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THE UTILIZATION OF TRUCKS AND INTERMODAL SYSTEMS
IN THE OTTAWA AIRFREIGHT INDUSTRY

by

RUSSELL W. MORROW B.A.

A thesis submitted to
the Faculty of Graduate Studies and Research
in partial fulfilment of
the requirements for the degree of

Master of Arts

Department of Geography

Carleton University

Ottawa, Ontario

January 14, 1993

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IN THE OTTAWA AIRFREIGHT INDUSTRY

submitted by

RUSSELL W. MORROW B.A.

in partial fulfilment of the requirements
for the degree of Master of Arts

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ABSTRACT

This paper focuses on the changing environment in Canada's air transportation sector since domestic deregulation, and how those changes affect freight handling at non-hub airports. In an effort to gain a better understanding of the nature and problems of freight operators located in smaller cities, interviews were conducted with local airfreight officials. Specific objectives were to describe the Ottawa airfreight industry, to identify problems with operating at a non-hub, to identify the role of trucking, and to assess the use of intermodal movements of airfreight. The conclusion is that while trucks are used to various degrees to transport airfreight from Ottawa, the employment of intermodal movements of air pallets and containers has not been as significant.

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Due to the nature of the thesis topic, it was necessary to contact and interview local airfreight managers, users, and government officials. I will take this opportunity to thank all of them for the time they allowed me to gain further insight into their industry.

Finally, I thank my courageous and supportive partner, Laura, who spent long hours proofreading, correcting, questioning, and encouraging me to complete this thesis despite several bouts of self-doubt on my part. Well, there you have it.

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CHAPTER ONE

INTRODUCTION

Aircraft are the most recent mode to be utilized for freight transportation. The main benefit for users of air transport is the speed of aircraft compared to surface transport vehicles. Successive developments in technology and organizational methods have contributed to an efficient process of transporting time-sensitive freight. The increased utilization of wide-bodied aircraft and unit load devices (pallets, containers) has improved the capability of handling cargo. The advances in aircraft design and performance have decreased the time required to travel between places, in other words 'shrinking the world'. As well, improvements in network configurations and integration with trucking firms has enabled air transport to provide smaller non-hub cities with the opportunity to exploit possible locational advantages.

The rapid growth of small package air express firms, such as Federal Express, highlights the increased importance that time has on daily business operations. These firms have fully integrated air transport with trucking to control all aspects of their operations. Other smaller airfreight firms, including air passenger carriers, have utilized private

trucking companies to provide similar service from smaller centres.

This thesis focuses on the changing environment in Canada's air transportation sector since domestic deregulation, and how those changes affect freight handling at non-hub airports. Prior to 1988, air passenger carriers and freight firms were inhibited in their daily operations by domestic government regulations. The introduction of the National Transportation Act 1988 lessened government control and opened the domestic market to new Canadian operators. Although the domestic air industry has been deregulated, the international situation continues to be heavily controlled through bilateral air service agreements.

Ottawa was chosen as a study area due to several factors including geography, its non-hub airport status, the freight transport needs of local users, and the presence of a small, but highly competitive airfreight industry. Three of Canada's major international/transborder gateway airports are located nearby: Montreal's Mirabel and Dorval and Toronto's Lester Pearson. The flight time to all three is less than one hour. The surface driving time is approximately two hours to either of the Montreal airports and five hours to Toronto.

Ottawa International Airport displays characteristics of a non-hub airport. It has relatively few non-stop direct links, excluding service to primary hubs at Toronto and

Montreal-Dorval. Air carriers predominately utilize small, narrow-body aircraft to serve the airport. Affiliated regional air carriers have increased their service at the expense of Canada's major trunk carriers. Internationally, Ottawa Airport has limited service to a few European and American destinations.

The importance of the region's freight market is evident in the number of airfreight and air express companies present. A small number of companies operate scheduled all-freight and combination¹ flights, including major US operators Emery and Federal Express, and Netherlands-based KLM. However, most other freight operators have chosen to truck airfreight to another airport to either meet their own aircraft or transfer to another carrier's flight. Airfreight companies have chosen a variety of techniques to transport cargo via truck, including bulk-loaded or unitized in a container or on a pallet.

