FREIGHT, GATEWAYS AND MEGA-URBAN REGIONS: THE LOGISTICAL INTEGRATION OF THE BOSTWASH CORRIDOR

JEAN-PAUL RODRIGUE

Department of Economics & Geography, Hofstra University, Hempstead, New York 11549, USA. E-mail: Jean-paul.Rodrigue@Hofstra.edu

Received: August 2003

ABSTRACT
The geography of freight transportation evolves at various scales, but it is increasingly acknowledged that freight flows occurring at the local level are a result of global and regional economic processes. Internationally, distribution networks have expanded, namely through the division of production, manufacturing and consumption. This has been accompanied by a growth of the quantity of freight being shipped as well as by a complication of supply and distribution chains. Most of the geography of freight at this scale is derived from strategic considerations where issues such as production and subcontracting planning and the choice of hubs and routes are considered for implementing global supply chains. Locally, many activities concerned with freight distribution have been modified with new transport terminals and distribution centres in response to growing consumption as well as from the imperatives of fragmented supply chains. From their traditional location around central areas with prevalent port and rail linkages, transport terminals and distribution centres have shifted to peripheral locations where road and airport linkages are more prevalent. The geography of freight at this scale is mainly derived from operational considerations aimed at servicing the requirements of local distribution with well-known strategies such as just-in-time and door-to-door. This paper is concerned about the intermediate, or regional, scale of freight transportation with a specific emphasis on one of the largest urban region in the world; the Boston–Washington corridor (Bostwash). Transport corridors and urban regions represent the geographical scale of freight distribution where global and local distribution systems interact. They are the dominant spheres of production and consumption of freight distribution. Conceptual and empirical evidence to analyse the relationships between the geography of transport terminals, regional freight distribution and urban corridors is provided.

Key words: Freight transportation, transport corridors, mega-urban regions, logistics, BosWash/BostWash

INTRODUCTION
The scale and scope of urbanisation attained a new dimension with globalisation, and the associated economic and technical changes (Hall 1995). One particular outcome has been the regionalisation of urbanisation where urban regions are forming an extended but cohesive territory, creating a new transactional and circulation space. A commonality of many urban regions is their orientation and development along corridors where transport, economic and demographic processes are linearly articulated. Corridors tend to offer better accessibility and connectivity and have consequently shaped urbanisation in many parts of the world. The
emergence of urban corridors began to be acknowledged in the 1950s as they appeared in the developed world, namely in North America (Gottmann 1961, 1987), Western Europe and Japan (UNCRD 1973). More recently, corridors of urbanisation (or mega-urban regions) have emerged in the developing world, particularly in Pacific Asia (Lo and Yeung 1996).

The issue of transportation remains fundamental to understand urban corridors. However, there has been a bias in the investigation of the relationships between transportation, urbanisation and the associated spatial structures, specifically concerning the scale and modes. While there has been an extensive literature relating to intra-urban transportation (e.g. Hanson 1995), interregional urban transportation has received less attention (Rimmer 1996). Most of these approaches focused on passenger transportation and mobility issues by analysing a geography of circulation, but little has been done in regards of freight distribution. The role of freight transportation in the geography of production, consumption and distribution of urban areas has been overlooked (Hesse and Rodrigue 2004).

This bias has to be considered within the context where fundamental structural changes within urban regions at the global, regional and local scales affect the geography of freight distribution:

- Globally, a complex network of gateways are interacting in a system of flows of people, freight and information composing spheres of production, consumption and circulation (van Klink and van den Berg 1998). Distribution networks have expanded, namely through the division of production, manufacturing and consumption. This has been accompanied by a growth of the quantity of freight being shipped as well as by more complex supply and distribution chains. Most of the geography of freight at this scale is derived from strategic considerations where issues such as production and subcontracting planning and the choice of hubs and routes are considered for implementing global supply chains.
- Locally/externally, the urban structure has evolved from a nodal single centre structure to a multi-nodal one, with suburbanisation being the dominant paradigm. Additional demands for space and lower locational costs have been leading forces behind this process. Many activities concerned with freight distribution have been modified with the construction of new transport terminals and distribution centres in response to growing space consumption as well as from the imperatives of fragmented supply chains. From their traditional location around central areas with prevalent port and rail linkages, transport terminals and distribution centres have shifted to peripheral locations where road and airport linkages are more predominant.

