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INTERMODAL FREIGHT TRANSPORTATION: THE CANADIAN NATIONAL AND CANADIAN PACIFIC RAILWAY COMPANIES

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Intermodal Freight Transportation:

The Canadian National and Canadian Pacific Railway Companies

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REPORT SUMMARY

Intermodal freight transportation is growing rapidly in both North America and Europe. Canadian railway companies have had to change and to rethink strategies to be market sensitive and to meet the new challenges ahead.

This report takes a look at the development of intermodalism within the Canadian railway companies CN and CP. It examines how it came about, what factors contributed to its growth and what kind of future lies ahead. The report also describes how the railway companies have adapted their operations by purchasing the necessary rolling stock and adopting a customer-oriented marketing strategy. The author also analyses the growth of Canadian and transborder intermodal transportation.

PREFACE

The transfer of freight from one mode of transportation to another is certainly not new; it has been around for thousands of years. However, the phenomenal growth of containerization over the past thirty years has helped to popularize the term "intermodal transportation", defining it as encompassing everything related to freight transport by container or rail-highway trailer.

When did intermodal transport begin? What is its present form? What kind of future does it have? How is it integrated into the operations of Canadian railway companies? This study of intermodal freight transportation within the context of railway transport in Canada deals with these questions.

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The findings, analyses and comments in this document are the author's and do not bind the department.

INTRODUCTION

Contrary to popular impression, the concept of intermodal transportation is not new. The first record of an intermodal vehicle dates back to an 1833 issue of the American Railroad Journal, in which there is a drawing of a locomotive pulling a passenger car and a flatcar carrying stagecoaches full of passengers and cargo-filled farm wagons. In Canada, piggybacking was a popular but, because of an unrealistic rate structure, short-lived service of the Nova Scotia Railway in 1858.

Intermodal freight transportation operations have been going full steam ahead for twenty years now. The message in this development is clear for all carriers, and in particular for railway companies, who have lost their supremacy in freight transport to the trucking industry. Previously limited to providing local transportation, this industry started developing rapidly after the Second World War. High-speed and multi-lane highways mushroomed, trucks became more powerful, and services were more easily adapted to customers' needs. These changes enabled the trucking industry to gradually latch on to markets which used to belong solely to the railway carriers. The 1950 railway strike dealt a severe blow to the rail industry. For the first time, people were realizing how outdated and inadequate this mode of transport was. Unfortunately for the railway industry, people quickly realized that road transport was an extremely satisfactory replacement. All this while, railway companies were so slow in keeping pace with market changes and the competition that their future did not seem promising.

This forced them to abandon old business practices and to quickly adapt to shippers' needs. Innovative marketing and leadership in technology kept them in the running. Intermodal transportation enabled them to win back and keep part of the truck freight transport market. The railway companies feel that a sound intermodal transportation sector strongly contributes to running a modern, efficient and profitable transportation system.

Will the railway industry be able to develop this sector and generate sufficient profits? The future seems promising, and the railway companies are betting on intermodal transportation to shore up their financial position.

1. What is Intermodal Transportation?

If one were to ask people actively involved in intermodal transportation services to explain "intermodal" with regard to the transport of freight, one would undoubtedly obtain many different definitions. Some of those people would say that intermodal transportation means piggybacking, others doublestacking containers, while fans of equipment innovations would speak of rail-highway trailers commonly called "Roadrailers". None of these answers is wrong, but they are only part of the picture and, taken separately, they project an unsatisfactory image of intermodal transportation in the freight transport industry.

In a nutshell, intermodal transportation can be defined as the transport of freight using several modes of transportation in the most efficient manner possible, promoted by marketing strategy tailored to clients' needs.

Intermodal transportation involves moving freight in the most efficient manner possible using several modes of transport. Depending on how it is used, intermodal transport can be a problem, a challenge or a tool. If looked at from the viewpoint of transferring goods between several transportation modes, and the difficulties involved, it is a problem; if storage is to be avoided, it is a challenge; for shippers who have a wide variety of choice of routes, services, and transportation costs which are lower due to less regulation and competition, it is an invaluable tool.

2. Factors Influencing the Development of Intermodal Freight Transportation

2.1 Regulations

The Atlantic and St. Lawrence Railway, founded in 1835, was the first railway company in Canada. The Grand Trunk Railway followed about 1850, and in 1881 Canadian Pacific appeared and built a transcontinental railroad stretching from central Canada to the Pacific. During this period and afterwards, several other companies were formed to complete the railroad network. Today, most of these companies no longer exist and the two main railway carriers are the Canadian Pacific and the Canadian National, with a network some 64 000 km in length.

Until the 1960s, Canadian and American rail transport, considered a monopoly, was highly regulated. Shackled by regulatory chains, Canadian railway companies were unable to react quickly to changes in the transport industry. The situation was to change around the 1950s, when railway companies started to lose ground to road haulers and saw their revenues dwindle to the point where their future was at stake.

The sorely needed reform of Canadian transport regulations started in 1967 with the passage of the National Transportation Act. This Act recognized intermodal transportation for the first time and

- removed the obligation of having rate increases approved;

- permitted more intermodal competition, a more flexible rate schedule enabling railway companies to set their own rates within a reasonable range as defined in the provision on minimum and maximum statutory rates;

- permitted and encouraged the adoption of joint rates by the two Canadian railroads, CN and CP;

- provided compensation for passenger services and for hauling nonprofitable freight maintained in the public interest.

In the United States, railway companies were plagued with the same problem and were pressuring government to change the burdensome, outdated regulations. This led to the passage in 1980 of the Staggers Rail Act. This law went further than the National Transportation Act since it aimed at improving the viability of the railway industry by creating a climate which would help streamline railway routes, improve productivity, and encourage companies to merge by giving them all the leeway they needed to be competitive; it introduced the notion of confidential rates. Railway companies were able to operate in a free enterprise economy and set their rates accordingly.

Competition was becoming increasingly aggressive and neither the railway industry nor shippers considered the proposed changes in the National Transportation Act sufficient or satisfactory. The setting of common rates was perceived by shippers as an impediment to intramodal competition. The prohibition against confidential contracts was not advantageous to shippers and gave American carriers an edge over Canadian railway companies. These factors, and the impact of the Staggers Rail Act in the U.S. led to the 1987 National Transportation Act, which provided many of the long-awaited changes Canadian railway companies had been asking for.

The new 1987 National Transportation Act came into force on January 1, 1988; it affected all modes of transportation, but mainly the railway industry, because of its:

- abolition of common rates;
- introduction of confidential contracts;
- introduction of a more flexible mechanism for settling disputes;
- increase of intramodal competition between the railways;
- simplification of line abandonment.

The most important change introduced by this legislation was certainly the possibility of entering into confidential contracts covering rate structure, conditions of transport and the carrier's obligations.

Our rail operations were starting to resemble those of our neighbours to the south and the climate was becoming increasingly conducive to conducting business more rationally in a market economy. New horizons were opening up which could only be beneficial for innovations in transportation and particularly for intermodal operations.

2.2 The Trucking Industry Takes Off

In intermodal railway circles, competition with the trucking industry is a dominant subject; the railway industry has decided to engage in head-to-head competition with the trucking industry for a share of the traffic that otherwise would be transported by road.

Freight transportation in Canada is a 21-billion-dollar-a-year industry, so even a small piece of the pie would be lucrative. While the trucking industry has two-thirds of this surface transportation market, Canadian railway company intermodal operations have only 2% to 3% of this market. Canadian railway companies hope to be able to increase their share of it, especially since 2% to 3% of intermodal freight transport represents 15% of their revenues.

The trucking industry really started to expand at the beginning of the fifties; with a well-planned, extensive road system and constant technological innovations with regard to road equipment, it has not stopped. Trucks are becoming increasingly powerful and economical, and can carry larger loads with jumbo trailers up to 53 feet long, or long combination vehicles.

The trucking industry has fewer handicaps than the railways. First, many trucks are driven by their owners, willing to put in long hours. Even companies with unionized employees can provide fast, flexible service tailored to the customer's needs. Such flexible service is an undeniable boon to the industry. A trailer can take to the road as soon as it is loaded, whereas a train must run on a fixed schedule. Recent technological innovations such as longer, heavier trailers and better fuel consumption have helped improve productivity in the trucking industry. Truckers have lower overhead costs than railways as they do not have to maintain expensive terminals or rights-of-way.

In Eastern Canada, railways carry a high volume of manufactured goods, food and miscellaneous commodities. These goods must be distributed quickly, so this constitutes a lucrative market for trucking companies. Railway companies have had to devise ways of competing and this search has led them to develop intermodal transportation by investing equally both in equipment and in services.

2.3 Containers

2.3.1. Characteristics

With the sixties, the transportation industry entered a new era. The container symbolizes a flight from the past and is a perfect illustration of intermodality.

Containers are resistant rectangular metal boxes used mainly for carrying general cargo. Containers by themselves are nothing more than giant unwieldy boxes, but in the context of transportation in general, and of the economy, they created the phenomenon of containerization--a new economic force. This developed through the generalized use of containers, and essentially consists of the passing of goods from one mode of transport to another without removing packaging or without fragmented handling. Containers are the cornerstone of the intermodal transportation system which involves several modes of transport; they are the embodiment of

intermodal transportation. Containers were designed to be universal and serve as load units for all means of transport.

In size, most containers comply with the dimensions recommended by the International Organization for Standardization (ISO), being 8 feet high and wide and 20, 30 or 40 feet long; however, a certain percentage of containers do not comply with these requirements. The standardized load unit can be loaded onto a truck, a flatcar, a ship or a large plane. So it should not be long before we have land-sea-air transportation systems. All these means form part of a network which resembles a large conveyor belt. Containers have turned the once fragmented transportation process into a flowing one.

Continuous transport links are time and money savers, and therefore extremely advantageous both to shipowners and to users. Shipowners save a great deal of time: handling operations at the port are faster and ships spend less time tied up in port. Fragmented and slow handling of hundreds of objects is giving way to rapid transloading of containers which are transferred from ship to train in three minutes. According to the Organization for Economic Co-operation and Development, at the Port of New York it takes approximately 600 man-hours to load and unload 10 000 tonnes of containerized goods, compared with 11 000 hours for the same quantity of general cargo. Stowage of heterogeneous and multiform objects is of the past. The use of containers greatly reduces a ship's time in port. A container ship stays two days in port instead of two weeks and can carry more cargo than a general cargo ship. With rotation taking less time, container ships can make more crossings and carry more freight than conventional ships, which means that they bring in more revenue. Over the same year, one container ship can transport the same tonnage as five conventional ships. This means shipowners are getting a better return on their investments.