Purpose

The idea for this thesis is based on the earlier work by Lewis and Culliton (1956) and their examination of using airfreight in physical distribution; and Mahoney's (1985) study on intermodal freight transportation. The demand by manufacturers and other shippers for efficient time-

¹ Combination flights implies that both passengers and cargo are carried on the main deck of the aircraft.

sensitive delivery of high value goods has led to airfreight finding a niche market in the competitive freight transportation industry. However, beyond generalized descriptions of airfreight uses and studies on the theoretical aspects of the industry, there have been few studies analyzing intermodal transport involving airfreight.

The purpose of this thesis is: first, to contribute to the understanding of transporting airfreight from non-hub airports. Second, to broaden the understanding of intermodal movements in airfreight operations. The thesis' premise is that trucks play an influential role in transporting airfreight from non-hub airports.

The research strategy developed, to acquire the necessary information, was to solicit a sample of individuals and companies² involved directly and indirectly with Ottawa's airfreight community. This involved a process of direct unstructured personal interviews with airfreight management personnel, government aviation officials, freight forwarders, and airfreight users. Statistical data was obtained from Statistics Canada publications. Individual companies provided little in the way of solid data. In most cases, cargo figures were considered privileged information.

The interview questions posed, to the various participants, were general in nature, and directed to gain a sense of their day-to-day operations. An unstructured casual

² In total 25 interviews were conducted.

format was used to allow the respondent to freely interject with any information they felt may be relevant. This was formatted around a base of 10 questions which ranged from type of aircraft (if any) utilized, the use of containers/pallets, the use of trucks to transport freight to another station, who performed the trucking end of operations, and problems encountered operating at a non-hub airport. Participant responses were specific to questions which did not breach confidentiality, otherwise, due to the highly competitive nature of the industry, information was withheld.

Organization

The thesis is organized to build on previous studies involving different aspects of the air transport industry, including both passenger and freight operations. The chapters are arranged to initially familiarize the reader with the regulatory environment air carriers and freight firms operate within. This will be followed by an examination of intermodal airfreight movements before addressing the Ottawa airfreight industry.

Chapter Two is a review of background literature for the thesis. The studies cited reflect the complex nature of air transportation. The chapter various approaches to such issues as time-space relationships, choice of airfreight as a method of distribution, hierarchies and air service, and

intermodality.

Chapter Three examines the impacts that domestic deregulation has had on the Canadian air transport industry. The chapter will include; a review of the rapid changes in air carrier ownership; the consolidation of regional airlines by Air Canada and Canadian Airlines International; changes to network designs; and the impacts on airfreight operators. It will close with a discussion on the difficulties Canadian air carriers have in competing in the heavily regulated international environment.

Chapter Four will introduce the concept of intermodality and discuss its increasing popularity amongst transportation companies. Initial emphasis will be on the innovations in technology that have spurred the organizational changes in freight systems. Intermodalism has been predominantly associated with surface modes; however, air transport has contributed to its development through container transfers with marine and trucks. Nevertheless, air transport is limited in its participation by several reoccurring problems.

Chapter Five focuses on the geographical background of the National Capital Region in regards to air transportation. This starts with highlighting Ottawa's physical location, economic base, intercity transportation infrastructure, and international airport. The chapter then turns to an analysis of Ottawa's domestic air links before

and after domestic deregulation; as well as to transborder and international service.

Chapter Six is an analysis of the Ottawa airfreight industry. It will address the problems of accessibility to local airfreight service for both users and airfreight operators. Other issues which are examined include the various roles played by airfreight operators, the use of trucks and unit load devices in the movement of airfreight, and the role of Montreal-Mirabel Airport in Ottawa's freight market.

Chapter Seven provides the thesis' summary and conclusions.