- Regionally, a division of economic activities regulated by hubs, major distribution centres around which transportation converges is occurring. The prevailing spatial structure of regional accumulation and distribution is thus articulated by a corridor of major urban centres. Transport corridors and urban regions represent the scale in the geography of freight distribution where global and local distribution systems interact.

It is thus argued that freight corridors are the dominant convergence paradigm of urbanisation integrating global, regional and local transportation and economic processes in a geography of distribution. The role and function of freight distribution in mega-urban regions will be investigated both from a conceptual and empirical perspective. It mainly focuses upon the case of the Boston – Washington corridor (BostWash) which has experienced significant changes over the last 25 years with globalisation and the associated restructuring of the US economy. First, an overview of the geographical theory about corridors is undertaken, underlining the current paradigm leaning on distribution. Second, conceptual relationships between freight and mega-urban regions are provided, notably over the functions of articulation and freight distribution. Third, empirical evidence is derived from an overview of regional freight transportation along the BostWash corridor. Freight distribution along the corridor is facing an increasingly congested transport system and strategies to mitigate regional freight distribution with the imperatives of modern logistics are being discussed.
URBANISATION AND TRANSPORT CORRIDORS

Corridors of urbanisation – Corridors, as an accumulation of flows and infrastructures, are dynamic entities linked with economic, infrastructural and technological processes. When these processes involve urban development, urbanisation corridors are a system of cities oriented along an axis, commonly fluvial or a coastline. Historically, urbanisation was mainly a factor of agricultural productivity and of the communication capacities offered by fluvial and coastal maritime transportation (van der Woude et al. 1990). Many urban regions share this historical commonality. The geographical scale of the processes shaping urbanisation has however changed. Out of the traditional consideration where urbanisation is the outcome of socio-economic processes occurring nationally, integration to global economic processes are among the strongest forces shaping contemporary urbanisation. Three dominant paradigms of geographical theory can be considered to relate urbanisation, transportation and corridors (Figure 1).

The urban-system and 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/order of services and functions and the corridor a structure organising interactions within this hierarchy. Transport costs are considered a dominant factor in the organisation of the spatial structure as the hinterland of each centre is the outcome of the consumers’ ability to access its range of goods and services (Berry 1967). Because of higher levels of accessibility along the corridor, market areas are smaller and the extent of goods and services being offered are broader (Figure 1A).

The specialisation and interdependency paradigm considers that some cities can have a level of interaction and that transportation could be more than a factor of market accessibility, but

Figure 1. Paradigms in the representation of transport corridors.
also of regional specialisation and of comparative advantages (Pred 1977). 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 specialised and interdependent. Most of this interdependence initially took place at the regional level as the mega-urban region is a more comprehensive system of production and consumption than the sum of its parts. The main assumption is that the accessibility provided by the corridor reinforces territorial specialisation and interdependency along its main axis, and consequently the reliance on a regional transport system (Figure 1B).

The two representations previously discussed are inadequate to explain the growing links between the regionalism of urban corridors and the global processes of trade, investments and specifically the integration of global and regional distribution systems. The current distribution paradigm is thus one where a global city, commonly the major articulation point of a mega-urban region, serves as the main interface between global, national and regional systems of accumulation and distribution. Under such a paradigm, three core structural elements are defining an urban corridor:

- Articulations points where the regulation of freight distribution is taking place through terminals and distribution centres. They provide an interface between global and regional flows.
- Freight corridors with a linear accumulation of transport infrastructures servicing a set of articulation points. They provide for the physical capacity of distribution.
- Freight distribution illustrating flows, their spatial structure and the underlying spheres of production, circulation and consumption.

