exports are loaded. The same structure applies to the South China Express route (SCX), but with a focus on Southern China and Southeast Asia. The eastbound trade flows are most likely to involve

Figure 7 Two Major Transpacific Pendulum Routes Serviced by OOCL, 2006 (The Wal-Mart Express)
finished goods bound for North American retailing distribution centers. It is worth mentioning the OOCL operates the terminals of Delta Port and Vanterm in Vancouver. In 2006, a new pendulum service, the Pacific North Express (PNX) was introduced. It has a 42 days loop with a similar port call structure than SCX, but calls Vancouver first when reaching North America. The reasons why these routes can be called the “Wal-Mart Express” are not trivial, as the world’s largest corporation buys about 12% of all Chinese exports and the substantial amount of traffic linked with these movements is serviced by trans-pacific shipping routes. The American corporations involved in the imports of Asian goods by maritime container transportation reflect well the Transpacific structure of production, distribution and consumption. The largest importers, such as Wal-Mart, Home Depot, Target, Sears, Ikea and Lowe’s, are all mass retailers relying on high volume and low margin goods, which are dominantly produced in China.

4. Transpacific Gateways: Mirror Images?

A closer look at maritime facades around the Pacific reveals a significant shift in the balance of commercial power. Pacific Asian container ports handled close to 70% of the global container traffic, which comparatively dwarfs the importance of the West Coast maritime facade. China alone account for 27% of the global containerized traffic.
As stated before, an economic correspondence has been established across the Pacific, which is being articulated by major gateways. Because of the structure of distribution imposed by this correspondence, trans-Pacific gateways can be perceived as mirror images (or evil twins...). While Pacific Asian gateways tend to be export-oriented and closely linked to manufacturing, West Coast ports tend to be import oriented and act as the early stages of North American distribution and retailing. Large manufacturing clusters, such as the Pearl River Delta, have emerged along coastal areas. The constraints of poor inland transportation in Pacific Asia have imposed a specific locational dynamic where manufacturers and suppliers tend to be located close to the port. There are no long distance corridors in Asia, except a latitudinal maritime corridor linking the major coastal areas. Pacific Asian gateways are thus mainly exit doors capturing dense but geographically limited hinterlands. In North America, good inland transportation along transcontinental corridors is linked with the continental distribution of imports. North American gateways are thus mainly entry points servicing a sparsely populated market with high economic density clusters with extensive hinterlands. Long distance trade corridors are thus of fundamental importance to the West Coast port clusters. For instance, half the cargo handled by the San Pedro Bay ports goes east of the Rockies. It reaches Chicago in 3 to 4 days and New York in...
5 to 6 days. For the Puget Sound cluster, long distance inland trade is even more pronounced, with about 80% of the traffic bound further inland.

Two new smaller container gateways are getting online, with Ensanada already having container facilities but poor hinterland access and Prince Rupert having excellent hinterland access and the container terminal expected to be online late 2007.

![Diagram of Gateways and Hinterland Effect](image)

**Figure 9 Gateways and Hinterland Effect**

This figure represents a synthetic structure of the respective hinterlands articulated by trans-Pacific gateways. In China, Special Economic Zones (SEZ) are an implicit acknowledgment that the accessibility of the hinterland is weak so that activities must be located as close as possible to gateways. Empirical evidence has underlined that it costs more to move a container from inland China to a coastal port than across the Pacific and across North America. Reflecting these heavy constraints, most of the development in China has taken place along the coast, a process linked with the export-oriented development strategies. It was cheaper to bring labor to coastal SEZ than to bring the manufacturing activities to the labor, a process which is contradictory to what has happened to manufacturing in the global setting (manufacturing going to the labor). As such, more than 120 million peasants have left the countryside since the early 1990s in the largest migration in human history. There are thus many advantages reflecting the Chinese transport and economic reality in the setting of SEZ, such as proximity to global freight distribution and addition of the conventional advantages of clustering.