CHAPTER TWO

BACKGROUND LITERATURE

The great trading cities of the world - London, Paris, New York, Tokyo - have developed with an advantage of being interconnected with each other through superior transportation systems. While these leading cities constitute a dominant hierarchy of world cities, other less powerful urban centres also share comparable demands for efficient freight transport connections. Ashton (1947, p.424) maintained, "transportation is the vital link in the mechanism of distribution and exchange." The ease to which spatial interaction takes place is the basis for productive trade between cities and regions.

Evaluating the success of a transportation system can be measured through two factors: time and accessibility. Time can be defined as the duration a commodity is in transit. This can be associated with perishability, but also with potential cost savings. Accessibility refers to the ability to move a commodity to and from a particular destination. The transit time of a commodity is often increased when there is no direct route between places and therefore the accessibility may be compromised.

The importance of time in the movement of freight has

been a significant ingredient in transportation. Innovations in vehicle technology and design have resulted in newer transportation modes which are faster than the previous dominant modes.¹ Time savings from improvements in transportation, such as vehicle speed, can be measured from two positions. First; the increases in vehicle speed have reduced the 'friction of distance' when measured by time and not distance. Second; time saved by not having goods tied up in transit can equal cost savings through stocking smaller inventories, and capital costs in interest payments and insurance.

The need for access to efficient transportation systems is one factor many businesses use to identify new industrial locations. The major trade centres of the world developed around seaports. A drawback for many inland locations attempting to exploit trade opportunities had been their relative inaccessibility to a seaport. The development of standardized intermodal containers has helped change the comparative advantages of non-port locations.

While literature dealing specifically with airfreight operations in smaller centres is sparse, overall changes in the air transport sector have had implications for non-hub cities. This chapter reviews literature to help form an awareness of the complex nature of airfreight

¹ for example: water, rail, truck, air, each respectively considerably faster than the previous mode.

transportation. Of importance to the discussion will be time-space relationships, determinants for airfreight choice, the integration of airfreight in the overall freight transportation system, and the implications of domestic deregulation in North America on air carriers and networks.

Time-space Relationships

The development of large passenger aircraft has had dramatic effects on the movement of people and goods. Sealy's (1957) Geography of Air Transport was an early geographical analysis of the state of world air transport. He reasoned that air transportation had the potential accessibility to bridge gaps where surface transport failed, thereby appealing to both landlocked and maritime regions. Yet, the ease of movement available to air transportation in the 1950s was severely constricted by physical barriers and climatic conditions.² The airplane's technical limitations (speed, range, altitude and navigation) inhibited its use in mountainous areas, ocean crossings, large forested areas, and tundra regions.³ Still, the ability of aircraft to fly the most direct and shortest route allowed them to overcome other less imposing physical barriers which had limited

²Sealy's study was conducted prior to the use of jet aircraft in civil aviation.

³for example, aircraft were restricted in flying over the Andes in South America due to altitude limitations, and flights across the Atlantic utilized airports in Gander, Newfoundland and Shannon, Ireland due to range limitations.

other modes.

While physical geography played a role in restricting movements of earlier propeller-driven aircraft the modern jet plane has overcome these barriers. Janelle (1968) introduced the concept of time-space convergence or decreasing friction of distance. He advanced the theory that as a result of transportation innovations (technology and logistics), places approach each other in time-space, therefore increasing accessibility to places and regions. Accessibility was defined as a measure of the ease (time, cost) with which a transfer occurs between two points. In time-space relationships he observed that as a result of transport innovations the time required to move between nodes had decreased and distance has declined in relative importance. In an abstract sense there has been a 'shrinking' of the world.

The value of transport to overcome the friction of distance was discussed by Cooley (in Hurst 1974) in his discussion of transportation as a tool in social development. He remarked that, "transportation in the measure of its efficiency is concerned with overcoming economic costs imposed by time and place." As a result efficient transportation and time-space convergence has the ability to extend the scope of business.

In a more recent study, Wheeler and Mitchelson (1989) used Federal Express data to examine information flows among

US cities. They found that distance had marginal effects on the spatial interaction of information flows between cities. As transportation technology has improved, places have become functionally closer together. The authors concluded that a degree of concentration in the origin of information existed within a few cities, forming a hierarchy of control.