These elements place the emphasis on the intermodal capacity of hub centres having an interface with multimodal transportation systems as well as with the logistical management of this complex distribution system where the local is integrated with the global. The corridor is then a sequence of distribution activities supporting a vast array of functions within the urban region; a logistically integrated axis (Figure 1C).

Globalisation, transportation and mega-urban regions – Mega-urban regions are the main recipients of global spatial accumulation since they are the spatial structures the most integrated to its forces. The international transportation system both adapted to and shaped the international division of production. A new transactional environment has emerged along with a new sphere of distribution regulated by major gateways. Each articulation point must develop an efficient regional transportation network to coordinate and transit the production and consumption of a vast territory and maintain or increase its importance at a global scale. Intermodal transportation has been a dominant factor of change in international and regional freight transportation with improved efficiency in distribution (Slack 1998; Rodrigue 1999; DeWitt and Clinger 2001). If an articulation point has efficient intermodal infrastructures, it could strengthen its position within the global economy. Such a hub is a point of origin, destination and transit of large quantities of freight, people and information.

Urban regions, as functional entities, account for a dominant share of global trade flows. The increased levels of interdependency are concomitant with the growing fragmentation and specialisation of production, distribution and consumption. However, this process is far from being uniform as mega-urban regions have adapted differently, depending upon which function they dominantly fulfil, their respective comparative advantages and the distribution systems they have access to. They are an expression of global market forces, industrial relocation and comparative advantages in production and distribution, enabling regional differentiations and interdependencies. This implies that mega-urban regions are structurally and operationally similar, but since they have different spheres of production and consumption, they have specific geographies of distribution. For instance, while mega-urban regions in East and Southeast Asia provide significant production and export functions going through major hubs (Hong Kong, Singapore, Shanghai, Kaohsiung...
and Pusan), mega-urban regions in developed countries have expanded their import and consumption functions. The result has been a growing circulation of freight between and within mega-urban regions.

**FREIGHT AND MEGA-URBAN REGIONS**

Most freight flows are a consequence of global and regional economic activities. Mega-urban regions are dominantly structural and functional entities since they do not fall into any specific jurisdiction and are rarely recognised as such. Since its inception, the concept of mega-urban regions has been subject to many nuances concerning its geographical extent. They have proved to be geographically difficult to define formally and to analyse comprehensively. If an urban area can be partially defined by the commuting field of its residents, where internal flows of passengers are more significant than external flows, the dynamics of a mega-urban region can reside on movements of freight.

As a space of flows, mega-urban regions have dominantly been considered in terms of flows of people – they are after all large concentrations of populations. While passenger flows are derived from economic and social interactions, which have a tendency to be skewed by many factors, freight flows are dominantly derived not only from the location of production and consumption activities, but from the complex web of intermediate activities, such as warehousing and transshipment. Combined, they form a regional transactional space in which many actors in the supply chain, from producers to consumers, interact. The relationships between freight and mega-urban regions can be better understood through the concepts of articulation points, corridors and distribution centres.

**Articulation points** – An articulation point is a location that promotes the continuity of circulation in a transportation system servicing a supply chain. It is the interface between different spatial systems; a gateway between spheres of production and consumption. It also expands the hub concept as it includes the consideration of terminal facilities, but also the numerous activities linked with freight circulation such as distribution centres, warehouses and finance. These separate but closely integrated activities, along with the terminals they are linked to, form an agglomeration of distribution. Conventionally, geographical factors linked to the site and situation of ‘hard’ terminals (especially for maritime terminals) were bounded with the location of articulation points. Around these facilities agglomerated many freight handling and distribution activities. The emergence of intermodal transportation systems reinforces articulation points 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 centres have relocated even further away.

