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Managing Rail Expansion and Congestion in North American Freight Transportation: The Thruport Concept

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Editor's Note

This paper examines the critical issue in North American freight transportation of increasing congestion at key hubs. It offers a suggestion for alleviating some congestion arising from inter- and intra-modal transfers of containers. This is particularly important for transportation hubs such as Chicago where dramatic increases of goods movement are projected (for example, from Prince Rupert Port and Halifax).

Professor Rodrigue's Working Paper is adapted from a much longer article that will appear in the Journal of Transport Geography. It raises important and controversial issues about enhancing levels of efficiency in moving increasing numbers of containers over longer distances in the North American system.

There is general agreement that we must focus more attention on improving the efficiency of intermodal transfers. And there is agreement as well that transfers within the same mode (what railroads call "interlining") often take place at less than optimal efficiency levels.

Rodrigue argues that because of market fragmentation, new gateways (Canada and Mexico), growth in containerized volume, long distance shipments as well as time reliability issues, it is likely that "transmodal" transfers (transfers within the same mode that require intermodal movements - in this case, containers trucked from one rail location to another) will increase. He suggests that the creation of rail "Thruports" will be required to facilitate the seamless transfer of freight by reducing handling and the number of movements required to perform a transmodal container or trailer operation.

This is where differences arise. Some, particularly colleagues in the rail industry, respond that rail Thruports are not required, except perhaps in the Chicago area, given the interlining capabilities of rail companies today. Moreover, the concept of transferring containers between the rail flat cars of two interlining railroads, rather than the simple exchange of the rail flat cars themselves, seems likely to increase handling costs. They doubt that the concept would become a market reality.

The Transportation Research Council’s review of recent research on North American transportation infrastructure (Working Paper 3) found that the JIT –lean inventory advanced manufacturing system developed since the 1970s that enables North America to compete successfully with Asian and European manufacturers is now reaching its capacity limits. The supporting transportation infrastructure is now inadequate to handle the projected volume growth of North American supply chains freight flows. Longer term: the system is incapable of improving without substantial changes in governance. Professor Rodrigue’s paper is an important response to this emerging critical situation.

Stephen Blank

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Introduction

The growth of international trade and the global extension of supply chains have put intense pressure on North American inland freight transportation systems, particularly rail. Growing demand has triggered a surge in rail transport and new conditions make rail increasingly flexible and time responsive, or at least sensitive to those issues.

Rail productivity increased notably following deregulation in the early 1980s. Mergers and acquisitions of North American rail networks enabled large carriers to manage their systems more effectively. For instance, rates declined by about 35% between 1980 and 2000 and fuel efficiency increased by 62% (AAR, 2005). In addition, the North American rail transport system has undergone major transformations which have promoted its efficiency. These include adding track capacity, coping with commuter rail services, improving terminal operations and interlining.

Meanwhile, road transport costs are increasing, mainly due to higher wages, labor shortages, insurance costs, energy costs and congestion. In North America, rail is 4.3 times more energy efficient (455 ton-miles per gallon), has 4.7 times the capacity (216 million tons per mainline per year) and is 1.8 times less costly (2.7 cents per ton-mile) than trucking (Brown and Hatch, 2002). Large volumes of containerized traffic handled at gateways create capacity constraints for the trucking industry. Accessing major port terminals is a challenge because of congestion; in many cases more truck traffic is simply not an option. Intermodal rail thus offers an opportunity to ship freight in and out of major port facilities to inland distribution centers.

In North America, the resurgence of rail has resulted in a growth of ton-miles, favoring the intrinsic advantages of rail as a long distance freight carrier (Figure 1).

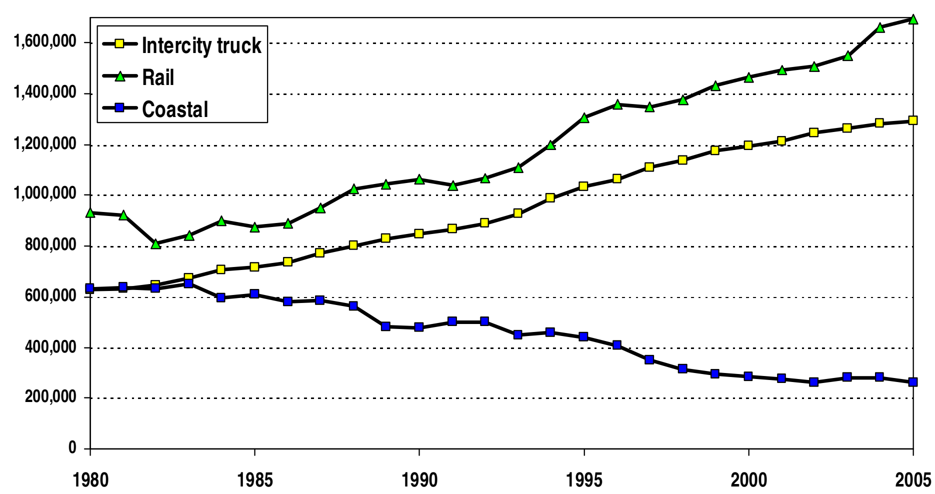

Figure 1: Ton-Miles of Transported Freight, United States, 1980-2005 (millions)
Source: Bureau of Transport Statistics

There is widespread recognition that rail freight is critical and rail transport systems are widely expected to accommodate growing inland freight volumes that road transport systems cannot handle effectively. It remains a question, however, if these expectations are going to be met in terms of rail capacity and service quality.