In North America, high capacity and efficient inland freight distribution has been linked with the setting of long distance trade corridors, dominantly supported by rail. The location of economic activities is consequently less constrained, particularly since it focuses on the freight distribution of finished goods.
香港是世界上最繁忙的集装箱港口。一个对其集装箱交通结构的概述很好地反映了上述讨论的不平衡。与其他珠江三角洲的港口相比，这些不平衡相对较小。例如，盐田，它位于香港的旁边，是一个单纯的出口导向型，这意味着每进口一个集装箱，就有九个集装箱出口。它模拟了中国通过利用其低成本的比较优势和转运不平衡的市场需求进入全球（西方）市场的策略。其80-90%的进口集装箱是空的。

图10 香港港口1995-2005年集装箱吞吐量（TEU）

图11 洛杉矶港口1995-2005年集装箱吞吐量（TEU）
The Port of Los Angeles and the Port of Long Beach are the most important gateways of North America. Southern California accounts by itself for about 18% of all American trade. The San Pedro port cluster handled 60% of all the TEU of the west coast of North America in 2005. An overview of the nature of the containerized traffic transshipped by the Port of Los Angeles is very revealing. While container traffic has been imbalanced for a while, the situation has become even more imbalanced in recent years both for loaded and empty containers. Many of the loaded inbound containers are transferred to local or regional distribution centers where the contents of maritime containers will be put into domestic containers. This option is widely used because the railroads do not charge more to carry a domestic (53 footer) or a maritime (40 footer) container. Overall, three maritime containers of 2,400 cubic feet each can be transloaded into two domestic containers of 3,800 cubic feet each (7,200 versus 7,600 cubic feet), more than compensating for the incurred costs and delays.

![Figure 12 Containers Handled by the Port of Vancouver, 1997-2005 (in TEU)](image)

Since 2001, the port of Vancouver has shifted from an export-oriented port towards a more prevalent import function. This is a good deal attributed to the decision in 2001 by OOCL, NYK and Lykes Lines (purchased by Hapag Llyod in 2005) to call Vancouver first for their transpacific routes with strategic pendulum routes to the production clusters of Pacific Asia. This accelerated the shift in the general balance of inland freight traffic and a change in the port’s hinterland with a growth of new markets, particularly in the United States. The strike at major American West coast ports in 2002 also enabled Vancouver to capture additional cargo. Two major global port operators are present; DPW (Centerm; formerly P&O) and OOCL (Vanterm and Deltaport through TSI Terminal Systems). Vancouver is actually the only North American holding of DPW, now the world’s largest
port operator, as its attempt to purchase the American assets of P&O in 2006 was sidetracked for political reasons.

5. Corridors and North American Inland Freight Distribution

On the land side, rail is of primordial importance to support long distance trade corridors in North America and has experienced a resurgence in the recent years. It accounts for close to 40% of all the ton-km transported in the United States, while in Europe this share is only 8%. Still, rail freight corridors have a functional typology which simplistically can be differentiated by the distance (scale) they service.

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<th>Function</th>
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<td>Northern East-West Corridor</td>
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Figure 13 Types and Functions of Rail Freight Corridors

All the types of rail corridors fit within a specific freight distribution strategy but are imbedded to one-another:

- **Short distance.** Conventional transport economics underlines that rail is not a very suitable mode for short distances. Short distance rails corridors are thus established under very specific circumstances, namely where there is acute congestion and a modal shift to rail is required to improve the capacity and throughput of a gateway or hub. This often concerns on-dock rail facilities where containers are exiting / entering a port terminal on rail instead of on truck, but the destination of these rail shipments often goes much further inland. The Alameda corridor is an example of a short distance rail corridor of 20 miles
(32 km) aiming at expanding the throughout of the San Pedro port cluster by shifting away containerized traffic from trucks. The “Agile Port” concept is an expansion of this strategy by linking directly on dock rail facilities to a nearby inland terminal where containers can be sorted by destination. On one side, the maritime terminal increases its throughout, in theory up to 40%, without additional land, while on the other side, a nearby inland rail terminal facing less land pressures is used to sort containerized shipments to their respective inland destinations. The Port of Tacoma is considering implementing this strategy. The Panama Canal Railway is a dedicated corridor for maritime shipping lines to shuffle containers to and from the Atlantic to the Pacific side.