The importance of an articulation point is measured by the volume and the nature of the traffic it handles at its terminals and the geographical extent of the distribution system it provides. For instance, an international articulation point handles a substantial amount of maritime, land and air traffic and has a hinterland that encompasses several regional articulation points. A regional articulation point will handle traffic mostly related to land transportation and will be characterised by a smaller hinterland. Functionally, an articulation point is a concrete geographical node within a wide variety of supply chains. It involves a concentration of many transport terminals, with each hub servicing its respective distribution system. The hierarchy and sequence of freight distribution will thus be reflected in the hierarchy and sequence of articulation points.

Three dominant functions of freight circulation can be assumed by articulation points, each deriving added value (Figure 2):

- **Freight Transshipment (A).** Involves a set of intermodal activities transshipping freight from one mode to the other. Dominant articulation points handle substantial amounts of freight through their transport terminals. This function is particularly important for gateways providing an interface between regions and the global economy.
- **Freight Integration (B).** Involves activities related to the logistics of freight circulation, the most common being the composition, warehousing and decomposition of freight shipments. Distribution centres are the
A common expression of this function of articulation (B2), often linked with transshipment activities taking place at major terminals (B1).

- **Freight Convergence (C).** Involves flows of freight bound to another location but going through an articulation point because of its intermediacy. Increased congestion has often made these flows less desirable with modal shift alternatives being considered.

The different scales and functions of articulation are linked with different transport terminals. Major international articulation points are not dissociated from port and airport terminals, while regional articulation points tend to be linked with inland transport terminals along a freight corridor.

**Freight corridors** – A freight corridor is a linear orientation of freight flows supported by an accumulation of transport infrastructures and activities servicing these flows. Flows can be divided by mode and by the infrastructures servicing them. Corridors have become the object of intense modal competition with the growth of movements of passengers and freight. Traditionally, flows in freight corridors tended to be fragmented and segmented since each mode tried to exploit its own advantages in terms of cost, service, reliability and safety. In many cases, transportation on the roads benefited, taking a significant share of regional freight transportation. More recently, as congestion increased along corridors and as productivity and efficiency improvements were sought within supply chains, modal complementarity improved. Corridors represent a setting where integrated transport systems through intermodality are particularly suitable to improve freight mobility (Figure 3).

As either distance or congestion increases, the efficiency of road freight distribution along corridors is challenged. Improvements can be achieved by shifting freight to another mode that is less congested or by using existing modes in a combination where they are respectively the most efficient. The latter opens opportunities of freight diversion where a terminal located along the corridor is used to transfer freight to a mode that lessens congestion inbound or outbound in a metropolitan area. Freight distribution centres are increasingly assuming the articulation of freight distribution in corridors.

**Freight centres and freight distribution** – There is a changing geography of distribution within mega-urban regions as many freight distribution activities are relocated to suburban areas. Conventionally, many transport terminals and distribution centres were located close to central areas mainly as a factor of market and terminal proximity. A new locational dynamic has
emerged with increased economic integration and specialisation, which involved a suburbanisation of distribution centres and terminals. This process is well documented and revolves around factors such as significant land requirements for logistics (namely warehousing and distribution centres), access to road transport systems and regional markets. The corridor significantly expands the sphere of distribution by providing an axis along which distribution centres can reliably service many locations along the corridor. Terminals and freight distribution centres located in suburban locations have a sphere of distribution that includes both the metropolitan area and the urban region (Figure 4).

Consequently, the combination of suburban locations of distribution centres and of a transport corridor creates an expanded sphere of regional freight circulation. This trend has been underlined by the ‘sub-harbourisation’ of many port terminals and the use of satellite terminals to lessen congestion (Slack 1999). Further, terminals located at the periphery of metropolitan areas are able to partake in a process of freight diversion where freight flows are avoiding more congested central areas and using less congested modes such as rail and barges.
The corridors between metropolitan areas are thus prone to the accumulation of a variety of intermodal activities and distribution centres.