Congestion affects inland rail transportation, even with substantial capacity benefits achieved by double stacking and double tracking on several corridors. In fact, additional capacity has almost disappeared from the American rail system. Rail congestion is a particular problem at major hubs such as Chicago which seem to have reached capacity constraints in handling growing quantities of containerized rail freight shipments.

Congestion in major hubs – and particularly in Chicago – is likely to increase given recent developments in Canada. The Western Regional Gateway Initiative, focused on the expansion of Vancouver capacity and the creation of an entirely new deep-water container port at Prince Rupert port, and the parallel Eastern Regional Initiative designed to increase the utilization of Halifax's existing but underused capacity, if successful, will bring a wave of new freight traffic to Chicago from both west and east. Prince Rupert port is scheduled to come online with about 500,000 TEU, rising to as much as 2,000,000 TEU, while plans for Halifax envisage an additional 250,000 TEU – a large share of which will be destined for the US. Similar expansion of US ports would unleash another flood of trains and containers.

While these estimates of increases in freight volumes may be optimistic, it is time to think about how we might cope with new traffic. The purpose of this paper is to examine possible improvements in intermodal rail efficiency – in particular, to discuss the "Thruport concept." The Thruport is viewed as a mean to improve transmodal operations at major bottlenecks, and to help increase the efficiency of movements in the North American freight transportation system. The Working Paper begins by looking at transmodal rail transportation in North America and describes the Thruport concept; it then examines the challenges and benefits of transmodal rail operations in North America, with a particular focus on Chicago. A model of a Thruport terminal is found in the Appendix to the paper.

Transmodal Rail Transportation and the Thruport Concept

Transshipment is vitally important in contemporary freight distribution. Within integrated transport systems, the time component has become increasingly significant, placing pressures on transport systems to maintain and improve the overall velocity of freight circulation. Since modal speed improvements tend to be marginal, it is at the terminal and in transshipment that most of the time and cost savings are achieved (Rodrigue, 1999).

That transshipments are both intermodal and transmodal appears to have been overlooked and requires a distinction. Transshipment not only involves handling movements between modes, but also movements within segments of the same mode. As commodity chains become longer and increasingly complex, pressure increases on the performance of intermodal and transmodal transportation.

Transmodal rail probably represents one of the least investigated segments of transmodal transportation. Most rail systems were built to service specific markets and were heavily regulated. It is only recently that containerization created the need for transmodal functions in rail transport systems, since rail transportation was forced to address a new variety of movements, many of them with international origins or destinations. Initially, rail developed greater intermodal efficiencies with maritime and road transport systems, particularly because this represented new market opportunities. The next step places a greater emphasis on developing transmodal efficiencies within the rail system itself.

The Thruport Concept

The idea of intermodal rail is not new. Efforts were made in the early 20th century to create intermodal services, but failed, given inefficient infrastructure and the lack of common standards among rail lines. With containerization and mechanized intermodal equipment in the 1960s, the emergence of a more efficient rail intermodal system became a reality.

Improvements in the track layout at terminals also helped intermodal operations by having both sides of the track used for loading and unloading operations[1]. In North America, double-stacking railcars were introduced in the 1980s, supporting the creation of high capacity long distance rail corridors or "landbridges".

But the steady growth of containerized rail freight has slowed in the past few years. Rail intermodal container traffic, both ISO (maritime) and domestic, increased by 58% between 1999 and 2005, but the number of trailers carried actually declined by close to 10% during the same time period.

Now that the rail industry has become an intermodal service provider, improving transmodal operations at major bottlenecks is a priority. It is in this context that the Thruport concept takes its shape.

By Thruport, we suggest a seamless transfer of freight by reducing handling and the number of movements required to perform a transmodal container or trailer operation. An analogy can be made with air transport hubs that consolidate and redistribute passenger and freight traffic. Because passengers can "reposition" themselves, it becomes a matter of flight scheduling, take off / landing capacity, gate positioning and baggage handling to insure efficient transmodal operations. Major parcel service operators, following a similar strategy, have also established very efficient transmodal facilities at specific hubs (e.g. Louisville for UPS and Memphis for FedEx).

For any freight distribution activity, there are significant cost savings in reducing handling operations. The problem is the geographical reality of freight distribution. In many freight

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[1] For instance, the UPS Willow Springs facility in Chicago (opened in 1994), which is the largest land transport distribution center in the United States (linked to a BNSF intermodal terminal), has all its tracks on a "two for one" setting. It is the only one in the United States entirely configured as such and is the most efficient terminal with the lowest operating costs and fastest turnaround.

distribution systems, market, supply chain and ownership fragmentation require additional transshipments. When these fragmentations take place over a land transport system where rail transport reaches a high volume, efficient transmodal operations eventually become a requirement.

Rationale for transmodal operations

A Thruport is designed to accommodate fragmented markets and ownership, notably when this fragmentation takes place at a large scale.

Market fragmentation drives transmodal transportation particularly for the retailing stage. Since retailing leans heavily on global production and national distribution, the system depends on gateways forwarding freight along long distance rail corridors. The gateways (usually ports) are limited in number and the markets are extremely diverse. This represents a distributional setting in which the Thruport acts as a hub where the containers are shuffled to their respective unit trains bound to specific markets.