It has become clear that new transport systems and vehicles (eg. jet aircraft) have helped overcome many earlier-perceived physical barriers. However, the time savings incurred with increased vehicle speed have had some drawbacks. Ashton (1947) concluded that the value of time in transportation is made evident through the cost. The relationship between cost and transportation can be stated as, "the cost of maintaining a given speed; and the value of high speed is derived from the value put upon time by the users of transportation" (Ashton 1947 p.439). In other words shortened transit times equal higher freight costs. This is evident in the case of airfreight. Users requiring quick transit times pay the highest freight rates as compared to other slower freight modes.

While the emergence of faster transport modes has meant an increasing capacity to promote time-space convergence the cost factor of employing these newer systems, as in the case of jet aircraft, may be prohibitive. Ullman (in Thomas 1956) in his study on spatial interaction suggested three interrelated conditions that must be satisfied for trade to

occur; complementarity, intervening opportunity, and transferability. Of importance to this discussion is the third condition - transferability.

Transferability reflects the time and cost factor of movement of a commodity or in other words the ability of the commodity to bear the transportation costs. Bulky commodities which characteristically have a low value to unit of weight would be substituted as the distance or cost increased to create an economically unjustifiable situation. At the other end of the spectrum, high value to weight commodities, such as high-technology manufactured products, are able to withstand substantial transportation costs. It is within this latter group of goods that airfreight has found its niche market.

While airfreight's lower transit times undercut those of other transportation modes, its high freight rates still inhibit potential users who are cost sensitive. In their defence, airfreight operators have developed marketing strategies based on the Total Cost Concept (TCC) to attract shippers. Lewis (1956) in studying the use of airfreight in physical distribution, emphasized that the means of transportation should be chosen not simply to reduce transport costs, but to reduce the expenses of production and distribution. He argued that business should purchase

the 'transportation package'⁴ which includes reliability, availability of service, management, equipment design, inventory control, warehousing, packing and packaging, handling and protection from theft (Lewis 1956, p.9).

Similarly McGinnis and Corsi (1978), Taneja (1979) and Eriksson (1986) suggest firms ignore previous attitudes towards high airfreight rates and analyze all costs involved in distribution. They all highlight the line haul transportation charge as merely one element of all costs involved in the distribution system. For the right type of products, accessing the speed of airfreight as a means for distribution cost savings could be justified. Conceptually this would imply overall cost savings can be realized, while taking advantage of airfreight's time savings.

The employment of jet aircraft has had significant impacts on time-space convergence. Almost any two cities in the world can be reached in a day's travel. The ability of the aircraft to overcome Ullman's transferability condition has been attainable in a number of industries. For example, the utilization of airfreight in distribution was discussed in Frobel's (1980) study on changes in the division of labour and the textile industry in Asia. One of the preconditions for the new international division of labour was that changes in transport and communications had left no

⁴ this package is better known as the Total Cost Concept or Total Distribution Cost

site in the world untouched. Hence, fast and efficient transport systems have allowed manufacturers to move offshore into developing countries. He also found that the high transport costs of using wide-bodied jet aircraft were offset by lower production costs, given the time factor of production and distribution involved.

Wallace (1990), in his review of the global economy, concluded that manufacturing development in the Newly Industrialized Countries (NICs) has been partly assisted by improved transportation systems involving containerization and airfreight.

Choice of Airfreight as a Method of Distribution

As stated previously, airfreight is an option for shippers of high value-to-weight products, especially on medium to long haul routes where time savings can be significant. Concomitant with lower transit times, airfreight markets a superior level of service. This includes; broad geographic coverage or network, door-to-door service, reliability, timing, schedule frequency, security, tracing capabilities, flexibility to receive emergency shipments, single party service, and ability to handle diverse shipments (Eriksson 1986, Taneja 1979). The reliability of airfreight to deliver on time with minimal damage to the cargo results in both time savings and overall cost savings to the shipper (Taneja 1979).

Several transport researchers - McGinnis and Corsi (1978), Bernstein and Dajani (1979), Vann and Stephenson (1981), Caldwell (1982), Hayuth (1983a, 1983b), and McAlpine (1986) - have determined that non-transportation cost factors constitute an equal or greater consideration to users than price with regards to choosing airfreight. These factors include: time, commodity characteristics, market characteristics, and service.