- **Hinterland access.** In this case, the rail corridor is a strategy to expand the market area of a gateway, often linking on-dock rail facilities to an inland distribution center where containers are moved to trucks to their final destination. It applies well when there is a dense hinterland such as along the Boston-Washington corridor where the Port Authority of New York and New Jersey has established the Port Inland Distribution Network to expend the port’s hinterland and provide alternatives for trucking over medium distances. The Port of Virginia has also established. It is thus not surprising that most initiatives have taken place in this context.

- **Landbridge.** A landbridge is a long distance continental rail corridor linking gateways which insures the continuity of global commodity chains. The North American landbridge is mainly the outcome of growing transpacific trade and has undergone the containerized revolution; container traffic represented approximately 80% of all rail intermodal moves. Landbridges are particularly the outcome of cooperation between rail operators eager to get lucrative long distance traffic and maritime shippers eager to reduce shipping time and costs, particularly from Asia.

- **Circum-hemispheric.** This goes beyond rail corridors to integrate a sequence of maritime and land transportation corridors in a seamless fashion. A circular transport chain across a hemisphere is thus established. Such a corridor does not yet exist and is likely to be decades away. The Northern East-West Corridor the Atlantic with the Pacific through the transsiberian has been in the design phase for decades.

The emergence of landbridges is a good example of the setting of intermodal nodes along transport chains. Rail freight in the United States has experienced a remarkable growth since deregulation in the 1980s (Staggers Act) with a 77% increase in tons-km between 1985 and 2003. A significant share of this transformation concerns the emergence of long distance rail freight corridors linking the two major gateway systems of North America; Southern California and New York/New Jersey via Chicago. This represents the most efficient Landbridge in the world, which considerably reduces distances between the East and the West coasts. Thus, the North American landbridge is mainly the outcome of growing transpacific trade and has undergone the containerized revolution; container traffic represented approximately 80% of all rail intermodal moves. Landbridges are particularly
the outcome of cooperation between rail operators eager to get lucrative long distance traffic and maritime shippers eager to reduce shipping time and costs, particularly from Asia.

Continuity within the American rail network is far from being practical as major regional markets are serviced by specific rail operators. Mergers have improved this continuity but a limit has been reached in the network size of most rail operators. Attempts have been made to synchronize the interactions between rail operators for long distance trade with the setting of intermodal unit trains. Rail companies have their facilities and customers and thus have their own markets along the segments they control. Each rail system is the outcome of substantial capital investments occurring over several decades. Interchange is a major problem between segments controlled by different rail companies, particularly since many networks were built to gather market share and regional control over rail freight services. Until the last two decades, this did not present too many difficulties since transmodal operations were comparatively small. However, with a surge of transcontinental rail shipments, rail operators are bound to further address transmodal issues. An analogy can be made with network alliances that took place in the airline industry. The outcomes were increased revenue, costs reductions (shared services and facilities), a better level of service and a wider geographical coverage. Rail networks are obviously much more constrained in this process since they have a high level of spatial fixity – by far the highest of any mode. This is the reason why mergers and acquisitions is a more common expansion strategy. They
have added numerous efficiencies to the rail system, notably a more centralized control and the reduction of duplicated facilities (e.g. maintenance). Only 7 Class 1 carriers remained in the United States as of 2005, down from 39 in 1980 and 71 in 1970. It is unlikely that additional mergers will take place, mainly due to the size the networks have achieved (diseconomies of scale) and an oligopolistic situation that could trigger anti-monopolistic interventions from the Federal Government.