THE BOSTWASH FREIGHT CORRIDOR

Overview – Many terms have been used to define the mega-urban region on the Northeastern seaboard of the United States, including the ‘Megalopolis’, ‘BosWash’, the ‘East Coast Metroplex’ or the ‘I-95 Corridor’. They all try to label an extensive urban region where the core commonality is an orientation along a transport corridor, notably an interstate system. This corridor extends along the seaboard and inland, including four major metropolitan areas (Boston, New York, Baltimore, Philadelphia and Washington), with numerous small urban areas with indistinct functional boundaries between them. Overlapping influences of large metropolitan areas, their interrelatedness and their relationships with local, regional and global processes characterises the urban corridor. This regionalisation of urbanisation has been implicitly acknowledged by different levels of government with the consideration of consolidated metropolitan statistical areas (CMSA) and regional planning/coordination agencies focusing on freight transportation.

The BostWash corridor is part of a national system of trade areas where freight distribution is coordinated by major articulation points (Figure 5). Their extent is mainly a function of the average length of domestic truck freight haul, which was around 550 miles in 2000. Like many segments of the US economy and territory, integration processes, namely North American Free Trade Agreement (NAFTA), have impacted on the nature and function of continental production, consumption and distribution (Holmes 2000; Woudsma 1999). About a third of the American trade took place within NAFTA in 2000 (US Department of Commerce 2002).

Land gateways are dominantly servicing an import function, expanded under NAFTA trade, and connected to corridors of continental freight circulation. These include three longitudinal and four latitudinal axes. One such axis, labelled as the NAFTA Corridor, links the two largest land gateways of North America, Detroit, Michigan and Laredo, Texas. It dominantly

\[\text{Figure 5. National trade areas, articulation points and major land freight gateways.}\]
relies upon trucking as about 65 per cent 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 automobile parts produced in Southern Ontario and in the Maquiladoras of Mexico, which are used for low-cost car manufacturing in the Southeast states (McCray 1998; Weiler et al. 2001).

In this system of continental freight circulation, the importance and structure of the BostWash corridor can be preliminary assessed by the size of its market. With a population nearing 75 million, accounting for about 27 per cent of the US population, but occupying only 6.2 per cent of its landmass, the significance of the corridor as a sphere of consumption is undisputable. The New York metropolitan statistical area alone, with its population of 21.2 million, accounts for 7.5 per cent of the national population. High population densities, over 250 persons per square mile, on a conterminous segment of about 400 miles between Boston and Washington are also observed (Figure 6). This concentration of population, facilities and their associated circulation makes the corridor the most congested region in the United States.

The corridor thus represents a significant share of the US economy and generates, attracts and transships a large amount of freight through its infrastructures, distribution centres and terminals. It is caught in a wider context of growth and change within national transportation where since 1970 the number of annual passenger-miles per capita has increased by 58 per cent (from 11,400 to around 18,000) and where the annual tonnes-miles of freight have doubled. This trend in freight circulation is derived from growing consumption by individuals and enterprises and by production systems that are increasingly globally integrated (FHWA-DOT 2001; Lakshmanan and Anderson 2002), which involves:

Figure 6. The BostWash corridor.
- **Changing demand for freight.** Linked to new markets conditions, namely a greater reliance on global supply chains concomitant to a tertiarisation of the US economy as it shifts from manufacturing to services. Since the mid 1970s, the US economy has systematically produced a negative goods trade balance. This is jointly the result of a growth of national consumption, an appreciation of the value of the US dollar making foreign products cheaper, and a shift of labour-intensive manufacturing activities outside the United States. While exports of goods have consistently grown to reach $718.8 billion in 2001, this growth has been outpaced by imports that totalled $1,356.3 billion the same year. Imbalances in freight distribution have thus resulted and impacted on its geography.

- **Changing supply of freight.** Linked to the development of intermodal transportation systems and the integration of freight transport services, namely by third party logistical providers. This goes on par with a higher level of supply chain management.