The market needs to be large enough, however, to justify this level of shipments. The efficiency of gateways to accommodate intermodal traffic would thus be linked with the efficiency of the Thruport. In some cases, the efficiency of ports and inland freight transportation can promote imports more than regional manufacturing, especially if the later relies on a different and less efficient distribution channel. In a situation of labor costs differences, this may create a multiplier effect making imports even more advantageous since they would offer cost as well as time benefits. A Thruport can improve the efficiency of long distance distribution by acting as a location where containerized freight can be broken down and re-assembled in batches (unit trains) bound for specific regional markets. In the first case, the volume is sufficient enough to simply be a matter of fragmentation. However, it is more likely that a Thruport would be the assembly and redistribution point of freight coming from several gateways.

Ownership fragmentation is the second driver of transmodal transportation. Each rail system represents substantial capital investments occurring over several decades. Interchange is a major problem among segments controlled by different rail companies, particularly because many networks were built to win 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.

In this context, the Thruport creates multiplier effects. The distribution potential of each operator is expanded because they have better access to their competitors' freight markets, creating a situation of complementarity. 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 why mergers and acquisitions is a more common expansion strategy. Mergers and acquisitions heightened efficiency to the rail system, notably creating more centralized control and reducing duplicated facilities (e.g. maintenance). Only 7 Class 1 carriers remained in the United States as of 2007, down from 39 in 1980 and 71 in 1970. It is unlikely that additional mergers will take place, however, 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. A Thruport would thus be a facility coping with the inefficiencies created by ownership fragmentation.

Operational Considerations

Currently transmodal rail operations rely on two strategies. The first involves trucking containers from one rail terminal to another within the same facility or between nearby facilities. The second strategy is a standard rail interchange ("steel wheel" transmodal operation) that switches railcars between different terminals, often using an intermediate rail service specializing in this task. Neither strategy is very efficient as both involve several stages each linked with additional costs and delays.

A Thruport would reduce the multiple steps in transmodal rail operations to a single one. Gains would be reduced cost and time and less likelihood of damage resulting from fewer handling operations. For instance, a Thruport would eliminate tractor, driver, chassis, and cross-town delivery to terminals.

Rail transmodal operations, particularly in the United States, are complex and time consuming, mainly because the terminals involved are not directly connected because of ownership fragmentation. Typically for transcontinental rail freight, a container has to be unloaded at the terminal of a rail operator to a chassis which is then stored at an outbound yard, waiting to be picked up. Then, after several document verifications, the container is carried across town to the terminal of another rail operator, where it is stored at an inbound yard. The truck that delivered the container often drives back empty. When the outbound unit train is being assembled, the container is picked from the yard, positioned next to the appropriate railcar and then loaded. The time and cost performance of such operations varies since there is a wide variation between peak and non-peak time periods, the amount road congestion between terminals as well as congestion and delays (queues) to access terminals.

The performance of a Thruport facility depends on the gantry crane equipment, its disposition and its level of automation. Discussed here are the operational considerations of the equipment designed by an American intermodal equipment manufacturer[2]. The facility has a design capacity of about 250 container transfers per hour (4,500 for an 18 hour day, considering down time, train switching and labor rotation; 1.64 million per year). This performance is superior to

[2] Mi-Jack, whose primary focus is intermodal, accounts for over 80% of the crane manufacturing market in the United States, and is also involved in the construction and management of rail terminals. Drawing on their experience of operating over 80 rail terminal facilities in the United States, the company is considering the development of the Thruport concept as an alternative solution to the rail capacity problem.

the throughput of a 5,000 TEU containership being handled at an efficient container port (about 130 containers per hour). Thus, the high throughput of the facility would enable the handling of more unit trains. For example, instead of trains entering and leaving intermodal terminals every 10 to 14 hours, having them entering and leaving every 1 to 2 hours is possible[3]. Trucking companies generally have a fleet ratio of six chassis to one truck, which enables enough flexibility to support the requirements of their customers. With a Thruport system, the higher level of containerized cargo and its faster throughput could lower the trailers to trucks ratio significantly, to about three to one. Further, instead of trailers, chassises would be used, reducing purchasing and maintenance costs.

While the array of benefits conferred by a Thruport remains to be fully assessed by additional research and is outside the scope of this paper, several elements can be identified. They include lower shipper costs mainly due to lower transmodal costs, an improvement in the time-wise reliability of rail freight distribution, gains in rail productivity related to a better usage of existing equipment and lower fuel consumption due to less long distance trucking and less cross-town transmodal movements. Other indirect benefits can also be considered, namely reduced congestion related to less truck movements, lower emissions (pollutants and noise) and potentially less road accidents. In addition to the benefits derived from transshipments in terms of time and costs, a Thruport could substitute for a significant amount of truck movements, both at the short and long distance range of the spectrum. For short distance truck movements, the benefits are mainly derived from less container truck chassis and hostlers movements, both within and between terminals. In this context the benefits are the outcome of *derived efficiencies* since the Thruport simply prevents truck movements from taking place and instead provides a transmodal alternative that is cost, energy and time-wise effective.