McGinnis and Corsi (1978) based their analysis of choosing transportation modes on product characteristics⁵ and shipper attitudes. They found those shippers choosing airfreight were particularly concerned with transit time, reliability, limiting loss and damage.

Bernstein and Dajani (1979) in analyzing modal-split models concluded that the decision to employ airfreight was a function of the level of service variables (transit time, reliability), commodity characteristics and market characteristics.

Vann and Stephenson (1981) found in their study on marketing airfreight that traffic managers regularly chose performance attributes associated with speed and reliability rather than cost of the service. Similarly Caldwell (1982), in discussing cargo strategy, used factor analysis of 35 service and cost variables to determine four dominant

⁵ product characteristics include size, weight, value and perishability

factors affecting the choice of airfreight: time sensitivity, price, information availability, and pick-up service.

Hayuth (1983a; 1983b) analyzed competitive advantage of air against marine in Israel's international trade through four variables: time, cost, nature of the cargo, and market characteristics. He concluded that there was considerable diversity between the variables for choosing airfreight or marine. For example, traffic not considered previously for shipment by air may be moved on the back haul portion due to favourable freight rates.

More recently McAlpine (1986), in her survey of US shippers' preferences in using airfreight, confirmed that reliability, and high level of service were still important determinants. As well she found that past performance was an important factor for users' continued patronage. Many of the traffic managers surveyed felt dependability and service were worth the cost: although freight rates were considered secondary, they could not be unreasonable.

The importance of time effectiveness and reliability is the basis for Just-in-Time (JIT) deliveries. For manufacturers, JIT means effective inventory control based on time sensitive deliveries of frequent, smaller shipments. Quick transportation lessens the need for holding large stocks of inventory (Cooley in Hurst 1974). The ability of airfreight to provide reliable service and flexible

scheduling for JIT delivery is an example of the potential for air to be an appealing distribution mode.⁶

Harper and Goodner (1990), in their study of JIT delivery systems, concluded that the distance from the shipper to the production site was not as major a concern as were other variables; shipment size, frequency, reliability, and reduced inventory. McCarthy (1986), although biased as a freight forwarder, suggests airfreight is the future transport system for firms involved in JIT delivery. The expertise of airfreight forwarders in coordinating scheduled pick-up and delivery times, with firms involved in JIT management systems, had allowed some types of manufacturing plants to locate in peripheral areas.

Goins (1986) concluded that airfreight was filling the market's need by providing time-definite movement of goods; plus rendering up-to-date tracing capabilities to aid inventory control. The importance of tracing was cited by respondents to a survey conducted by Lieb (1988) of manufacturers using JIT. He also found reliability and responsiveness to short-term needs as critical measures of a transport company's performance. Similarly to Harper and Goodner (1990), Lieb found airfreight and trucking had increased business at the expense of rail.

⁶ the use of air transport to move freight is restricted by specific volume/weight characteristics of a commodity.

Hierarchies and Air Service

Several transportation researchers have established service variables as having considerable influence when shippers select airfreight. Unfortunately, a uniform quality of air service is not available to every city or town having an airport. The phenomenal acceptance of hub and spoke systems has affected both time and accessibility.

Prior to deregulation in Canada and the United States, the respective federal governments, through aviation regulatory agencies, demonstrated more interest in controlling air service to communities rather than overseeing airlines operate efficient network systems. As a result both governments managed most aspects of air transport, including the economically critical area of route selection. The power both the Canadian and American governments had in administering air service in their countries cannot be underestimated. However, the development of domestic air networks has long paralleled the historical evolution of the urban hierarchy.

It is important, in the design of air carrier networks, to recognize the existence of an urban hierarchy. Taaffe (1956; 1962), in investigating the urban hierarchy of U.S. cities, used air passenger flows between cities as his measure. In his earlier study he concluded that two primary factors in the development of air passenger patterns were city size and urban grouping. Air passenger flows focused on

larger centres: however, not all large urban centres necessarily attracted air passengers. Of particular relevance was Taaffe's introduction of the idea of traffic shadow⁷ in explaining dissimilar air service to cities within close proximity of each other.