- **Public policy.** In many cases, public policy has not addressed much freight transportation issues. Overall, there is a variety of converging and diverging policies concerning transportation in general and freight transportation in particular. Such issues involve investment, zoning, security and safety regulation that can impair or improve the efficiency of freight transportation. A major shift has been from a modal to multi-modal surface transportation policy embedded with increased environmental accountability.

**Freight terminals** – Among the vast number of transport terminals located along the BostWash corridor, 13 major airports, 11 major seaports and many other intermodal facilities can be found (Figure 7). Each terminal is an element in the continuity of global, national and regional freight distribution and contributes to the articulation function of their respective metropolitan areas. New York is the traditional gateway of the corridor, a function that has been developed over the last two hundred years, and which has significantly

---

*Figure 7. Major intermodal terminals, BostWash corridor.*
impacted on the structure of the metropolitan area with large port and rail terminals (Chinitz 1960). The development of air transportation and the growing reliance on air freight has added a new terminal dynamics as the corridor’s major airports handled more than 9 million tonnes of landed freight in 2000. The two major airports of the New York metropolitan area alone handled about 28 per cent of this traffic (2.5 million tonnes). Containerised traffic is also an activity relying on a new dynamics of integration between transport terminals and freight distribution systems. As such, maritime container terminals are becoming increasingly linked with inland COFC/TOFC (container on flat car/trailers on flat car) facilities bound to local, regional and national distribution (Figure 7).

From 1991 to 2000, container traffic at the seven major ports (New York/New Jersey, Baltimore, Philadelphia, Wilmington, Boston, Richmond, and Portland) increased from 2.7 million to above four million TEUs. Three quarters of the growth occurred at the Port of New York and New Jersey, which in 2000 handled just over three million TEUs, one million more than just eight years earlier. This growth is jointly the result of regional freight demand and of global distribution chains used by multinational corporations. Although during the 1980s and early 1990s the hubbing role of New York was challenged by traditional rivals such as Baltimore, Philadelphia and Montreal and by new rivals such as Halifax and Hampton Roads, the beginning of the 21st century leaves New York the undisputable maritime container hub of the corridor. This status was confirmed in 1999 when Maersk-Sealand, the world’s largest container shipper, decided to keep New York as their East Coast hub. The growth of containerised traffic for New York/New Jersey during the 1990s topped the combined growth of all its competing ports of the North Atlantic. New York’s hubbing role is one of the most pronounced in the United States, since it received the largest number of containership calls, even if it is the third largest container port. Unlike the Pacific, the Atlantic seaboard has much potential for coastal freight distribution with a number of small and medium-sized ports.

Freight distribution – The BostWash corridor has particularly been impacted by the restructuration of the US economy. For instance, recent trends underline that about 18.3 million Americans worked in manufacturing in 2000, a figure similar to the 1950s. Concomitantly, the workforce in the service sector has grown from 30 million to 107 million. The functions of distribution and consumption have consequently grown much more substantially than production, a trend reflected by a growth in interregional and international freight flows. More than 1.1 million people worked in the logistics and distribution sector in the five largest metropolitan areas of the corridor.

The amount of domestic tonne-miles carried in the United States between 1980 and 2000 has more than doubled for road traffic and more than tripled for air freight. Over 13.6 billion tonnes of freight valued at $9 trillion was carried in the United States in 1998. Of these figures, the BostWash corridor accounted for 3.5 billion tonnes valued at $2.6 trillion; 26 per cent of the carried tonnes and 28 per cent of the value. The nature of freight circulation implies a higher level of flexibility, more frequent deliveries, and greater reliance on trucking. From freight terminals, a large quantity of freight flows through the corridor. Moreover, freight circulation has expanded with the growth of containerised traffic handled at ports, but also from the containerised traffic transshipped at West Coast ports and moved through the continental landbridge to be distributed along the East Coast. Much conventional cargo is also being distributed. In addition, the Baltimore–Philadelphia–New Jersey – New York corridor (Figure 7) serves as major distribution points for high volumes of intermodal rail to truck transfers of domestically produced automobiles (mixing centres) and also for a wide range of bulk products. These goods are moved by rail and then transferred to trucks for regional and local distribution. Regional rail freight handles more than 225 million tonnes of containerised and non-containerised cargo originating or bound to the region. An additional 90 million tonnes is transiting through the region.