For long distance trucking, the Thruport is likely to create a *substitution effect* through a modal shift. Because of improved transmodal rail operations rail freight distribution becomes more reliable time-wise, triggering a shift as shippers opt for rail instead of road. The substitution effect is particularly important in the long run because of the compounding effects of congestion and energy consumption. Aside from alleviating tractor trailer related congestion, the Thruport will concomitantly reduce emissions from the combustion of fuels and improve the safety of highway transportation due to fewer trucks in circulation. Modal shift takes place because there is a clear advantage, as perceived by the users of the system, in doing so. As long as the differences remain marginal, users will continue using a distribution system they are familiar with. A more efficient transmodal rail system could help trigger a modal shift in commodity chains through substitution. As such, rail transportation could become more integrated with the time constraints of contemporary supply chains, even permitting the handling of temperature

[3] There are many factors related to this improvement, one being the usage of radars on freight trains to avoid potential collisions. This is particularly important since unit trains would be circulating with a higher frequency.

sensitive products. More reliable transit times, in combination with radio frequency identity devices (RFID) temperature readings, will make this more likely. There is a growing trend to use of RFID technology for temperature readings while in-transit, which improves the confidence of shippers to meet the expectation of their customers. Doing so, the reliability of the service would improve, implying shorter transit times, higher frequencies and better timing as well as the possibility for the customers to track their shipments in terms of their location and, as importantly, their condition.

The Challenges and Benefits of Transmodal Rail Operations in North America

A Continuity Problem

Continuity within the North American rail network is limited because major regional markets are served by different 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[4]. The issue of ownership fragmentation remains particularly important and dictates much of the locational rationale of a Thruport.

Because of the geography of rail ownership, nine major locations may be suitable for 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 major gateways, particularly those of the West Coast.

In the United States, these locations correspond to changes in rail ownership, imposing an interface between different segments of the continental rail network. Chicago, Minneapolis/St. Paul, Kansas City, St. Louis, Memphis and Dallas/Fort Worth are particularly suitable locations since they are interface nodes in the rail system. In Canada, locations correspond to bifurcations between rail freight bound for/coming from Eastern Canada and that bound for/coming from the American market. Each Thruport is positioned to act as a hub, collecting, sorting and redistributing the containerized freight along major rail corridors.

Potential Impact

The first potential impact of a Thruport is system-wide. A few strategically located Thruports could help remove millions of trailers from roads each year. Better service made possible by the Thruport coupled with better tracking and monitoring technology will improve the confidence shippers have about the reliability of the rail distribution system. This is particularly important because shippers' decisions to use a distribution system underline its real potential. Management

[4] For instance, since 2001 BNSF and CSX have built an agreement to have intermodal trains between Los Angeles and Atlanta. In 2006 this agreement was extended to include two trains per day in each direction.

preferences also play a role as expertise was developed to manage flows on the previous distribution system and may be difficult to adapt to the new one. The negotiation of new procedures and contracts are certainly tasks corporations are unwilling to undertake if the benefits are not readily apparent. The fact that the existing mode has a proven reliability, even if costly, will also play in delaying a potential modal shift.

A greater shift from road to rail facilitated by Thruport facilities could thus transform North American freight distribution (see Table 1). Time-wise, transcontinental rail shipments could drop from an average of five days to three days with management strategies able to track the movement of goods for the users. Particularly important for shippers is the standard deviation of transmodal operations' time.

Table 1 Potential Impacts of a Thruport System

	Derived efficiencies	**Substitution effect**
Nature	Transmodal operations	Modal shift to rail
Scale	Micro (metropolitan area; city logistics)	Macro (national; commodity chains)
Thruport effect	Direct (transmodal benefits); less short distance trucking	Indirect (supply chain management); less long distance trucking
Potential modal shift	20-40% (depending on local rail terminal locations and configurations)	10-20% (depending on the level of market, supply chain and ownership fragmentation)
Potential energy savings	25,000 to 50,000 barrels of diesel per year for a large terminal (e.g. Chicago)	60 to 120 million barrels of diesel per year (United States)
Potential time savings	About 1 day (30% to 50%) of transmodal operations (from 1 to 2 days currently); Less uncertainties	About 2 days for landbridge shipments (from 5 days currently, including time savings from derived efficiencies)

In addition to the benefits of reduced time, the time range of freight distribution is reduced accordingly, which implies that its reliability can be improved. For a shipper, a reduction of one day in distribution time is relevant, but if the reduction is not accompanied by a proportional reduction in uncertainty, then the benefits are not substantial. Potential efficiencies in energy consumption are also notable, since intermodal rail is 3 to 5 times more energy efficient than trucking. Depending on the type of rail cars, locomotives, freight rail capacity, and condition of rolling stock, substantial amounts of diesel fuel could be saved.

The improved efficiencies that would result in North American rail freight distribution with more efficient transmodal operations also raise questions about their impacts on the geography of production and distribution. It can be inferred that such as system would jointly be a factor of convergence and divergence. For freight distribution, it would favor a convergence along the major gateways, hubs and corridors. The agglomeration of logistics and distribution activities next to a Thruport facility, in the form of a "freight village", would give them direct access to a continental system of freight distribution. For the geography of production, potential impacts are difficult to assess since globalization has already incurred a major shift in recent decades. However, since transmodal operations result in notable time gains, it is likely to favor a higher level of customization of the output of manufacturing activities and a better synchronization between global production and North American demand.