Users are also saving time and money due to lower costs in handling operations, fewer risks of breakage or rusting, lower protective packaging costs (25% to 50% cheaper), and reduced insurance premiums and harbour dues.

2.3.2 The Impact of Containerization on Port Activities; Example: the Port of Montreal

Not long ago, an event occurred at the Port of Montreal that revolutionized its activity. In 1968, the Port opened the Manchester terminal, Canada's first container terminal. With the dawn of containerization, the port was to broaden its horizons.

The Port's customers were quick to adopt the giant metal box called a container, which provided them with a more economical and safer way of handling general freight. The Port's commitment to containerization also drew new shipping lines to its wharves and established new regular sea links.

Containerization would allow the Port of Montreal more than ever to take advantage of its unique geographical position on the doorstep of North America's industrial heartland and of its intermodal (sea, rail and road) transportation system for serving this vast hinterland, linked to the Old World by the shortest and most direct land-sea route.

These advantages, combined with efficient and competitive services, have rapidly made the Port of Montreal Canada's number one container port and a leader on the North Atlantic route.

2.3.3 Intermodal Characteristics of the Port of Montreal

The Port of Montreal has container facilities; it ensures their maintenance and entrusts operations to specialized firms.

The port has five modern terminals, covering an area of more than 54 hectares, which are equipped with 13 giant gantry cranes,

straddle carriers for year-round handling of containerized cargo. Containers can also be loaded and unloaded at most cargo berths by means of mobile cranes. Special ramps are available for the accommodation of roll-on/roll-off vessels.

The Port of Montreal also operates its own railway terminal and has more than 100 kilometres of tracks with a switching capacity of 1200 cars to and from berths per day.

Both major railway companies, Canadian National and Canadian Pacific, have terminals at the port, giving them direct access to the container facilities. The railways provide Montreal with a direct link to all of Canada and the American Northeast and Midwest.

Montreal is also at the crossroads of a major road system which provides access to all major markets.

2.3.4 Growth in Containerized Traffic at the Port of Montreal from 1968 to 1989

In 1968, the year its first container terminal opened, the Port of Montreal handled 13 798 containers or TEUs (Twenty-foot-Equivalent Units). Ten years later, in 1977, it handled its 1 000 000th, four years later its 2 000 000th, three years later its 3 000 000th and, by the end of 1986, or less than two years after that, its 4 000 000th. In 1987, the number of containers shipped through the port in a single year reached a new peak--574 522 TEUs. In 1989, 522 451 TEUs were handled despite fierce competition on the North Atlantic routes.

The tonnage of containerized cargo has increased by an average of 13.1 percent per year during the last decade. Again in 1987, the port saw its containerized traffic soar from 11.9 percent or approximately 600 000 tonnes to 5.5 million tonnes: its fifth

consecutive record year. Traffic died down slightly in 1989 but 5.4 million tonnes of cargo were handled nonetheless (Appendix 1).

2.3.5 Impact on Equipment and Port Facilities

Containerization, its intermodality and its popularity as an efficient and rapid means of transport have resulted in containerized traffic accounting for a growing proportion of the port's total traffic. Port authorities had to take this factor into account in planning facilities and their design layout for present and future operations. Particular attention was focused on developing container terminals by equipping them with all required loading facilities.

The sustained growth of the Port of Montreal's containerized traffic has changed port operations considerably and made it necessary for the port to continue redesigning facilities to meet its specific needs. In the port's five-year plan for the period from 1988 to 1992, it earmarked 60 million dollars in capital expenditures for container terminals and 20 million dollars for its rail system.

2.3.6 The Role Played by Shipping Lines

Shipping lines have also played a decisive role in intermodal transportation. They were the first to use containers and are increasingly providing door-to-door service. This means that, using the cost of service and quality as their gauge, they can choose which means of transport are to be used from one end of the chain to the other. This spares their customers the bother of having to deal with a myriad of middlemen. Since container transport is a specialized activity, shipping lines have the expertise required for container handling operations and have also invested the capital needed to develop the sector. This, coupled with the quality of service offered by CN and CP, and Montreal's location, has so contributed to the development of intermodal transportation

that some 250 000 TEUs have been transported between Europe and the United States (Midwest and Northeast) via the Port of Montreal.

3. Marketing

Thanks to deregulation, ushered in by the passage of the U.S. Staggers Rail Act in 1980, and of the Canadian 1987 National Transportation Act, Canadian railway companies had no choice but to adapt to the new conditions, changing from common to contract carriers. Although Canadian railway companies still have a common carrier obligation, they have become more market-oriented.

Loosed from the regulatory chains that had bound them for decades, it was now easier for Canadian railway companies to offer their services in a free market economy. With no experience in this new world, they started by cutting prices, but this was not sufficient since all modes of transport were becoming increasingly deregulated and the market more demanding towards carriers. Railways had to respond more to customer needs or be pulled under by the competition.

Railway companies had to tailor their services to customers' needs and to offer a wide variety of services: like supermarkets. Marketing departments had to switch to a marketing structure based on the commodities going into the cars rather than on the cars themselves; sales services had to restructure to reflect the new philosophy.

By endeavouring to find the best possible solution in this new business world, railway companies designed specific load units for intermodal transportation. The industry first concentrated its efforts on three types of equipment: trailers or containers on flatcars, containers on double-stack cars and rail-highway trailers.

However, it was going to take more than new technology to turn intermodal transport into a success. In their zeal to improve ramp-to-ramp service, railways overlooked the customer need for door-to-door service. To make up for this shortcoming, American railway

companies teamed up with middlemen or forwarding agents who play an important role in trying to choose the best deal and the best route for the shipper.

In Canada, although railway companies work with forwarding agents, they directly retail "Plan 2" intermodal services, which comprise the greater part of intermodal transportation. Canadian railway companies offer four types of intermodal service plans.

Plan 1: The railway transports from ramp to ramp; the trailers belong to road transport firms. Carriers pay by the truckload.

Plan 2: The railway establishes the road list and provides door-to-door service from shipper to consignee using its own trailers, containers, flatcars and rate system. The railway also makes pickup and delivery arrangements.

Plan 2½: Similar to Plan 2, except that shippers make pickup and delivery arrangements, or one or the other, under separate provisions.

Plan 3: Railroad transport of shipper-owned trailers from shipper's dock to consignee's dock. Pickup and delivery can be arranged separately.

Canadian rail companies also offer overseas markets transshipment services for intermodal traffic in all major Canadian ports. They use container terminals and trailers in strategic locations and ensure links with most American railway companies.

4. Intermodal Transportation at CN

4.1 Intermodal Organization

The Intermodal organization which falls within CN's rail marketing structure (Appendix 2) has been divided into four main thrusts:

- the North American wholesale group, which deals largely with truckers and pool car operators;

- the distribution group, which deals directly with shippers using CN's own trailers;

- the overseas market group, which deals with import-export carriers as well as U.S. intermodal markets;

- the automotive group, which deals with the movement of automotive parts and finished products to, from and within Canada.

The following two sectors can be added:

- CargoFlo and bulk freight sector: moving of pulverulent substances, bulk liquids and bulk freight;

- intermodal transportation operations and planning sector: planning and follow-up of operations and smooth functioning of data processing systems.

CN operates system-wide through regionally managed staff with overall guidelines from headquarters.

4.2 Beginnings and Development

Contemporary intermodalism began in its present form at CN during the 1950s, after truckers began offering transcontinental services in 1952 as a result of railway labour difficulties. CN began

offering flatcar space to truckers--a wholesale operation that still exists today as Plan 1 intermodal service.

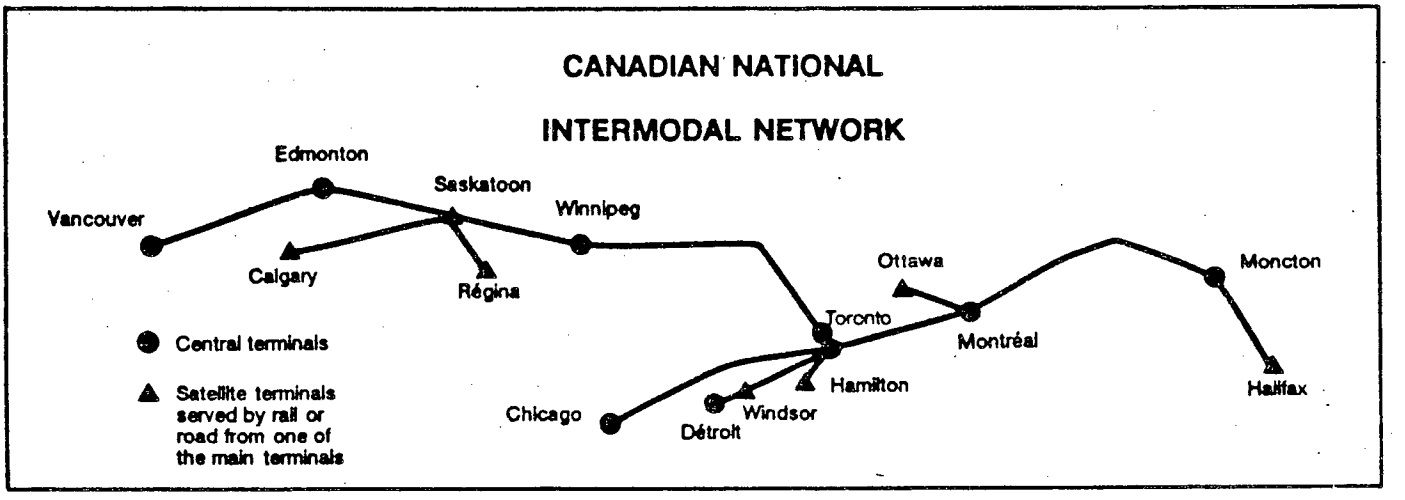
CN started Plan 2 service in 1957. This retail service consists in furnishing the trailer and in addition to carrying the trailer on a flatcar, providing door-to-door pickup and delivery service. For the time being, this is CN's most important intermodal service. CN has since added "Plan 2½" and "Plan 3".

Intermodal service began in the Toronto-Montréal corridor, and expanded into the Maritimes and finally into the West in the mid-sixties. During this period, several ramps for loading and unloading trailers were constructed and CN ended up with some 80 intermodal hubs.