Challenges – The development of transport systems in the BostWash corridor has created a strong dependency on trucking for regional freight distribution. With the development of the Interstate highway system in the 1960s and
1970s, growing freight circulation was accommodated by growing road capacities. The growth of one was the rationale behind the growth of the other. The expansion of road infrastructures has however declined substantially in the 1980s and 1990s, leaving the growth of road freight distribution without significant additional capacities. As the road transport system got increasingly congested, including access to major transport terminals, alternatives are sought to improve its capacity. Estimates by the Federal Highway Administration place the growth of freight transportation in the corridor to figures around 75% between 2000 and 2020. In a tightly integrated distribution system, congestion involves delays and a disruption of trade and production. The growing integration between the functions of production and transportation underline this trend. Among the major transport challenges affecting distribution in the corridor are (I-95 Coalition 2001):

- **Road Congestion.** Congestion in the corridor involves many dimensions, ranging from highways, access to terminals and urban circulation. It has traditionally being perceived with the purpose of improving passenger mobility, as investments going to highway development benefited trucking. With the spectacular growth of trucking, congestion is reducing the effectiveness of distribution systems, over which trucking is particularly vulnerable. Each day 38,000 trucks go through the New York–Northern New Jersey region. Of these, 10,000 trucks are using the I-95, accounting between 10 per cent and 20 per cent of all vehicles using this highway segment. As such, trucking may cause between 30 per cent to 40 per cent of all highway congestion. Most of the major highways along the corridor are operating around or above design capacity (Figure 8). Congestion is further exacerbated by the geographical scale of distribution, most of it taking place within the corridor and using its major highways. Until recently, little alternatives to regional distribution outside trucking were being considered.

![Figure 8. Volume to capacity ratio, major highways, BosWash corridor, 1998.](image-url)
Circulation bottlenecks. Freight distribution is currently hitting many road, rail and port bottlenecks raising questions about the capacity of the regional transport system to answer the expected growth of the demand. Urban areas and access to major port, rail and air terminals represent significant bottlenecks impairing trucking. A survey of the Mid-Atlantic rail corridor identified 25 locations having insufficient capacity and 90 locations where vertical clearance cannot accommodate double stacking container rail cars (Cambridge Systematics 2002). Improving flows at critical bottlenecks will require large infrastructure upgrades.

Intermodal capacity. There is a lack of efficient intermodal transfers in the corridor, particularly truck-to-rail transfer facilities (TOFC) and rail integration at port terminals (COFC), notably at the Port of New York and New Jersey. Since 85% of containers bound for the port are carried by 15,000 truck-journeys each day,7 local accessibility to maritime terminals is a fundamental issue. For instance, in 1991 the Port of New York and New Jersey inaugurated a direct ship-to-rail and rail-to-ship transshipment facility, a function which grew at a phenomenal rate from 43,000 containers handled in 1992 to 228,000 in 2002. It is expected that by 2010, intermodal rail share would climb to between 25 per cent–30 per cent of transshipped containers, resulting in improved economic and environmental benefits for the locality (NYMTC 2001). Inland rail terminals could consequently act as satellite terminals and permit freight circulation to avoid the congested road system of the metropolitan area, especially near port terminal facilities.