A significant caveat to a Thruport system concerns the use of direct unit trains that do not require reassembly, particularly in light of the growth of transcontinental rail traffic. This potential is however limited by the capacity of the rail facilities at gateways to assemble such trains. For instance, the capacity of Los Angeles' rail yards, the most important gateway of the West Coast (San Pedro ports; Los Angeles and Long Beach) is very limited for such operations, unless a Thruport facility is established to handle the flows of the Alameda rail corridor[5]. Transloading is increasingly viewed as a strategy to help alleviate the empty container problem (Prince, 2006), but this would require the development on new inland rail terminals with good rail and highway access. In such a setting, the growth of transloading opens additional opportunities for Thruports nearby major port terminals. Thus, two major types of Thruport facilities could emerge, one specializing in transmodal operations (a pure Thruport) and the other supporting transloading (an hybrid Thruport).

The Chicago Nexus

Chicago represents one of the most suitable locations for a Thruport. A very high share of the national containerized rail traffic – more than 13.98 million TEU in 2004 (Rawling, 2006) – transits through the metropolitan area which is a point of convergence of six Class I rail operators.[6] About 70% of the containerized traffic entering Chicago by rail has a final destination that is more than 480 kilometers away, which is indicative of its transmodal importance.

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[5] The Alameda Corridor is a 20-mile-long rail high capacity freight expressway linking the port cluster of Long Beach and Los Angeles to the transcontinental rail terminals near downtown Los Angeles. It was built to provide a better rail access to the port cluster which is the most important in North America both in terms of the volume and value of its containerized traffic. The Alameda Corridor consists in a series of bridges, underpasses, overpasses and street improvements that separate rail freight circulation from local road circulation.

[6] BNSF (Burlington Northern and Santa Fe), CN (Canadian National), CP (Canadian Pacific), CSX Transportation, NS (Norfolk Southern) and UP (Union Pacific).

This gigantic rail hub handles about 1,200 trains hauling 37,500 rail freight cars every day, which is approximately 50% of the American rail freight volume. About 17,200 lifts per day are performed at the rail terminals of the region (6.3 million per year), of these about 7,500 can be considered as transmodal.

In addition, 60% of the traffic is of high-value, underlining the nature of the intermodal traffic handled by long distance rail servicing global commodity chains.

Chicago thus acts as North America's primary consolidation and de-consolidation center; the most important rail chokepoint. To service these transmodal operations, about 4,000 cross-town transfers are made between rail yards each day averaging 40 kilometers each. This accounts for about 130,000 barrels per year in diesel fuel consumption. On average 15,000 daily trucking movements – pick up or deliveries – are performed at the intermodal rail terminals.

The rail terminals handling intermodal lifts within the metropolitan area were built long before containerization. Most are located near the city core, are difficult to access due to local congestion and have limited, if any, room for expansion.

The growth of intermodal rail traffic has induced the construction of new terminal facilities located away from the existing clusters, such a Willow Springs, Joliet and Rochelle (the later is not shown on Figure 2). This emerging configuration exacerbates transmodal cross-town movements since the average distance between terminals in increasing at the same time.

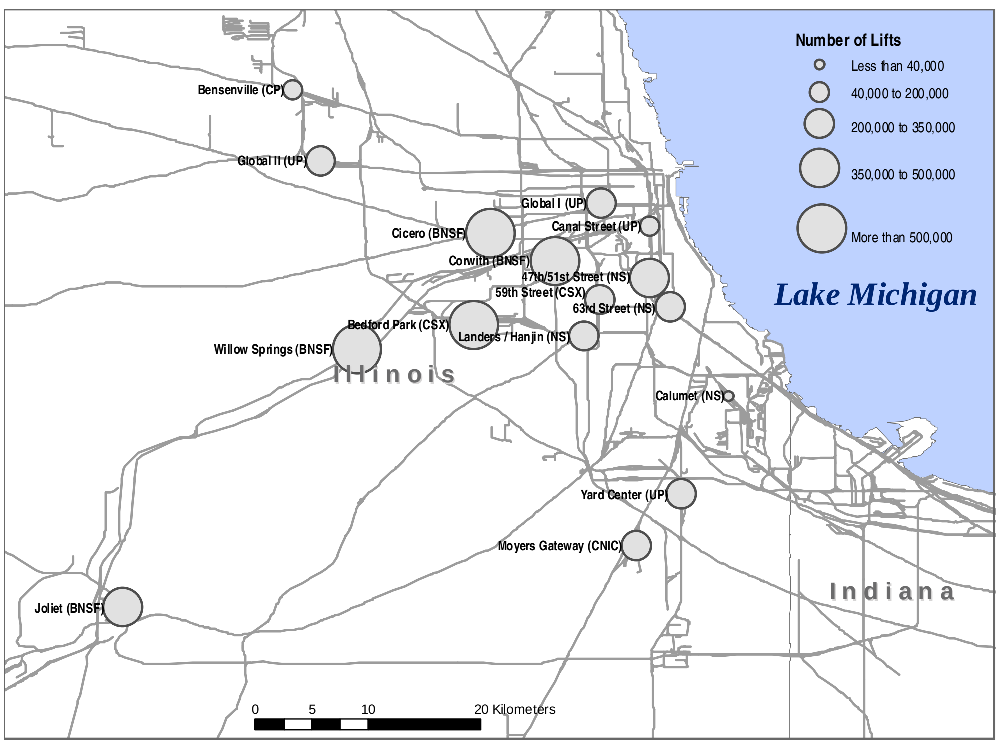

Figure 2: Number of Lifts at Major Intermodal Rail Terminals, Chicago, 2005

Modal issues are top priority in improving rail operations which is fallacious to an extent. For instance, UP and BNSF were completing the double-tracking of their California–Chicago transcontinental rail corridors which are expected to be completed by 2008. Some sections will even be triple-tracked. This added capacity is contrasted with the difficulties faced by transmodal operations in Chicago, which leads to significant inefficiencies such as congestion and delays.