After the mushrooming of these hubs, a reverse phenomenon began in the 1980s because of operations steamlining and increasingly intense competition. CN pared down its facilities and today boasts only seven main central terminals, seven satellite facilities and two border terminals.

4.3 The Intermodal Network

For economies of scale, maximum station through-put is required, so only the main lines could be kept. In addition to cutting costs, this streamlining made it possible to provide better service.



The preceding diagram shows CN's hub terminals in main centres across Canada. This hub-and-spoke system is now well established. The network configuration has a small number of load centres (hubs), each serving a regional market by truck (the spokes). With these centres, each serving a zone 500 km in radius, CN's operations cover almost all of Southern Canada. The central prairie region and Northwestern Ontario, not considered major markets, are served by satellite facilities in Saskatoon, Regina and Thunder Bay. This network is also composed of more than 100 "intermodal points", actually locations where CN offers intermodal service almost exclusively as set down in "Plan 2". These intermodal points allow CN to attract markets which are not on the railroad route.

4.4 Intermodal Services

4.4.1 LASER Trains

In 1982, to obtain maximum use of its flatcars and provide customers with rapid, direct service, CN launched the Montreal-Toronto LASER train, the pride of its intermodal service. The LASER operates something like a subway; it consists of a fixed number of cars that go back and forth whether they are loaded or not. This train is dedicated solely to intermodal traffic, mainly carrying trailers, although it does handle some containers; the equipment can be turned around quickly because it does not have to go through classification yards. In 1985, CN extended the LASER's route to Chicago; in 1986, it set up a LASER route between Moncton and Toronto, and in 1988 a second LASER train was put on this route to meet the marked increase in traffic.

4.4.2 CN's New Destination Train Service

In May 1987, CN tested its new destination train service. This weekly service transports containers from the Port of Vancouver to Toronto and Montréal. This service has shaved at least one day off CN's regular transcontinental link schedules.

The two customers involved in the initial testing were Orient Overseas Container Lines Canada Inc. (OOCL) and Neptune Orient Lines (NOL), both of which bring general merchandise to the Port of Vancouver from Singapore, Hong Kong and Korea. This association was a success: representatives of both companies were enthusiastic about the CN service. The secret behind this success is non-stop service. The train remains intact the entire run, bypassing the Edmonton and Winnipeg yards and pausing only for crew or fuel changes. CN was able to convince its customers to commit sufficient traffic volume to allow it to run trains on a regular weekly basis.

Associations and successes such as these pave the way for interesting prospects in the future and the stakes are high. The most important activity at the Port of Vancouver is the importing from Japanese car manufacturers of ckd's (completely knocked-down vehicles), which are reassembled in Eastern Canada. By providing rapid and reliable service, CN was able to use this train to serve its Japanese customers who had a preference for doublestacking, as offered by American railways, which they believed gave the cargo a smoother, more damage-free ride. Customers were won over by the quality and reliability of the service, since double-stack trains headed for Toronto and the eastern part of the country from the United States have to pass through Chicago whereas those from Vancouver are direct and do not require any additional handling. This certainly makes a difference when parts or other fragile goods are being transported.

This service has made it possible for shipping lines to extend their market into the East and to keep their customers. This train gives them a broad edge over their competitors, who ship goods from the East on double-stack trains out of Seattle. These trains make some stops in the States before coming into Canada, thus prolonging the trip, whereas the destination train does not stop in the United States and takes only five days to complete the route.

However, this service was dropped at the end of 1989, since the cargo volume did not justify maintaining such a run and the potential savings in costs was no guarantee that shipping lines would remain loyal to the railways.

4.4.3 Double-stack Service

Subsequent to its announcement in November 1988, CN launched a Vancouver-Toronto double-stack service in February 1989 and plans to launch a similar operation between Halifax and central Canada in 1990.

Several reasons propelled CN to offer this type of service. Following several feasibility studies, it was felt within the organization that the service could be viable despite a few technical difficulties caused by the railway infrastructure, which was not designed to carry containers higher than 8'6", and the fact that the Canadian market does not have the same potential as the American market. The Port of Vancouver was pressuring CN to start this kind of service because of increased container volume and requests from shipping lines to this effect. Faced with competition from West Coast U.S. ports and afraid of losing its customers, the Port of Vancouver had no choice but to keep after railway companies to offer the service. Besides, it would be an interesting experiment to follow the example of American railway companies, which have been offering this service for several years now, and to see if Canada could reap the same benefits.

Double-stack container trains have been used in the United States since 1981 and this trend has become so popular that there are currently about 100 such trains running from the American West Coast to the Midwest and the East Coast. Although CN was not entirely convinced of the profitability of such service when it made its decision to offer it, these factors made it take the plunge. The service was not as successful as had been hoped and was discontinued in the fall of that year--the experiment had proved

that the operation could not turn a profit with the capital investments required and in the context of the Canadian market.

The Port of Halifax also requested CN to set up a double-stack container service, for the same reasons as the Port of Vancouver. In 1988, container traffic at the Port of Halifax increased by 26.7% compared to the previous year. Despite this fact, and despite the findings of a feasibility study conducted by the transportation consulting firm Temple, Barker and Sloane Inc. which confirmed that shipping lines want such a service and that the volume and the savings would justify such a service, CN has decided not to invest in such a venture, because the required investments would not bring in sufficient profits. According to CN, even though it admits that volume is high, a double-stack service would not be justified because of some of the aspects of port traffic--heavy merchandise, high volume of 20-ft. containers, relatively low volume of traffic furnished by shipping lines.

CN's attitude is especially understandable since CN currently has four trains on the daily Halifax-Montreal and Halifax-Toronto runs and would prefer to wait, and watch market trends. Nevertheless, CN is ready to set up such a service if shipping lines guarantee sufficient volume and provide the rolling stock. It is keeping doublestacking on the back burner and plans to go ahead with it once the conditions are right and a profit can be made, since no problems were experienced during the required trial runs on the route.

4.4.4 CN Intermodal Traffic

Generally speaking, trailers and containers carry different types of cargo. Most transportation by trailer is done within Canada, whereas container transport is far more international in scope. A matter of two different markets.

CN has chosen to use trailers for its domestic services, concentrated in the East in the Moncton-Montreal-Toronto-Chicago corridor, and in the West on the Montreal-Toronto-Edmonton and Vancouver route. These services are in direct competition with trucking and CN must constantly guard against losing its customers in a fairly volatile market. Prices, schedules and delivery deadlines all affect piggyback service. The matter is one of anticipating problems before they arise, of refining solutions, of adjusting prices and schedules, of reducing waiting times and of providing customers with a service tailored to their needs.

In recent years, to meet these challenges, the intermodal hubs at Moncton, Toronto, Winnipeg and Edmonton were expanded, renovated and equipped with new container and trailer handling facilities. Twenty million dollars was poured into Montreal's new Monterm terminal for work done in 1986 and 1987, mainly to increase the capacity of the container facilities, to modernize methods of handling trailers and to obtain higher productivity through better integration of all intermodal activities. The most impressive changes were in trailer handling operations. Lanes were set up alongside tracks to facilitate circulation of 21-metre-high gantry cranes able to lift and move containers or trailers to be loaded onto or unloaded from trains.

CN's containerized traffic service, excluding that from Newfoundland which is a domestic container transport service, is primarily for export or import. Containers belonging to shipping lines such as ACL, ZIM, HAPAG, LLOYD and OOCL are loaded at CN's harbour facilities at Halifax and forwarded directly to Montreal or Toronto. Although the Port of Halifax's containerized traffic is currently on the increase, there are always risks involved in containerized traffic--shipper mergers, a shipping line's decision to stop coming to the Port or its itinerary change could adversely affect CN's containerized traffic. The opposite is also true. A shift from eastern to western ports will have positive effects for its containerized traffic. It is estimated that a growing

proportion of containerized traffic will pass through Vancouver; this indicates higher revenues for CN since the distance by rail is longer. CN will have to be ready for these rapid changes and be able to adapt quickly.

4.4.5 CN's Future

In 1986, CN's objective was to increase its proportion of intermodal traffic from 10% to 15% by 1990. Using a market-oriented approach, CN planned to improve its performance in this sector by increasing productivity and reducing operating costs by optimizing use of its rolling stock, modernizing radio communications and making appropriate investments. This actually translated into 250 million dollars' worth of investment during the 1986-1990 period and into a continuous search for new avenues. Innovation and flexibility were the order of the day.

The direction taken by the intermodal system reflects this well: polyvalent intermodal terminals, increased use of LASER-type trains and polyvalent cars, all were in CN's future plans. CN announced that it was introducing a new domestic double-stack service linking Moncton and Toronto. Early in 1990, the intermodal service had started to receive its first hundred new generation cars. Each car comprises five articulated platforms capable of carrying either a domestic double-stack container 14.6 metres in length (48 feet) or a road trailer up to 16 metres (53 feet) in length, or both.

This new double stack service would lower operating costs and make it possible to offer the same service as the railway's main competitor in this area: the trucking industry. CN forecasts that, by 1995, its domestic distribution service will be mainly carried out by container. This conversion, while breaking with tradition, does not necessarily signal the disappearance of piggybacking operations or of CN's trailer fleet, since CN's new generation cars will open up new markets and enable it to better serve market

niches using either type of equipment. In 1990, a new LASER service will be introduced in the Toronto-Edmonton corridor.

The objectives set in 1986 were met and surpassed, since halfway through 1990 the proportion of intermodal traffic was 21% of turnover.

5. Intermodal Transport at CP

5.1 The Beginning of Intermodal Operations

CP inaugurated its intermodal operations over thirty years ago, with a view to counteracting the inroads truckers were making into the railway's regular carload traffic.

CP began its intermodal operation with 50 flatcars and 100 trailers. Most of its business involved moving trailers for motor carriers. It was not long before CP started using its own equipment to carry goods; it still does. This operation is now the major part of its intermodal business. The investments made over the years to purchase suitable equipment greatly increased CP's rolling stock--it now has 2000 domestic containers, 2900 container cars and 1600 flatcars for piggybacking. Both marine and domestic containerized traffic is handled in some twenty intermodal terminals across the country.

Today CP offers two main types of intermodal services: domestic service, for trailer on flatcar (TOFC) and container on flatcar (COFC) traffic and the import-export service which moves marine containers from one end of the country to the other using a container terminal network operated by stevedores at the St. John, New Brunswick, Montreal and Vancouver terminals.