Looking beyond the system of maritime container terminals that are the gateways of most of the long distance corridors, a system of inland intermodal and transmodal facilities is emerging and articulating corridors. This articulation involves two major stages. The first stage is composed of maritime rail gateways which are mainly large rail yards where freight coming from the nearby port complex is assembled for inland rail distribution. Several are linked with on-dock rail facilities but a great share of the traffic involves transloading from trucks carrying containers from the port terminals. Some freight is also coming from distribution centers that have repackaged the contents of maritime containers into domestic containers (53 footers) which have a higher capacity and are more suitable for inland distribution.

The second stage concerns transmodal rail operations which are required because of the market and ownership fragmentation of the North American freight distribution system. There are 9 major locations that appear suitable to begin the foundation of a transmodal rail
freight distribution system in North America; six in the United States and three in Canada. Each transmodal hub could act as a gigantic funnel, collecting the freight of all the major gateways. Chicago is obviously on top of the list because it handles a very high share of the rail traffic, 13.98 million TEU in 2004 (up from 12.4 in 2003), about 50% of the American rail freight. Primary consolidation and de-consolidation center (chokepoint). 4,000 cross-town transfers of freight are made between rail yards each day averaging 25 miles.

![Map of Western North America: Value of US Rail Imports by Port of Entry, 2002](image)

If we look more closely at the area of concern by Canada’s Asia-Pacific Gateway and Corridor Research Consortium, we are dealing with a containerized freight market that has a low and clustered density, but with several opportunities as far as raw materials and agricultural products are concerned. Still, an important component of the corridor’s function is long distance trade to and from the Pacific’s gateways with the major markets of the Midwest and Eastern Seaboard. Transmodal operations in the Canadian context are likely to take the form of a bifurcation strategy. Since the ownership spans the continent from east to west, as opposed of the ownership of American rail companies which is fragmented along the Chicago / New Orleans axis, transmodal operations would involve a separation of the traffic continuing within Canada and the traffic heading towards the United States. This could take place at three major locations: Winnipeg, Regina and Calgary. Canadian rail companies (CN and CP) are already positioned to do so with the control of substantial assets accessing Chicago and other locations in the United States.

An inland transmodal terminal in Western Canada could work as a major sorting facility. Unsorted containers could be directly moved away from on-dock rail terminals of
ports like Vancouver, Seattle-Tacoma and Prince Rupert, increasing their respective throughput, and then brought to Calgary, Regina or Winnipeg where unit trains bound for specific large North American markets could be assembled. Many initiatives to improve rail infrastructure (extended siding and double tracking of several rail sections) between Vancouver and Calgary as well as between Regina and Calgary are under way, which will obviously increase the corridor’s capacity, but the transmodal throughput is also a determinant factor.

Prince Rupert, as a new container gateway along the North American West Coast, is expected to come online during 2007. The terminal management strategy follows the standard model where a private operator leases the terminal and operates it on a per lift basis (Maher will be the terminal operator). The rail connection, operated by CN, aims at direct non-stop intermodal services to Chicago in about four and a half days (107 hours). The major comparative advantage is thus the time component which is jointly saved from shorter trans-pacific crossings and inland rail transport. The decision to use the gateway will be made by maritime shipping lines as they allocate their fleets in terms of port calls and the frequency of those port calls and in which pendulum services they are part of. However, the quality and efficiency of inland distribution will be a factor behind the number and frequency of port calls. What about the “warm chain”, which is maintaining the temperature integrity of a product being transported? For a wide array of goods, such as apparel, it does not matter much, but many products have a level of tolerance to low temperatures (food, paints, beer & wine, adhesives, chemicals and coatings). For instance, LCD displays should on average not be stored at temperatures lower than -30o C. Depending on the composition of the freight, this could create difficulties. Logistics can ill-afford an additional layer of sorting that would involve temperature sensitive freight (outside reefers), so this factor should be considered.