In 2003, a strategy was set forward to improve the efficiency of rail flows in the Chicago metropolitan area. The Chicago Regional Environmental and Transportation Efficiency project (CREATE) calls for the creation of five rail corridors, including one primarily for passenger trains, thus separating the traffic of commuter and freight trains. In addition, rail and road networks will benefit from several new grade separations, eliminating many delays and increasing the operational speed of both systems. Although CREATE is a clear step in the right direction, it does not tackle with the essential issue of transmodal operations.

Finding an appropriate location for a Thruport facility is likely to be one of the most difficult tasks in its implementation since many interests are at stake and a “neutral” location remains elusive. A preliminary analysis of potential locations for a Thruport terminal (Rohter, 2006) identified a few sites corresponding to existing terminal facilities that could be expanded and converted or brown field sites (abandoned steel mills in this case) that have available land and good rail access. Most of the locations are along the Indiana Harbor Belt Railway, the largest switch carrier in the United States. It handles the great majority of the rail interchanges between the major rail carriers connecting to Chicago. A particular advantage of this line resides in its accessibility to all the major transcontinental rail corridors.

Conclusion: 21st Century Rail Freight Distribution and Redistribution

After more than two decades of containerized rail corridors, North American freight distribution is facing acute inland capacity problems at its chokepoints. This situation is exacerbated by the realities of ownership fragmentations of rail networks. Fluvial transportation has a limited capacity to alleviate these chokepoints because of obvious geographical constraints, although some containerized attempts have been made where possible (e.g. New York).

In this context, the Thruport concept can be of strategic importance to mitigate the contemporary challenges in transcontinental freight distribution.

It takes advantage of the strengths and weaknesses of each mode and enables them to service the distribution segments for which they are most suitable. For rail, it offers a higher capacity (particularly with double stacking), is more energy efficient, has fewer emissions, and involves lower labor costs. There are limited alternatives for continental freight distribution in North America.

In trucking, convenience, flexibility and point-to-point services clash with escalating wages and fuel prices, high insurance costs, and the shortage of drivers. A reduction in long distance trucking would go a long way to mitigate the labor issue by using the labor force more locally and more productively.

There is a growing recognition by truck operators that rail is not always a competitor, but can become an efficient partner. Carriers are being increasingly supportive of a higher level of integration with rail. The evolution of logistics has made many of them view themselves as freight transportation companies[7] rather than solely trucking companies. Any infrastructure improvement, whether highway or rail, that promotes their service or lowers their costs (insurance, wages, maintenance and repair of tractor trailers, capital investment, and solve the shortage of drivers) is likely to be accepted.

Under such circumstances, the Thruport represents a unique opportunity to build more efficient intermodal relationships between rail and truck transport systems. As the Thruport reduces interchange activity at the current terminals, the railroads will have more operating real estate in terms of additional capacity to capture additional freight volume. Unlike most major transportation infrastructure projects, the Thruport and the new rail infrastructure has the ability to quickly achieve returns on investments because of efficiencies and cost reductions. This has the potential to attract much needed investments in modal and transmodal rail operations.

It is however from the perspective of commodity chains that benefits can be derived with an increased velocity of the freight, leading to known advantages related with lower levels of inventory and higher turnover.

Better reliability and time performance demanded by contemporary supply chains is an important operational challenge to North American rail transportation. This reality is also facing peak oil and surges in energy costs, challenging logistical practices and freight distribution systems. The higher the energy prices, the more demonstrable are the derived efficiency and substitution effects of a Thruport. A Thruport – particularly at Chicago – would help mitigate this ongoing paradigm shift in freight distribution. Railroad assets would be better utilized, multiplying the productivity of rail operations and conferring a rail freight system better adapted to the requirement of contemporary shipping.