5.2 Domestic Containerization

CP Rail pioneered domestic containerization in North America when it introduced a container of odd dimensions: 44'3" X 8'6" X 9". This domestic container, launched in 1979, was designed to be as spacious as the longest trailers were back then (45 feet). The container design was the result of careful planning to save space and to develop a loading capacity greater or equivalent to that of the largest trailers. CP wanted a freight container which would be efficient and fit on both trains and trucks. Its length, 44 ft. 3

in., made it possible to load two onto an 89-ft. long flatcar. CP also introduced a 29-ft. 5-in. long domestic container for the transport of high-density freight. This container was designed so that three could fit on a flatcar.

5.3 Reorganization

The drive to be competitive, to remain competitive and to optimize operations sparked a realignment of CP's activities into two business units--Heavy Haul Systems (HHS) and Intermodal Freight Systems (IFS), to tailor services to customers' needs.

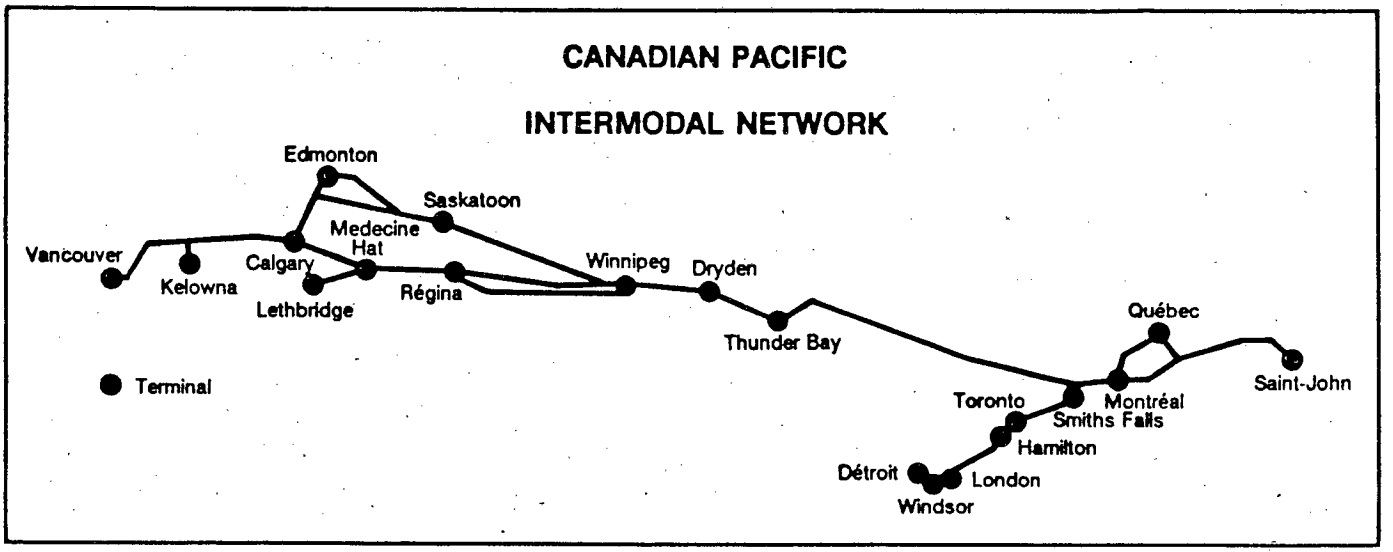
HHS, with its head office in Vancouver, handles large volumes of bulk commodities like grain, potash, sulphur and coal, to name a few, by unit trains. Intermodal Freight Systems, with its head office in Toronto, involves thinking volume--everything that can be carried by domestic or marine container or by trailer. This mode of transport is used to carry consumer goods, pulp and paper, semi-processed materials, auto parts and automobiles, which are hauled on specially designed trailers. To put it simply, intermodal transport is in direct competition with road transport.

5.4 Intermodal Network

To handle constantly increasing containerized traffic volume, CP operates twenty intermodal centres (rail/road) in major urban centres across the country. These terminals are in operation almost twenty-four hours a day and handle domestic and marine containers of all types, as well as trailers.

Some hundred transloading centres are managed independently, by CP employees or by a combination of both. A transloading centre is not a port but a centre where produce from regional markets is assembled before being shipped to a remote centre for final redistribution. This type of centre depends heavily on intermodalism because the traffic volume usually requires

transloading between two modes of transport--most frequently truck and train.



5.5 Organization of CP's Intermodal Services

The intermodal services, as shown in Appendix 3, are divided into two main categories: marketing and sales, and intermodal network operations and maintenance. This structure reflects the philosophy of customer-orientation put forth by CP during the 1987 restructuring process. This process was designed to put emphasis on the cargo transport sector and on related services. The restructuring has made CP more market and service oriented, creating a more efficient, reliable and flexible distribution system.

5.6 CP's Future

Canadian Pacific wants to keep its intermodal operations competitive with those in the United States, to compete with motor carriers, to keep its customers and attract others. The challenge is formidable but CP intends to take it up and has made decisions which show that it is not twiddling its fingers.

If CP Rail were to keep its intermodal system competitive with the U.S., it had to eliminate capacity problems in Toronto. To do so, it undertook to build one of the most modern intermodal terminals in North America at Vaughan, just northwest of Toronto. This 29-million-dollar terminal will transfer freight in containers and piggyback trailers between rail cars and trucks. The terminal, which should be completed in the fall of 1990, will keep CP in the forefront of a highly competitive transportation market while providing quality service. It will also provide a crucial inland distribution centre for import and export traffic through Canadian ports. This terminal will primarily handle Western Canadian domestic traffic as well as marine containers to and from West Coast ports. It will strengthen railway links between Ontario and markets in Western Canada and the Pacific Rim nations.

Containers are increasing in size--some of CP Rail's domestic containers are now 48 ft. in length: the maximum allowed on North America's highways. They are intended to replace the older 44 ft. 3 in. standard units. The new containers are 9½ ft. high and 8½ ft. wide with a capacity of 3460 cubic feet. One hundred of these containers are already in operation and CP is in the process of purchasing another two hundred. CP has purchased 65 telescopic chassis (adjustable to container size) to handle these new containers and plans to buy one hundred more.

CP is also updating its trailer fleet by acquiring 100 spine cars for shipping containerized freight loaded in a variety of container sizes. Each car is 76.7 metres long and consists of five platforms linked by articulated joints. Each platform can carry a container up to 49 feet long, or two 20-foot containers. Maximum load capacity of a spine car is almost four times its empty weight--62 460 kg.

Although American railways have switched to a stack-train concept and CN is experimenting with this, CP has opted for spine cars because of their adaptability and cost-effectiveness. Regardless

of the type of containers, articulated cars move cargo more efficiently than ordinary flatcars because there are fewer conventional couplers: a smoother ride and less chance of damage in transit.

This does not mean that CP has shelved doublestacking. It will continue to examine the technique's future potential by continually testing it on its own trains. It feels that the technique is not cost efficient unless there is sufficient volume to justify running stack trains. However, it wants to be in a position to meet any future demands for doublestacking provided the market opportunities so warrant.

The "Roadrailer" (rail-road trailer) is also in CP's plans and CP has been studying the Mark IV and Mark V prototypes. Each of these has attractive features: Mark IV, with its retractable wheels, helps cut down handling time, and Mark V is lighter because of the detachable rail bogie it leaves at the terminal.

According to CP officials, now that the Roadrailer has been tried and tested in the United States, it is probably just a matter of time before it is used in Canada. CP feels the Roadrailer could be used to carry car parts from the Detroit to the Oshawa area.

6. The Future of Canadian Railways

In streamlining their operations, Canada's railway companies plan to discontinue costly seldom-used secondary branch lines. It should not take them too long, as the 1987 National Transportation Act enables them to so. This will mean losing several kilometres of track since railroad policy tends to concentrate supply in a limited number of places and to maintain the most lucrative lines. Nonetheless, railways will be in a position to keep up their strong performance in the regions they serve, using intermodal transportation where road transport is used at the beginning and end of the rail route, to link up to customers which they otherwise would have lost.

Door-to-door freight transport has always handicapped the railroad industry, since it could not provide all customers with doorstep service. Railways are now concentrating on this problem and trying to improve productivity by adopting the appropriate techniques.

CN and CP adapted very well to changes--much more rapidly than American railways. This explains why they have been more successful. Their handling of containerized traffic and dealing with all the related logistics starting in the early sixties, their ability to handle both domestic and marine containers, and their management of unit trains have made it possible for them to acquire considerable experience in this field.

In the United States, railways were not quick to adopt intermodality and the situation unfolded differently. It was the shipping companies that launched the concept in the early eighties; they introduced doublestacking, which changed the name of the game and forced American railway companies to thoroughly review their operations. Ever since then, American carriers have been making up for lost time by adapting quickly--something that was facilitated by the characteristics of their markets.

Canada's intermodal freight industry is doing well and the future seems promising. There has been tremendous growth in this field and prospects for the future are encouraging. The statistics on this subject (Appendices 4,5,6) speak for themselves; taking 1981 as a reference year, Canadian intermodal traffic increased considerably and growth of transborder traffic between Canada and the United States was spectacular.

In addition to showing a remarkable growth rate, the statistics reveal some interesting facts:

- the revenue per tonne/km is on the average about 3.42 cents for domestic intermodal transport and 5.67 cents for United States-Canada, 4.12 cents Canada-United States, transborder transport;

- the average distance per tonne is approximately 1933 km for domestic intermodal transport and 1943 km for transborder transport.

With a cost of 5.4 cents to 24.6 cents per tonne/km (Appendix 7) for motor carriers, railway transport compares favourably to road transport and offers shippers many interesting possibilities. Canadian railway carriers should use this advantage to increase their share of the market and should continue efforts to sell intermodality to customers.

No longer can CN and CP content themselves solely with running trains; they must supply shippers with transportation and distribution services tailored to their needs. Their intermodal services combine the efficiency of long haul rail transport with the flexibility of truck transport and represent a very important trend in the future of transportation in Canada.