Taaffe also determined that two lesser variables influencing air passenger flows were the city's function (eg. tourism, wholesale, manufacturing) and the existence of overnight rail service. In the future he predicted that a generally increased emphasis on speed would tend to increase the dominance of the large urban centres in air travel.

Taaffe (1962) continued his study to identify 'cities of dominance' or hubs in US domestic airline passenger flows. He determined that the amount of traffic originating and received by any particular city is related to its size and hierarchial position. The term hierarchy was defined as a connected set of linkages involving at least three nodes (Taaffe 1962 p.6). In this example a small centre may be dominated by a medium size centre which in turn may be dominated by a larger centre. Dominance of one place over

⁷ Traffic shadow, as defined by Taaffe (1956), is an effect in air transportation which exists when the largest city in a cluster of cities acts as a receiving centre for traffic to other cities in the cluster, thereby depressing their air traffic levels. This effect is most noticeable within a range of 120 highway miles from the largest centre.

another was based on passenger flows.⁸

Going beyond his earlier work, Taaffe matched his actual data with predictions from a gravity model which he developed. From the use of actual data and the forecasts from the gravity model Taaffe concluded that larger cities would increase their dominant positions and intensify the hierarchial makeup of inter-city links. Of considerable interest to the accessibility of future air service, Taaffe predicted that highways would play an ever increasing role in linking cities to each other and their hinterlands. In turn air transport would continue to be used to connect major hubs.

The effects of hierarchies on transport systems were investigated by Ekstrom and Williamson (1971). They described a transport system as a pattern of different levels of service based on a hierarchial system of urban areas. Level I was defined as a small number of metropolitan areas with a network of direct connections with rapid access. Level II was defined as a large number of medium-size places with few direct connections. Level III was defined as a larger number of small places with access over short distances (Ekstrom and Williamson 1971 p.37-8). They concluded that in practice a transport system has fewer than the total of possible interactions between places. This was

⁸ For example City A is dominated by City B if B accounts for more air passengers to and from A than does any other city.

due to assorted restrictions and barriers imposed by government regulations and business decisions.

The relationship of urban hierarchies to airline networks and the need to analyze which network configuration best suited a carrier's operation was the subject of a study by de Neufville and Gordon (1973). They analyzed the structure of passenger airline networks with the objective of minimizing scheduled delay. A model was designed to assist in choosing appropriate air carrier networks from various existing network configurations. The model determined optimal capacity and could be employed to allocate the best network to serve a particular traffic pattern. The model was also flexible, taking into account changing network patterns as different aircraft size were used, or when traffic increased. De Neufville and Gordon concluded that a hub and spoke⁹ network configuration would minimize overall system schedule delay; however, the quality of service may decline for some stations in the network.¹⁰

The characteristics and underlying economics of the airline hub and spoke system were the focus of a number of studies including Kanafani (1981), Kanafani and Ghobrial

⁹ This route configuration resembles the hub and spoke of a bicycle wheel.

¹⁰ Scheduled delay is in reference to the number of flights per day. For example if a small community is served on a linear route pattern it may only receive one flight per day, but the same community served by a carrier on a hub and spoke system may have more than one flight, hence less schedule delay.

(1985), Morrison and Winston (1986), and Oum and Tretheway (1990). The dramatic changes in network design were based on a combination of domestic deregulation, rising aviation fuel costs, scale economies, and maintaining high levels of aircraft utilization and schedule frequency.

In a hub and spoke network, major hub airports are fed by traffic generated at the hub city and by links with smaller non-hub communities. Many of the larger trunk air carriers rationalized their networks by utilizing large size aircraft¹¹ to service long distance and high density routes. Less important non-hub airports in turn were serviced by regional carriers utilizing smaller commuter-style aircraft¹² adapted for short haul routes.