6. Conclusion

Concomitantly with Transpacific trade Western Canada’s gateways and corridors, along with their American counterparts, are facing a new commercial environment, which mainly involves the emergence of global production networks and the associated rebalancing of flows of the global economy. Among the numerous developments that can be anticipated in the coming years, a continuing growth in the amount of tons and tons-km would appear at first glance to be rather obvious and almost taken for granted. Such a setting would imply additional demands on modes and terminals and pressures to provide investments in freight distribution systems. However, because of macro-economic conditions pertaining to the American economy, the growth in freight flows over the next decade is likely to be less significant than expected. Since debt can be defined as reduced future consumption at the expense of present consumption, the staggering amount of debt accumulated be the American economy, many of which for done in unproductive sectors, is likely to imply serious reductions in future (Chinese produced) consumption.

Within the framework of the global economy, a structured global freight distribution system is emerging with a reliance on integrated freight transport systems. Gateways are fundamental elements that perform intermodal operations while hubs perform transmodal
operations. Jointly, they support the geographical and functional integration brought by the emergence of global production networks. Geographical integration - the exploitation of the comparative advantages of the global economy - has led to the extension and more complex supply chains while functional integration has favored a high level of control and synchronization of flows along supply chains. Gateways and hubs are thus effectively capturing and adding value within global supply chains. They are also facing intensive competition with other gateways when they service similar markets and even within nodes when several terminal operators and freight forwarders are present. This is particularly the case for Western Canada where the hinterland is of limited economic size and Transpacific traffic must be captured to generate additional growth. There are thus many challenges and opportunities in the insertion of gateways and corridors in global production networks. Among the most notable are:

- The global economy and its arbitrage in terms of labor costs, has led to acute trade imbalances that transport systems have to cope with. International trade flows currently reflect significant disequilibrium in the global geography of production and consumption. On the short an medium terms, there will be pressures to cope and manage with the disequilibrium, such as the number of empty containers. In such a context, many gateways will be hard pressed to cope with traffic imbalances while capturing and adding value to the flows they handle.

- Since supply chains are closely integrated entities, freight transportation systems are increasingly reflecting this reality. The challenge remains about improving intermodal as well as transmodal movements along corridors. While the intermodal issue received a lot of attention, transmodal imperatives have somewhat been neglected in spite of their strategic importance as they reconcile the various scales of freight distribution. Although several aspects of this integration can be considered as capital investment issues, others require a higher level of modal collaboration. In many ways, globalization has forced many transport providers to adopt a wider perspective that goes beyond the freight distribution segments they control.

- In view of additional frictions in logistics, particularly congestion and the likeliness of long term raises in energy prices, a new modal balance is likely to be achieved where each mode will be used in it most cost effective way while abiding to time constraints of contemporary freight distribution. Therefore, the gateways and corridors offering the most efficient alternatives in terms of time, costs and energy efficiency will have an advantage over others. Competitive advantages are thus increasingly derived from the whole transport chain in which corridors and gateways are component.

- The fact that North American freight corridors are a trans-jurisdictional issue involves two major dimensions. First, the commercial context is shaped by forces well outside the control and to some extent the comprehension of any political jurisdiction; globalization has seen to that. Second, freight transportation is mostly a private industry and the allocation of assets is the outcome of profit seeking and efficiency maximizing strategies. Under such circumstances, public policy should take account of the tremendous flexibility of freight distribution and implicitly acknowledge this new environment. Thus, attempts by the State to regulate and “plan” will be met by the flexibility of the transport industry to sidetrack
conditions judged to be unfavorable. The phase of deregulation that North American transportation went through in the last decades was mainly aimed at the national transport industry. It was little foreseen nor expected that global freight shipping companies, such as maritime shippers and port operators, would play such an important role. Still, global production networks require global distribution networks and the setting of gateways and corridors reflects this new global geography of freight distribution.