Modal shift. A shift of road freight to other modes remains one of the most important challenges for the corridor. Attempts at separating freight and passenger circulation are likely to improve the performance of both systems. Intermodal transportation is changing the dynamics of regional transportation from a situation of modal competition to the development of modal complementarity. For container transportation, a higher usage of rail and barges for regional circulation could also significantly alleviate the road system, especially over local access to large terminals. Since the corridor is oriented along a coastline, the development of a regional system of maritime distribution servicing the existing international system could provide substantial benefits. The importance of air transportation for regional short distance movements has also created an unsustainable situation. For instance, 40 per cent of all the flights from Logan airport (Boston) are bound for New York, only 200 miles away. The development of a more efficient and possibly high speed rail service would free much needed airport capacity in the corridor, capacity that could easily accommodate the growth of air freight.

Freight diversion. The development of inland terminals, a strategy pursued by many freight forwarders and port authorities, is creating a process of freight diversion. The port inland distribution network (PIDN) developed by the Port Authority of New York and New Jersey and the Virginia inland port are two notable example of this strategy. Through the usage of inland rail and barge terminals, a freight diversion effect would prevent trucks entering the congested metropolitan areas and enable the respective ports to capture a wider market area (PANYNJ 2003). A process of ‘sub-harbourisation’ is well under way.

CONCLUSION

Urbanisation, as a regional process, resulted in spatial structures that are inherently complex and in which flows of people and freight require a high level of regulation. In many urban regions, corridors represent a paradigm of urbanisation over which it has been argued that freight distribution offers a perspective to understand their dynamics. They are serviced by complex freight distribution systems, linking global, national and regional distribution systems. Mega-urban regions, as logistically integrated entities, have adapted differently to a changing geography of production, consumption and distribution, as they are the main structures behind the international division of labour and production. This integration is supported by articulation points where an accumulation and a concentration of terminals, distribution centres and related activities
coordinate local, regional and global freight distribution. Concomitantly to the specialisation and fragmentation of production, a specialisation of distribution is taking place.

Being one of the world’s leading urban regions, BostWash has experienced a qualitative and quantitative shift in its distribution. First, the corridor is imbedded in a system of national corridors of freight circulation that have expanded since NAFTA was established. Second, while regional freight movements are increasingly been linked with a growth of consumption, transport terminals have adapted to globally oriented supply chains, where inbound traffic far exceeds outbound traffic. Many distribution centres have been sub-urbanised to answer the requirements of additional space, to satisfy a dependence on trucking and to access the regional market in a timely fashion. A notable concentration of terminals and distribution centres has taken place along the Baltimore–Philadelphia–New Jersey–New York axis to offer a corridor-wide level of freight distribution. In turn, this has exacerbated congestion along major highway axis and next to major intermodal terminals. Among many of the strategies implemented to address the corridor-wide challenges of freight distribution, a process of ‘sub-harbourisation’ is taking place within the corridor in addition to a modal shift from road to rail. How well these regional challenges will be addressed is of strategic importance to insure that present and future distributional needs of BostWash remains to be answered. The issue of freight corridors, logistics and distribution certainly deserves further investigations.

Notes

1. The author would like to thank Brian Slack for useful comments.
2. We prefer to use the term ‘BostWash’ instead of ‘BosWash’, as initially introduced by Gottmann (1961). Although it is less phonetically elegant, it provides a clearer reference to Boston and a better indication that it is a neologism.
3. The number of the interstate highway at the core of the corridor.
4. CMSAs are composed of two or more adjoining metropolitan areas which have demonstrated some economic linkage.
5. The I-95 Corridor Coalition, initiated in 1993, is an attempt to manage this entity by forming a regional partnership of major public and private transportation agencies, toll authorities and industry associations serving the Northeastern part of the United States from Maine to Virginia. It tries to offer a multi-jurisdictional approach to transportation issues covering multiple states. <http://www.i95coalition.org>
6. A sub-corridor that can be labelled as ‘intermodal alley’.
7. The national average is 44%.

REFERENCES


I-95 Corridor Coalition (2001), Intermodal Strategic Plan. <http://www.i95coalition.org/>


Port Authority of New York and New Jersey (2003), *PortViews* 2, pp. 1, 7.


© 2004 by the Royal Dutch Geographical Society KNAG