7. Conclusion

Growth in conventional cargo transport by rail has levelled off and will not again reach the heights it did at the beginning of the century. Both revenues and freight transport also seem to have reached a plateau (Appendix 7). This is happening not only to Canadian railways but also to American railways. The picture is even bleaker for European railways, for growth has dropped. Only two areas are not overly affected by motor carrier competition: first, movement of freight by unit trains between shippers and consignees linked by rail; second, movement of freight by a rail, road and sea transportation system. These combined modes of transport have been thoroughly tested and their increasing use leads us to predict a promising future. These transportation techniques are popular both in the United States and in Europe where not even one country is not ready to load trucks onto trains. At the 1990 Euromodal symposium (Colloque Euromodal) held in Brussels on January 31 and February 1, 1990, fourteen European countries signed a joint declaration in which they made a commitment to do everything in their power to make sure all aspects of intermodal transportation would be ready for the building of a new Europe. A common objective was identified: to double traffic by 1994 and triple it by the year 2005. The agreement was two-pronged: first, to put a stop to the competition between the trucking and the rail industries on long-haul routes, by taking advantage of the technology offered by combined transport; second, when physically and economically justified, to replace a road route by a railway route in order to maximize natural resources management with a view to attaining a better quality of life and to reducing the number of heavy vehicles on main highways.

With more and more attention focused on the environment, with increasingly crowded highways and growing hostility towards the growing number of heavy vehicles on these highways, new methods of moving freight must be found. One of these new methods is combined transport, which is becoming more and more popular. Whether moving

rs, swapbodies or trailers, this form of
ce road traffic and is less damaging to the
also meet shippers' requirements in cost
:y.

eloping rapidly and becoming an increasingly
transportation industry. Intermodal has come
early 1950s but still has a long row to hoe
larger share of the market. This is good news
:iers and for shippers.

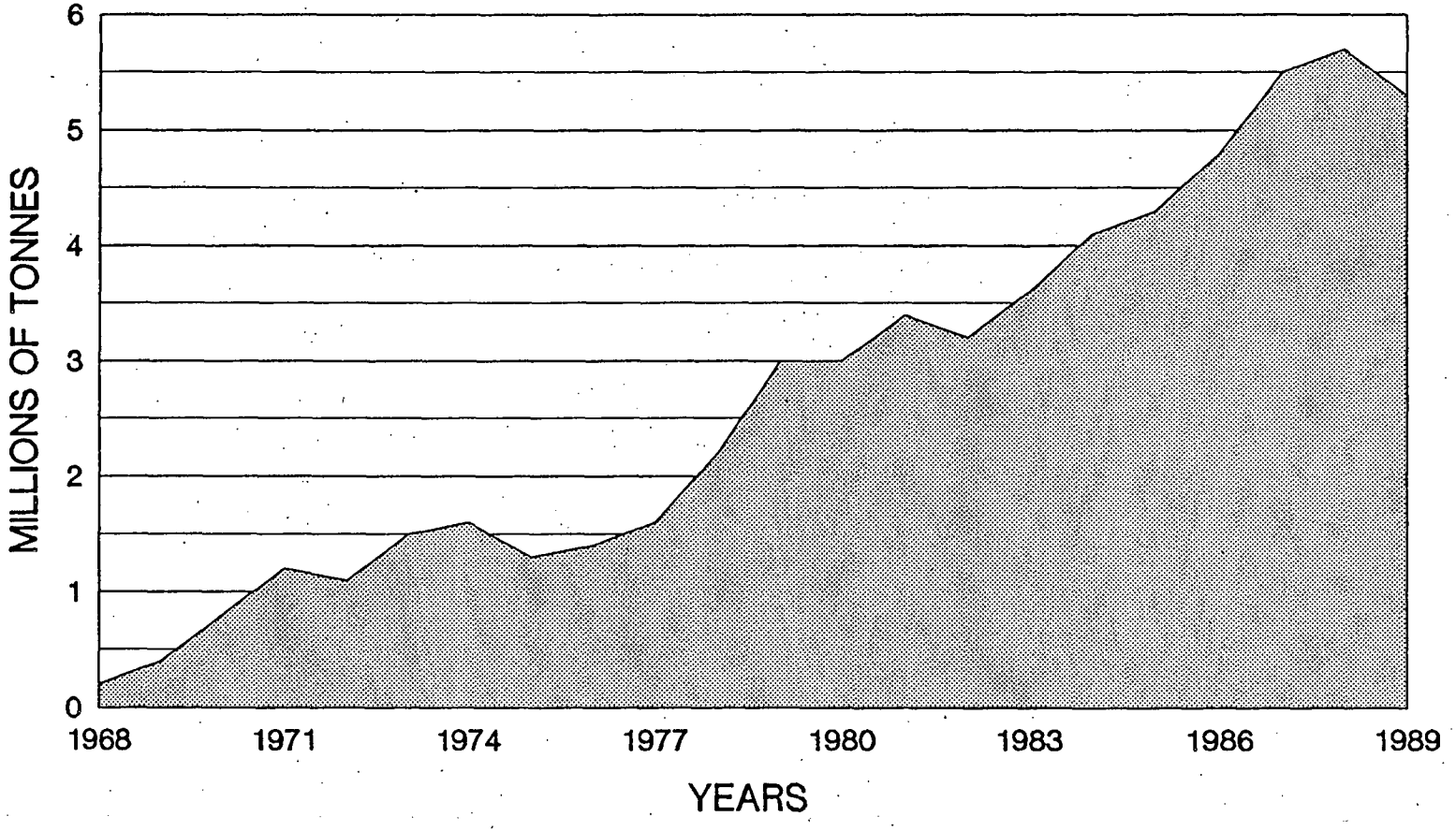
Appendix 1

Containerized Traffic at the Port of Montreal

Containerized Traffic as a Percentage of the Port of Montreal's Total Traffic

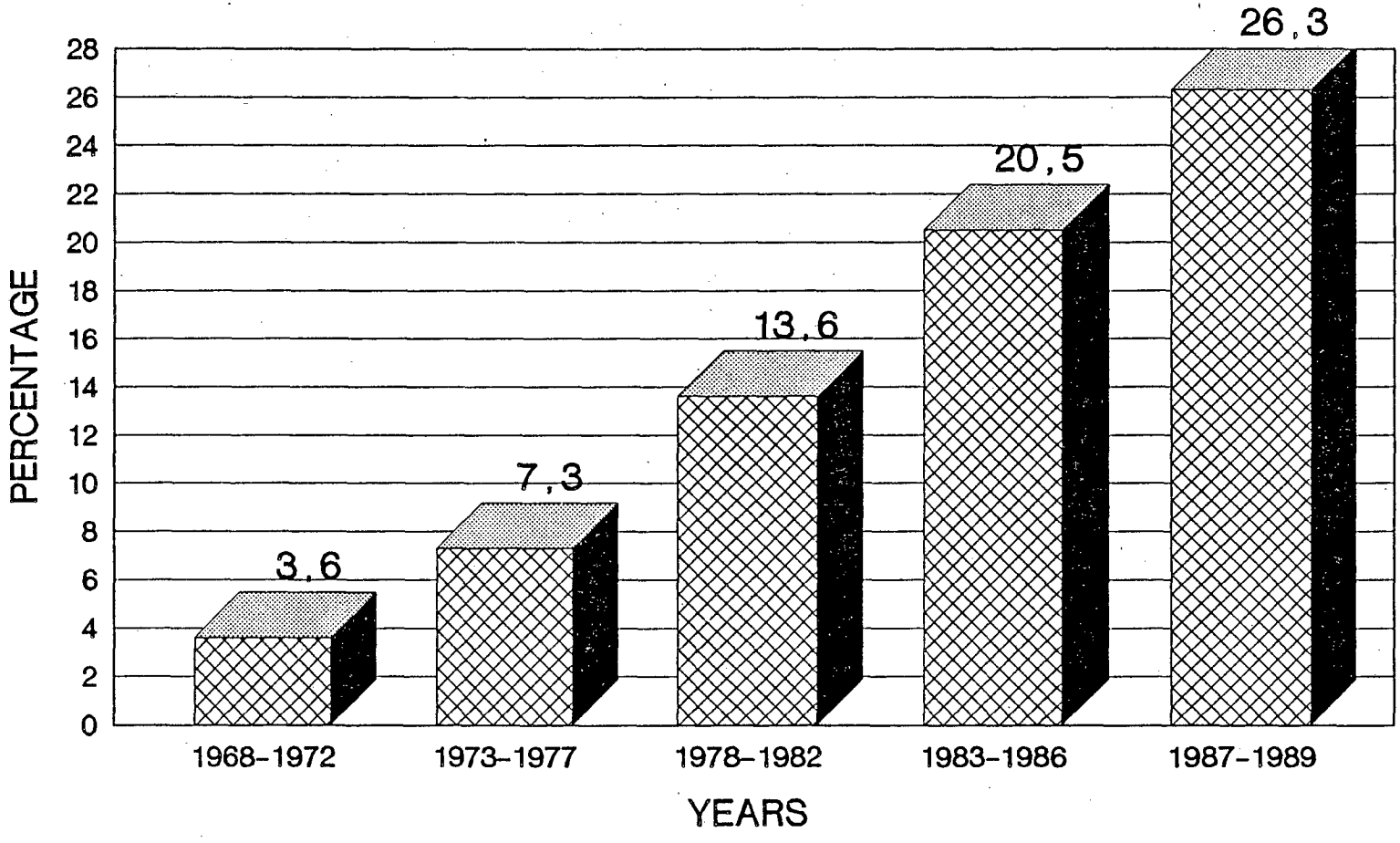
Gouvernement du Québec
Ministère des Transports
Service du transport ferroviaire