An important consequence of deregulation was that through hub and spoke networks air service became increasingly viable to small and medium-size places. Carriers, by routing short haul flights through a hub, were able to offer smaller centres access to more destinations than previous linear direct routing. However, for non-hub cities and towns, a tradeoff for increased frequency of service and number of destinations is commonly a required change of aircraft at the hub, increasing the duration of a

¹¹In this context large size aircraft refer to jets capable of holding greater than 100 passengers.

¹²Commuter-style aircraft are smaller propeller-driven aircraft or jets with a capacity of 30-75 passengers.

trip due to connection times and circuitous routing.¹³

The circumstances of air transportation to non-hub cities was investigated by Butler and Huston (1990), Mahmassani and Toft (1985) and Warren (1984). These studies focused on whether service had improved or declined to non-hub cities since deregulation.¹⁴ Butler and Huston (1990) compared a sample of small cities' air service before and after deregulation. Applying the number of possible daily connections that could be made through a hub as a measure, they concluded that even the smallest cities in their sample enjoyed an increase in service.¹⁵ Improvements in air service included an increase in daily flights to a hub airport and an increase in competition as more carriers were free to offer service as well.

Mahmassani and Toft (1985) scrutinized the concerns of air transportation services to medium-size cities with high technology industries. They argued that the growth of high technology industries has imposed new demands on transportation resources.¹⁶ Unlike Butler and Huston

¹³ the increase in frequency of service is also related to less scheduled delay.

¹⁴ based on studies of American cities

¹⁵ Previous methods to measure service from non-hub airports included counting number of daily flights and those that were to non-stop destinations.

¹⁶ High technology firms' special needs include handling materials of high value and precision instruments, minimum transit time, reliability, and pick-up and delivery door-to-door service.

(1990), they concluded that the concentration of air transport networks in hub and spoke systems had meant a decreasing quality of service¹⁷ to medium-size non-hub cities with high tech industries. Their conclusions are based on the loss of direct connections, time delays in making connections at the hub, and the loss of larger jet aircraft to move cargo.

The problems of indirect travel were addressed by Warren (1984). He concluded that for non-hub communities air passengers were travelling greater distances on less direct routes. He also found that travellers were utilizing alternate modes of travel (eg. bus and automobile) due to increased costs and time. A concern stated by Warren, that has so far proved unfounded, was that higher costs for aviation fuel in the future may make connections to smaller centres impractical.

While the majority of studies relating to air networks have concentrated on air passenger flows, a few researchers in recent years have examined air networks involving the small package air express industry. The importance of time and accessibility is critical to the success of overnight delivery service. Hall (1989) and Chestler (1985) studied

¹⁷ Principal dimensions for quality of service are frequency of service and directness of the connections to major destinations. Generally gains in scheduled service are lost to delays at hubs.

the U.S. domestic overnight air express industry¹⁸ and its rapid adoption of hub and spoke networks.

The importance of a hierarchial order of centres is critical to the success of overnight deliveries. A significant difference between air carriers and their air cargo operations is that several of the larger air express package carriers have chosen to operate their main sorting hubs at airports in less populated centres.¹⁹ With congestion and curfews at many of the dominant airports in the United States air express firms required access during their peak hours of operation, which are between midnight and six a.m.. Chestler noted that generating local traffic at the main hub was a minor consideration to air express companies against off-hour accessibility.²⁰

Chestler's (1985) descriptive paper examines the nature and structure of air express operations and focuses on the spatial patterns of the transport system. He stated that difficulty with flight schedules and route changes by airlines led air express companies to purchase their own aircraft. In doing so those air express companies achieved

¹⁸ Air express firms specialize in moving freight made up of courier (parcels up to 5 pounds) and small packages (up to 70 pounds). They generally do not handle heavier air cargo which is the domain of the airlines and all-cargo companies.