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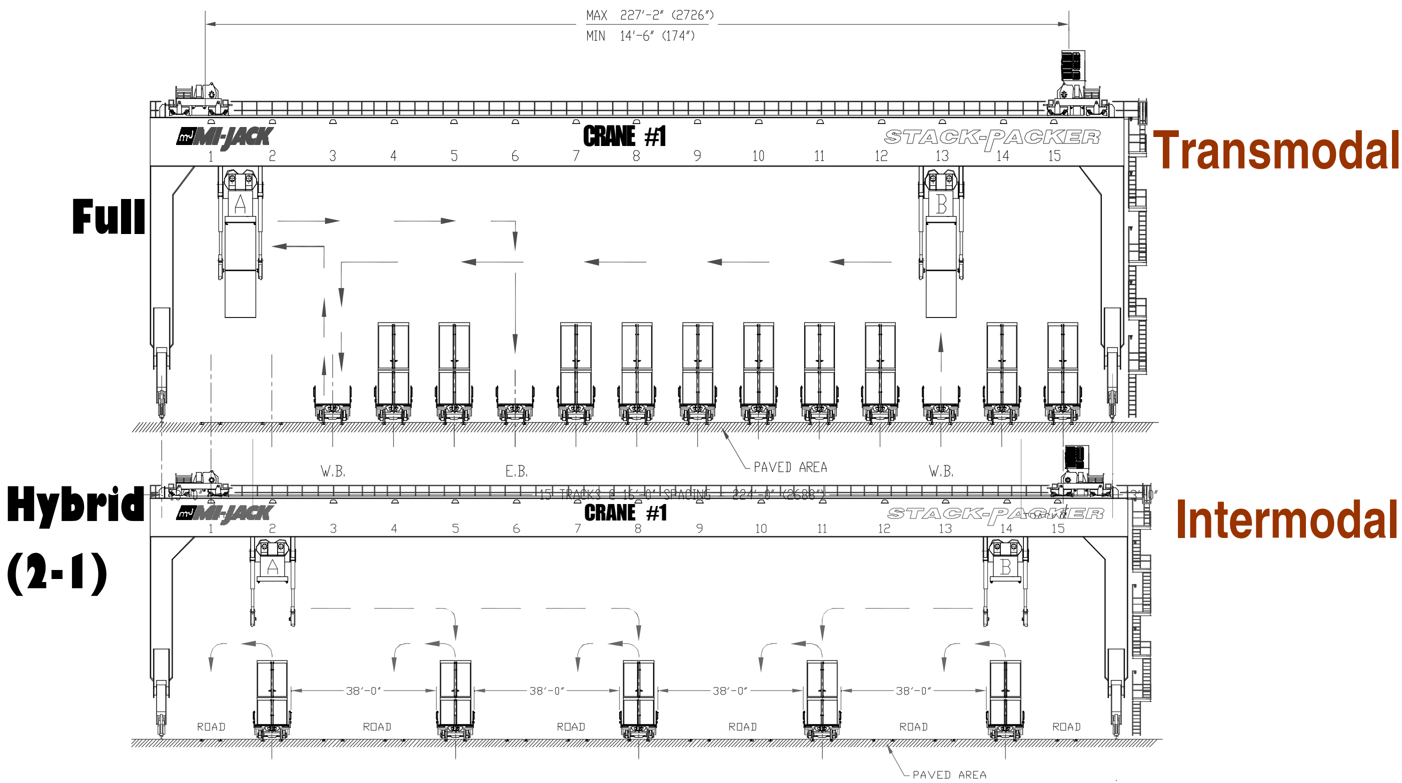
[7] For instance, J.B. Hunt, one of the largest trucking companies in North America, advertises itself as "The Transportation Logistics Company". http://www.jbhunt.com/

Appendix: The ThruPort Terminal

Thruport Terminal: Full and Hybrid Configurations



The main purpose of the "Thruport" is to improve the efficiency of inland intermodal and transmodal rail operations. In either the full (transmodal operations) or hybrid (intermodal operations) design, the objective is to concentrate all terminal activity under the crane. All intermodal rail operations—loading from truck line carrier, unloading to truck line carrier, and transmodal transfers—take place under one large crane that can straddle up to 15 tracks, eliminating drayage, separate storage, and hostlers. For transmodal transfers, there is one step with each lift being a transfer. Rubber tire interchange currently entails 21 phases at Inbound Terminal A, 24 phases at Outbound Terminal B, 10 pieces of equipment (three chassis, two yard tractor, three street tractors, and two overhead cranes), and 9 employees. The ThruPort will require one StackPacker crane and one operator.

The ThruPort crane can lift up to three containers from one corridor doublestack car to a doublestack car on another corridor (e.g., two 20-foot and one 40-foot container without having to unlock and lock the Inter Box Connectors; IBCs). Comparatively, at conventional terminals, this would entail 6 lifts per transfer (3 off and 3 on) and workers to lock/unlock the IBCs, operate the cranes, work the gate and storage yard, and drive the tractors and hostlers.

At its most efficient level of operation, the ThruPort involves one step, where each lift is a transfer. A ThruPort operation essentially eliminates the operation of yard tractors, hostler, and chassis, as well as the cross-town delivery of containers to other freight terminals. Aside from the increase in efficiency, there is far less of a damage risk from the numerous operations a container undergoes. Operating much like an “airport” for freight, the ThruPort is conceived to be a neutral facility where freight is consolidated in a confined area (gated community) for redistribution without ever leaving the terminal. The ThruPort will dramatically improve throughput times for the enormous number of transmodal interchanges currently occurring system wide, and has the potential to decrease dramatically the volume of domestic freight currently using long- haul motor carrier service.

The Hybrid aspect allows access to multiple Class I Railroads for outbound traffic. An hybrid terminal will give shippers far more outbound departure options and direct routes (no rail interchange interruptions). Outbound containers can be loaded directly to corridor assigned trains; consequently, eliminating handling at other local terminals, reducing congestion and lowering operation costs. For motor carriers, manufacturers, and major distribution centers located at the Hybrid ThruPort, the efficiencies will be substantial. For all railroad customers not located at the Hybrid ThruPort, it will provide an additional drop-off option, alleviating congestion at other terminals. System-wide cost reductions should result from decreased handling of freight.

The Hybrid ThruPort will give more “flexibility” to compensate for unforeseen circumstances such as, late inbound arrivals, late outbound departures, derailments, peak volumes of freight, and unanticipated container-to-trailer ratios (likely to vary from 50/50 to 60/40.) It also would free up space at current landlocked intermodal terminals, permitting the railroads to expand their operations to generate additional revenue at their other terminals.