CONTAINERIZED TRAFFIC AT THE PORT OF MONTREAL 1968-1989



Gouvernement du Québec
Ministère des Transports
Service du transport ferroviaire

CONTAINERIZED TRAFFIC AS A PERCENTAGE OF THE PORT OF MONTREAL'S TOTAL TRAFFIC

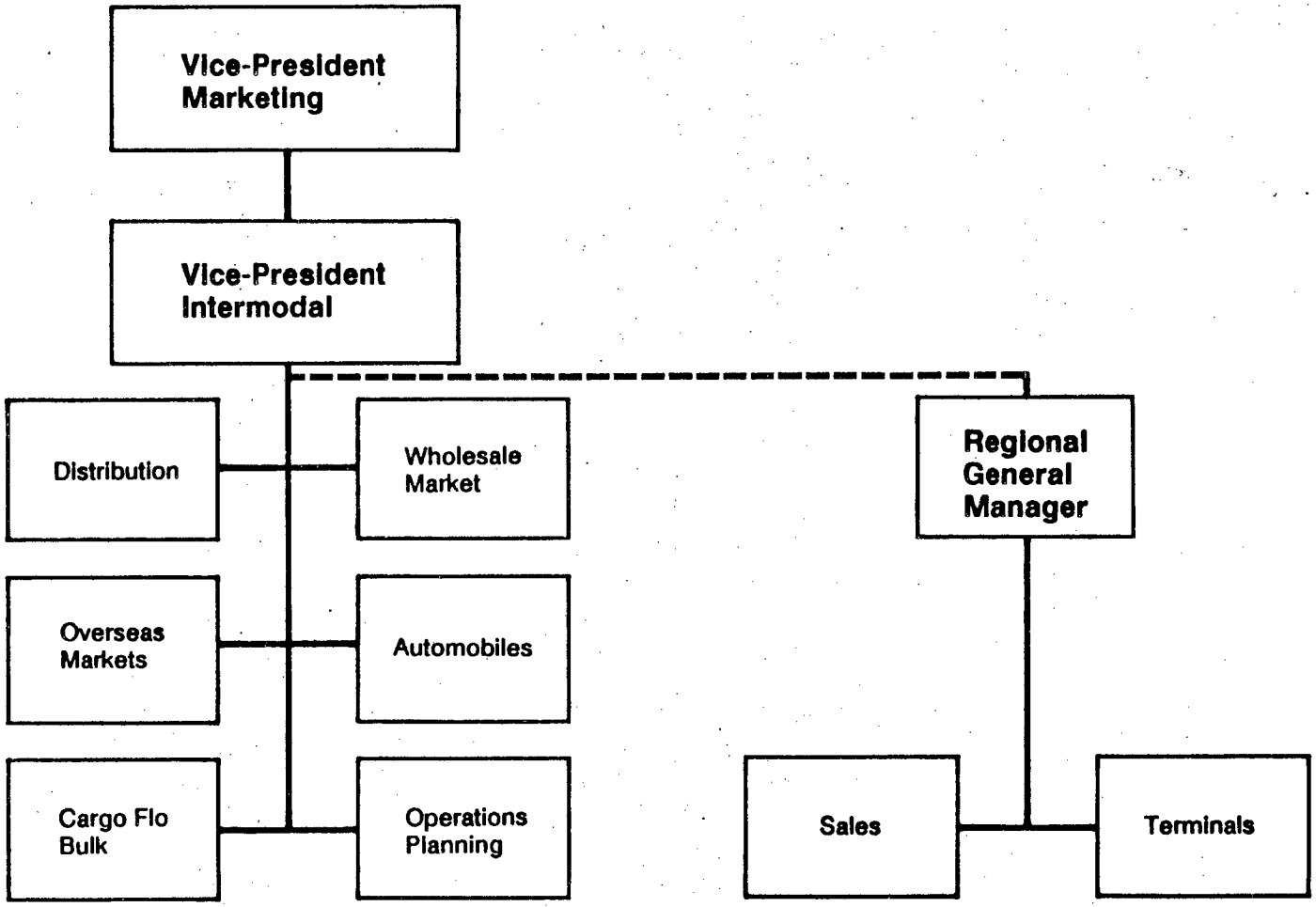


Appendix 2

Organization Chart of Canadian National's Intermodal Transportation Systems

CANADIAN NATIONAL

INTERMODAL TRANSPORTATION SYSTEMS

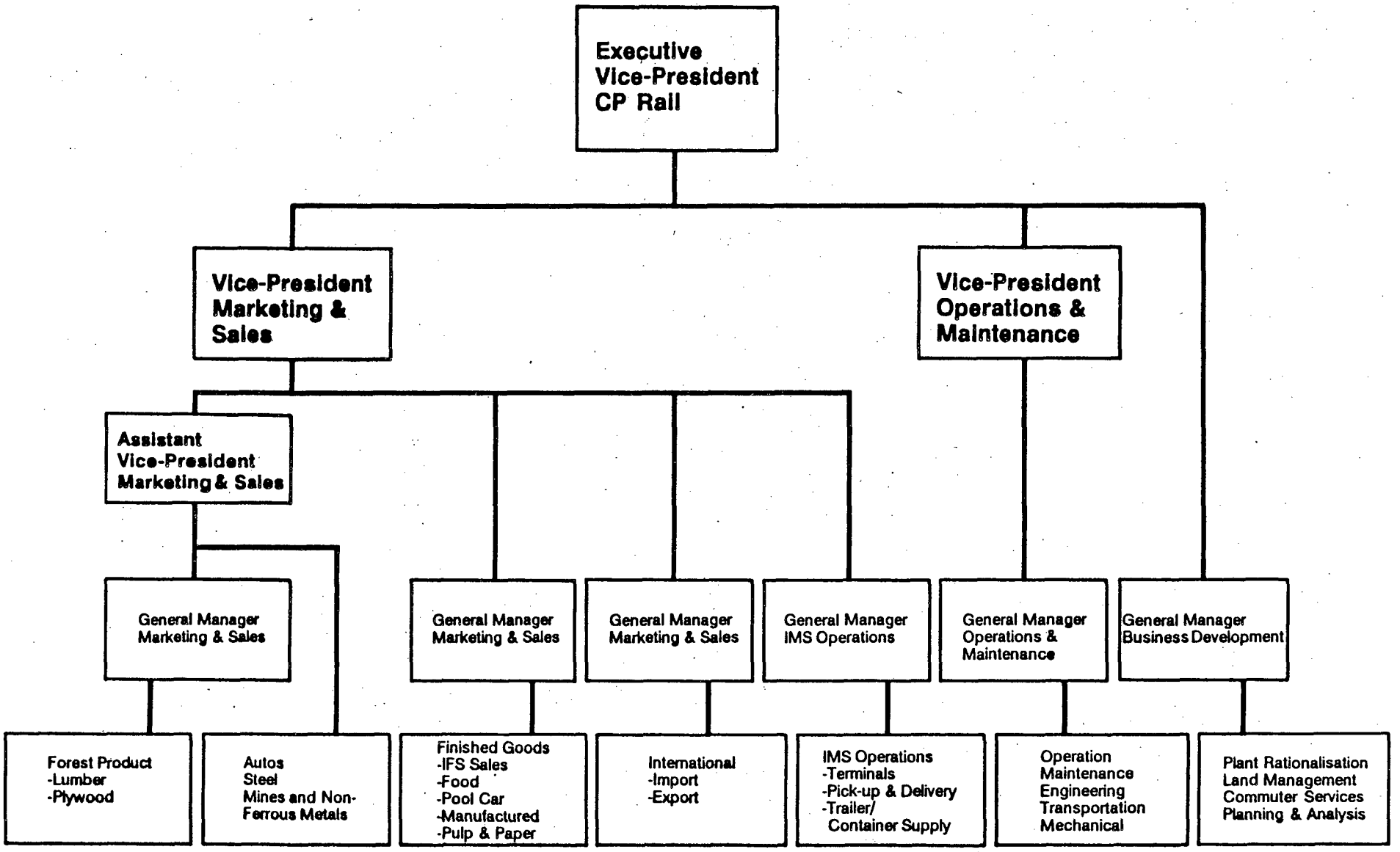


Appendix 3

Organization Chart of Canadian Pacific's Intermodal Freight Systems

CANADIAN PACIFIC

INTERMODAL FREIGHT SYSTEMS



Appendix 4

Commodity Flow Analysis for CN and CP Intermodal Services

Gouvernement du Québec
Ministère des Transports
Service du transport ferroviaire

COMMODITY FLOW ANALYSIS

FOR CN AND CP INTERMODAL SERVICES

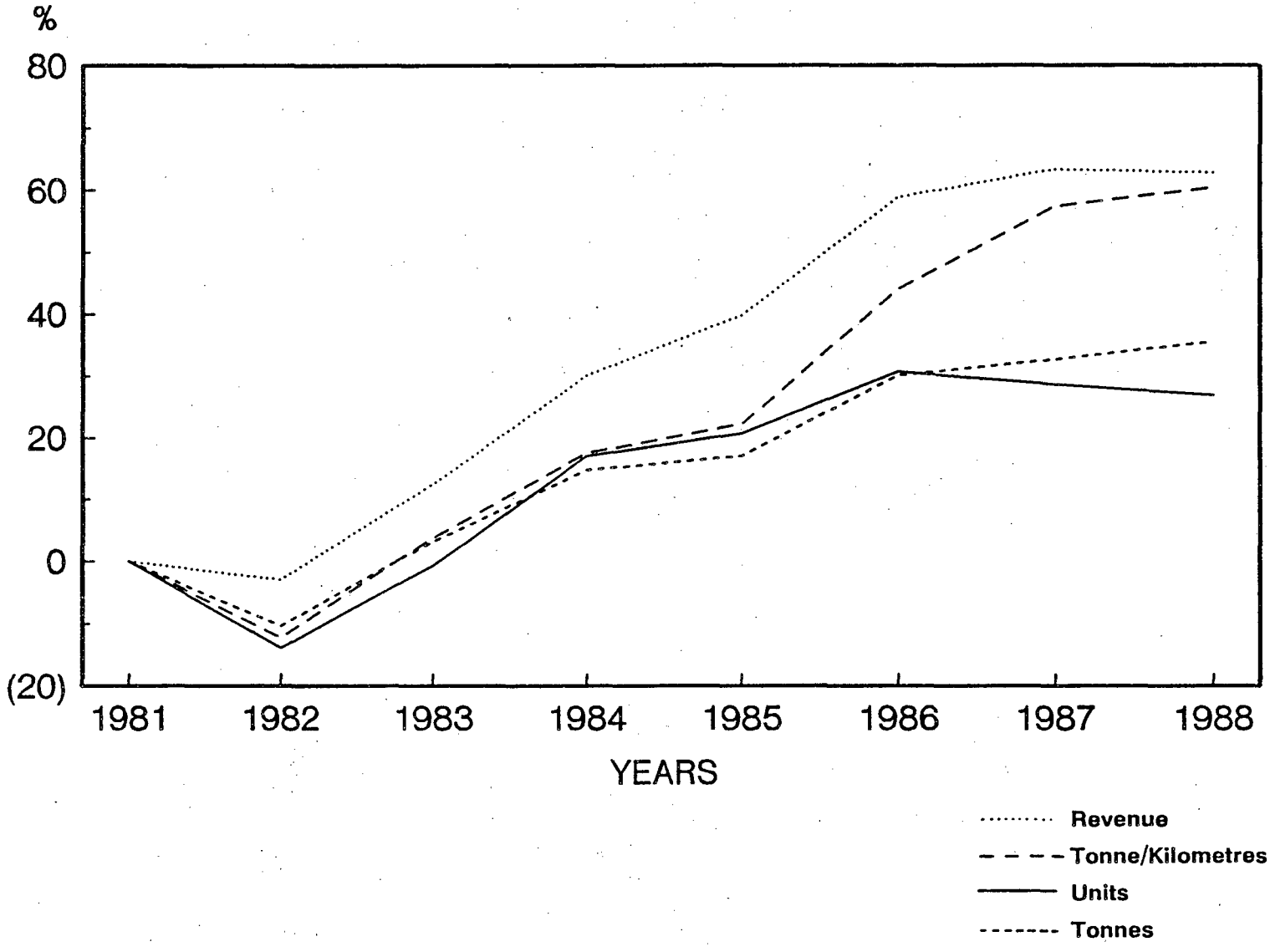
	UNITS	TONNES ('000)	CANADIAN REVENUE ('000$)	TONNE KILOMETRES ('000)	UNIT KILOMETRES	REVENUE ¢/ TONNE-KILOMETRES	AVERAGE DISTANCE PER TONNE (KM)
1981	518 819	7 506	434 177	13 613 237	951 805	3,19	1 814
1982	446 987	6 729	421 407	11 941 112	799 707	3,53	1 774
1983	515 446	7 749	488 180	14 132 839	932 748	3,45	1 824
1984	607 211	8 620	564 859	16 007 007	1 126 137	3,53	1 857
1985	626 018	8 787	606 569	16 627 397	1 168 936	3,65	1 892
1986	678 187	9 761	689 755	19 602 594	1 337 569	3,52	2 008
1987	667 471	9 958	709 112	21 422 161	1 393 515	3,31	2 151
1988	658 417	10 171	706 967	21 838 418	1 377 853	3,24	2 147

SOURCE: NATIONAL TRANSPORTATION AGENCY OF CANADA

Gouvernement du Québec
Ministère des Transports
Service du transport ferroviaire

COMMODITY FLOW ANALYSIS

CN AND CP INTERMODAL SERVICE



Appendix 5

Commodity Flow Analysis for CN and CP

Intermodal Services Canada to United States

Gouvernement du Québec
Ministère des Transports
Service du transport ferroviaire

COMMODITY FLOW ANALYSIS

FOR CN AND CP INTERMODAL SERVICES
CANADA TO UNITED STATES

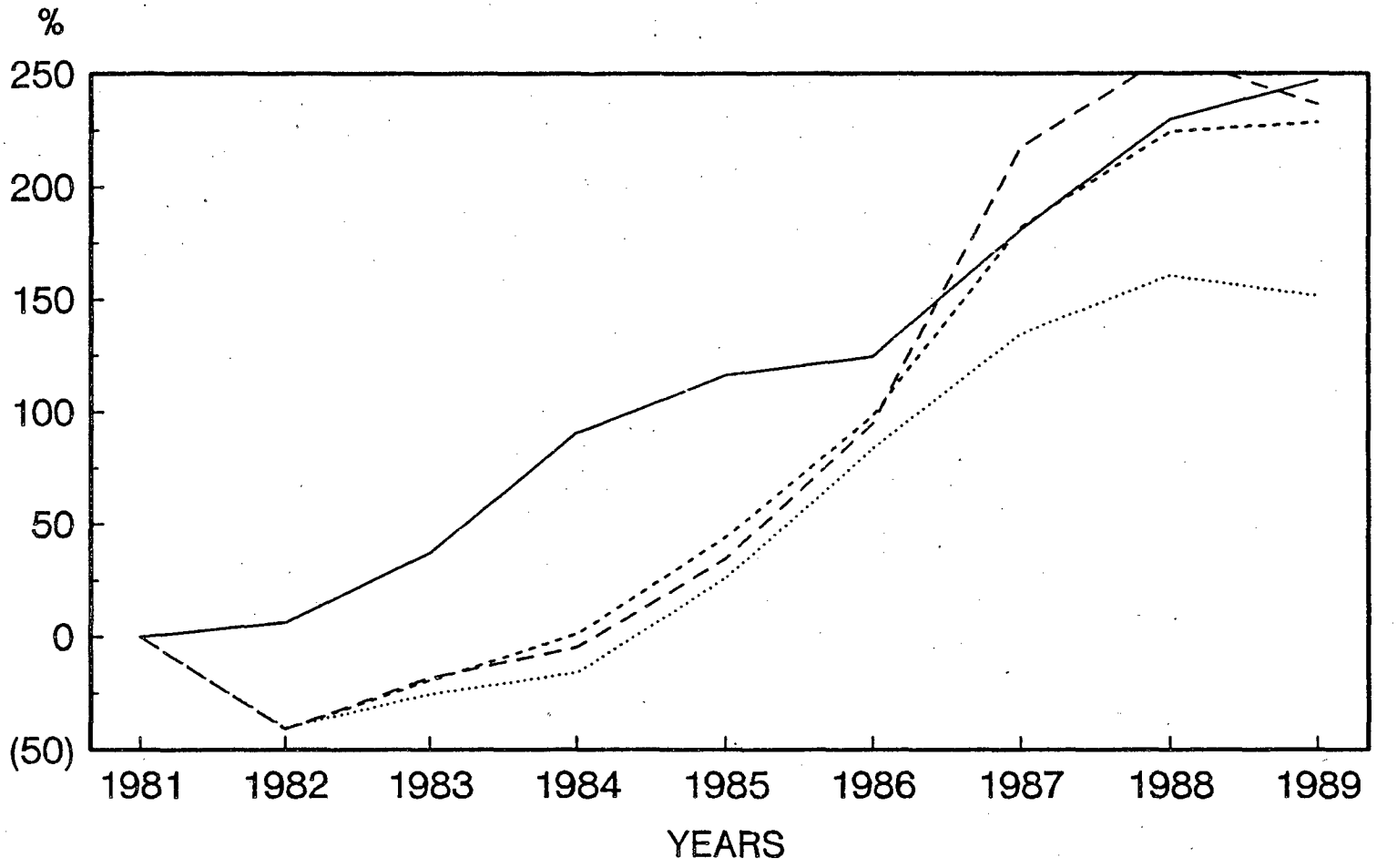
	UNITS	TONNES ('000)	CANADIAN REVENUE ('000$)	UNITED STATES REVENUE ('000$)	TONNE-KILOMETRES ('000)	UNITS-KILOMETRES	REVENUE TONNE-KILOMETRES	AVERAGE DISTANCE PER TONNE (KM)
1981	30 730	497	12 501	9 806	473 948	30 428	4,71	953
1982	32 705	295	7 598	5 753	281 456	31 826	4,74	953
1983	42 160	401	9 510	7 096	387 977	41 202	4,28	968
1984	58 618	503	10 844	7 918	452 118	55 023	4,15	899
1985	66 490	717	15 172	12 985	638 211	61 763	4,41	890
1986	69 006	989	22 914	18 072	924 672	62 412	4,43	935
1987	86 407	1 402	33 266	19 053	1 505 230	84 928	3,48	1 073
1988	101 307	1 612	36 569	21 535	1 697 980	97 827	3,42	1 053
1989	106 624	1 633	34 880	21 250	1 594 967	95 785	3,52	977

SOURCE: NATIONAL TRANSPORTATION AGENCY OF CANADA

Gouvernement du Québec
Ministère des Transports
Service du transport ferroviaire

COMMODITY FLOW ANALYSIS

CN AND CP INTERMODAL SERVICE
CANADA TO UNITED STATES



Appendix 6

Commodity Flow Analysis for CN and CP Intermodal Services United States to Canada