Although ThruPort terminals shared by multiple railroads are optimal in many locations, other locations may warrant different strategies. For example, a single railroad may wish to operate a ThruPort outside of urban areas to service its own corridors.

The advantage of the advanced terminal designs being discussed is that they are the outcome of a major container crane manufacturer and rail terminal operator. There are thus initiatives coming from the industry itself.

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Comments & Reservations

Barry Prentice: The focus on Chicago is appropriate because it is a major bottleneck in the system, but if CREATE were implemented, would the Thruport still be necessary? Moreover, the "neutral" location is not a trivial issue; especially as it relates the flows with and without CREATE. **Response by Jean-Paul Rodrigue**: CREATE is only about a better separation between road and rail; it does not deal with transmodal operations. It could actually make matters worse for transmodal by having more freight trains per day coming in and out of Chicago. Neutral site is indeed quite difficult. A Thruport is thus likely to be the outcome of a joint venture between at least two rail carriers (with one as the leader).

Rob Harrison: This is an interesting idea and I expect that there might be one or two in the next few years. Suggestions for future research: identify data that demonstrate that the interlined containerized commodity flows are of sufficient magnitude to make Thruport trans-loading profitable; examine how capital costs are recovered and who pays the trans-loading fees; review success of the latest terminals which act as large-scale intermodal logistics hubs and seem to be favored by most Class One railroads; and look into operational challenges of synchronizing east and west bound trains (from different companies) so that the cranes perform in the way they are designed

Malcolm Cairns: I must disassociate myself from this report

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The North American Transportation Competitiveness Research Council

Who are we?

In response to mounting concerns about carrying capacity throughout the United States, Mexico, and Canada, we have come together to form the North American Transportation Competitiveness Research Council. The Council is composed of researchers in transportation, logistics, and supply chain management from universities, transportation research institutions, and companies in Canada, Mexico and the United States.

Our initial meetings were organized with the support of authorities in Kansas City and Winnipeg – well-established freight and distribution hubs in their respective regions. However, it has become clear to all of us that the issues must be addressed on a continent-wide basis. Mexico, the U. S., and Canada each have unique needs and capabilities which complement each other. But realizing these synergies requires a continent-wide approach to moving freight within and between these three countries. Many companies have organized trinational production systems whose continued efficiency is threatened by deterioration in infrastructure capacity and network capabilities

What does the Research Council do?

North American companies have spent the last thirty years finding ways to leverage the unique capabilities of the three countries that share the continent. This progress is now threatened by rising congestion at borders, in major cities, and at critical hubs. The Council intends to investigate how to transform the overstressed, disjointed network into an efficient and secure continental freight transportation system that will enhance North American competitiveness in the 21st century.

Trustworthy information, innovative alternatives, and political insights are all critical to enabling the necessary changes to the North American network. The Council will deliver objective information, policy assessments, and options to key stakeholders in industry and government. It will organize projects to educate and train professionals in North American transportation, bringing together planners, civil engineers, users, and operators of the North American transportation systems. Thus we will facilitate collaboration between North American transportation research institutions, transportation industry executives and their customers, and urban region leaders to seek both short term and long term solutions to congestion issues that are facing every freight transport mode serving the North American business community.

Developing an agenda for addressing transportation shortcomings to North American Competitiveness

The members of the Research Council welcome the opportunity to work with transportation industry and government agencies to cooperatively develop an agenda for this purpose and to undertake the necessary research, consultation and evaluation to ensure that North America remains the global leader in transportation productivity and efficiency. We hope to:

Evaluate technological, organizational, and political solutions to port, infrastructure, and modal bottlenecks throughout North America

Determine specific requirements and priorities for infrastructure improvement and expansion to improve North American freight and data connectivity

Lay out options for creating a more efficient and secure North American transportation infrastructure for the 21st century.

The Council's initial output will be briefs on transportation infrastructure competitiveness, relevant policy options, and alternative future scenarios. These briefs will be designed to address the needs of decision makers who have been identified in cooperation with transportation industry and government leaders. The Council believes that it can initially contribute by:

Identifying existing research assets and completed studies that support specific initiatives

Building links among research projects already underway in research centers, industry, and government agencies throughout North America

Locating gaps where new work should be undertaken to address near term choke points in the continental network.

The Council will have an equally important mission to show policy makers the need to configure transportation systems to support the reality of a deeply integrated continental economy. The Council, in cooperation with industry and government leaders, will strive to open points of access into the national policy making processes – through the SPP-North American Competitiveness Council, through elected representatives and through other governmental agencies. The overarching goal is to create a dialogue among transportation industry leaders and experts representing different regional, modal and industry perspectives, a dialogue that will produce recommendations for action and also build a broad constituency to support the implementation of these recommendations.

North American firms have long since understood the need to be globally competitive, and they have made many adjustments to face that reality. However, competitiveness is a moving target, and what served in the past will not assure a bright future. Safeguarding and improving living standards in North America requires the best use of the talents, knowledge, and resources of three major countries working together. These synergies can only be realized if the physical connections throughout the continent are capable of handling an increasing level of commerce. The North American Transportation Competitiveness Research Council is committed to finding and synthesizing the best information available to give policy makers alternatives which address current congestion, capacity, and security issues while showing the best ways to employ North America's formidable resources to enable three major economies to work together and improve opportunities for citizens of all three nations.