Gouvernement du Québec
Ministère des Transports
Service du transport ferroviaire

COMMODITY FLOW ANALYSIS

FOR CN AND CP INTERMODAL SERVICES

UNITED STATES TO CANADA

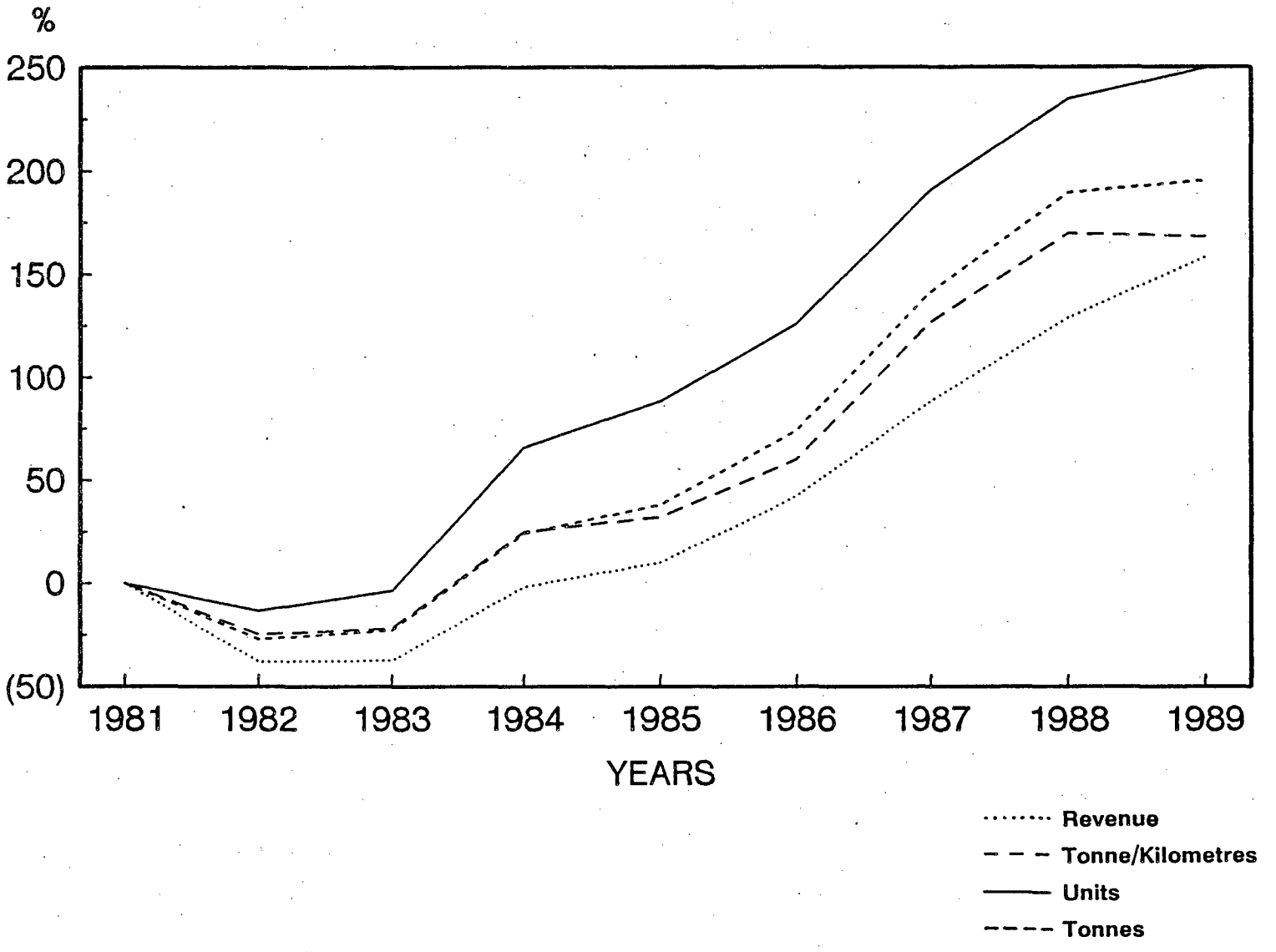
	UNITS	TONNES ('000)	CANADIAN REVENUE ('000$)	UNITED STATES REVENUE ('000$)	TONNE KILOMETRES ('000)	UNITS KILOMETRES	REVENUE ¢/ TONNE-KILOMETRES	AVERAGE DISTANCE PER TONNE (KM)
1981	34 052	536	16 427	17 077	510 015	33 791	6,57	952
1982	29 593	391	11 990	8 850	384 430	29 163	5,42	983
1983	32 808	414	11 844	9 113	398 673	31 929	5,26	963
1984	56 485	665	18 725	14 113	637 227	53 279	5,15	958
1985	64 135	740	20 209	16 666	674 164	57 677	5,47	911
1986	76 892	933	26 330	21 356	816 082	67 145	5,84	874
1987	98 970	1 293	34 895	28 167	1 156 254	88 474	5,45	894
1988	113 938	1 551	43 072	33 591	1 374 475	101 292	5,58	886
1989	118 981	1 583	48 120	38 396	1 366 997	102 824	6,33	864

SOURCE: NATIONAL TRANSPORTATION AGENCY OF CANADA

Gouvernement du Québec
Ministère des Transports
Service du transport ferroviaire

COMMODITY FLOW ANALYSIS

CN AND CP INTERMODAL SERVICE
UNITED STATES TO CANADA



Appendix 7

Data on For-hire Trucking in Canada in 1987

Gouvernement du Québec
Ministère des Transports
Service du transport ferroviaire

DATA ON FOR-HIRE TRUCKING IN CANADA

IN 1987

	REVENUE ('000$)	TONNES ('000)	TONNE/KILOMETRES ('000)	REVENUE $/ TONNE/KILOMETRES	AVERAGE DISTANCE PER TONNE (KM)
TRUCK-LOAD	2 624 164	153 097	48 192 377	0,054	314
LESS THAN TRUCK-LOAD	2 243 677	15 681	9 127 642	0,246	582

SOURCE: STATISTICS CANADA
CATALOGUE 53-222

Appendix 8

Canadian Railway Transportation CN-CP

Railway Transport Data for CN-CP

Gouvernement du Québec
Ministère des Transports
Service du transport ferroviaire

CANADIAN RAILWAY TRANSPORTATION

CN - CP

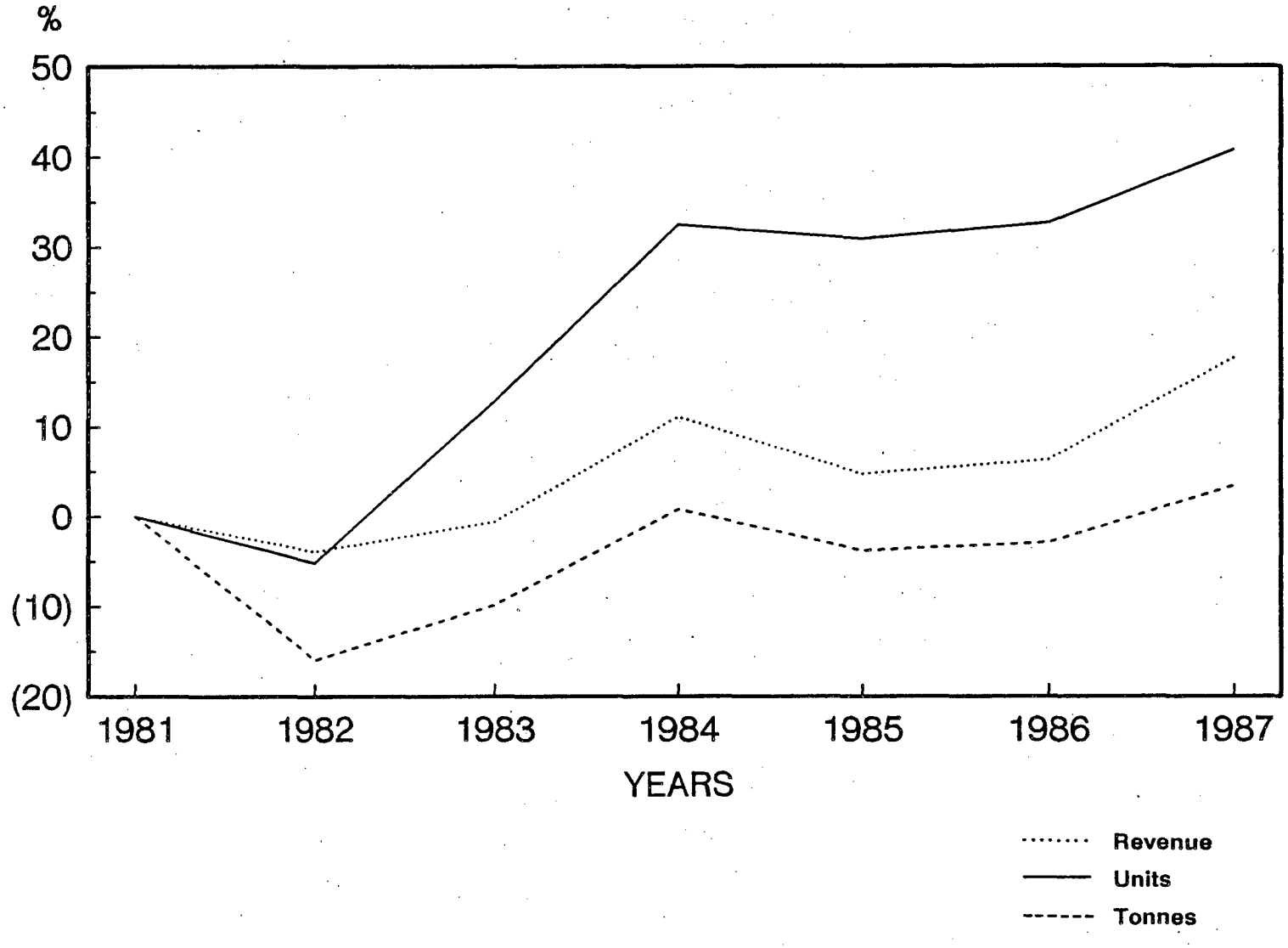
	FREIGHT REVENUES ('000)	NET REVENUE TONNES ('000)	NET REVENUE TONNE-KM ('000 000)	REVENUE ¢ TONNE-KM	AVERAGE DISTANCE PER TONNE (KM)
1981	4 262 149	195 878	207 785 132	2,05	1 061
1982	4 041 633	164 600	199 551 515	2,03	1 212
1983	4 807 653	176 532	206 545 796	2,33	1 170
1984	5 644 980	197 410	230 742 002	2,45	1 169
1985	5 578 776	188 384	217 633 583	2,56	1 155
1986	5 654 435	190 178	220 839 133	2,56	1 161
1987	5 999 429	202 499	244 473 876	2,45	1 207

SOURCE: STATISTICS CANADA
1981:VOL. 52-208 52-210 1982-1985:VOL. 52

Gouvernement du Québec
Ministère des Transports
Service du transport ferroviaire

RAILWAY TRANSPORT

DATA FOR CN-CP



BIBLIOGRAPHY

Chaput, Fernand, La conteneurisation: une révolution dans la géographie des transports, Québec, 1971, pp. 54-55.

Hamilton, Janice, Growth is steady, competition is strong, Keeping Track, Montréal, Volume 21, Number 8, October 1986.

Hamilton, Janice, Intermodal Part 2: the North American Context, Keeping Track, Montréal, Volume 21, Number 9, November 1986.

Hamilton, Janice, Intermodal Part 3: the Future, Keeping Track, Montréal, Volume 21, Number 10, December 1986.

Mahoney, John H., Intermodal Freight Transportation, Connecticut, Eno Foundation for Transportation, 1985, 241 pp.

Latouche, Daniel, "A la remorque des transports", Québec Science, 1980, 282 pp.

Mckenzie, David R. et al., Intermodal Transportation. The Whole Story, Simmons-Boardman Books Inc., 1989, 289 pp.

Roberts, Robert, Marketing: An Ascending Star, Modern Railroads, New York, August 1988.

Slack, Brian, the Locational Determinants of Inland Load Centers, Transport Canada, July 1988.

Sorrow T., Donald, Where, How Does Intermodal Fit IN?, Modern Railroads, New York, May 1989.

CP Rail Info, Volume 4, Number 2, April-May 1989.

CN Movin, November, December 1988, Volume 20, Number 6, "CN Intermodal: Ready for the fight".

CN Movin, March, April 1988, Volume 20, Number 2, "Destination: Trains to Beat the Competition".

La vie du rail, No. 2235, March 8-14, 1990.

Conférence européenne des ministres des Transports - 35ième Rapport annuel 1988 - Conference activities
Resolutions of the Conseil des ministres des Transports and reports approved in 1988.

Commodity Flow Analysis, National Transportation Agency of Canada, Rail Complaints and Investigations, 1981 to 1989.

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