¹⁹ for example; Federal Express chose Memphis, Tennessee; UPS: Louisville, Kentucky; Emery: Dayton, Ohio; Airborne Express: Wilmington, Ohio

²⁰ Oum and Tretheway (1990) feel that a passenger hub must generate over 50% of its business from the local community.

total control of their surface and air operations.²¹

Chestler's article gives an insight into the importance of time in the overnight delivery business. The hub and spoke system allows air express companies to quickly and efficiently access more city-pairs through a central hub. Pick-up deadlines and aircraft departures are set in each city so that all inbound aircraft arrive at the central hub within a short time-frame of each other. Shipments are sorted and aircraft depart to their respective destinations to facilitate morning deliveries.

Hall (1989) similarly investigates spatial patterns and delivery systems in examining the impact that time-frame restrictions have on the configuration of a network. Using the US as a region of study with its many time zones, Hall focused on arrival patterns, sorting operations and best location for a hub to maximize a time window for distribution. Hall's study concluded that network structures and time considerations favour a single master hub located in the eastern time zone over other locations and multi-hub configurations.

²¹ Air express or integrated companies are generally involved in door-to-door operations controlling all air and ground aspects of their operation.

Intermodality

The airplane arguably has had the greatest impact on time-space convergence, but not all shippers have easy access to aircraft. Freight transport firms, whether local or global, have continually developed and improved transportation systems to reduce transit times and increase accessibility. Transport technology improvements since 1945 have greatly assisted all freight modes. In air transportation examples include: jet powered aircraft, wide-bodied aircraft, containers, and mechanized ground handling equipment. In regards to the organization of the transportation system, intermodality has been a major systematic innovation. Hayuth (1987, p.15), in an extensive review of air and marine transport, defines intermodality as:

the movement of cargo from shipper to consignee by at least two different modes of transport under a single rate, through-billing, and through-liability

While intermodal freight movements have been more readily associated with surface modes due to the standardization of surface containers²² (Slack, 1990 and Hayuth, 1987; 1988) airfreight has also been involved. A simple form of modal transfer involving air is when shipments are moved to and from the airport by surface vehicle.

²² truck, rail, marine, and pipeline

Mahoney (1985), in his comprehensive work on intermodal freight transport, describes the limitations airfreight has had in being part of a more extensive transportation network. Early optimism led to predictions of airfreight becoming a full partner in intermodal transfers with surface modes. However, surface container design limitations and their excessive tare weight have all but eliminated multimodal transfers.²³ While complete container transfer from surface to air has been problematic, several systems have been developed including transferring air containers by truck.

Whereas the lack of an intermodal air container has been a setback to the airfreight industry, the extensive use of trucks has helped offset some disadvantages. Stevenson's (1982) research into the regulated air freight system of the New York City airports details the use of trucks to provide pick-up and delivery from areas greater than 50 miles away through air-truck alliances. These air-truck contracts were negotiated through Air Cargo Incorporated.²⁴ The substituting of trucks for aircraft to move freight over short distances from mid-sized cities (eg. Philadelphia) enabled the New York airports to increase their hinterland.

²³ The tare weight of a 8x8x20 sea container is over 5,000 pounds compared to an equivalent size air container which weighs 2,200 pounds (Mahoney, 1985).

²⁴ Air Cargo Inc. is a joint air carrier development designed to act as a broker for member airlines.

increase traffic volumes, and offer improved service to airfreight companies.

The use of truck transport to work in cooperation with air is discussed by Chestler (1985), Erickson et al. (1988), and Gorys (1988, 1990). Chestler predicted that future changes in small package services will involve utilizing trucks more and more to move cargo over shorter routes linking communities previously served by air. The rationale is the greater cost efficiency of truck transport over air on short hauls.²⁵

Both Erickson and Gorys examined the use of trucks to move Canadian exports to US gateway airports. Gorys (1988; 1990) study on Ontario exports found that modal share had shifted from rail and marine modes to highway and air. Several reasons cited for the use of trucks were based on both geography and highway infrastructure including; the extensive road network linking Canadian industrial concentrations with the US border; the short distance to US markets, which makes it hard for other modes to compete; and the directness and frequency of service (Gorys 1988, p.424).

Erickson et al. (1988) investigated Canada's Pacific Rim air cargo industry and the potential opportunities for trade with individual countries. One of the reasons cited for the use of US gateways for Canadian exports/imports was

²⁵ short hauls refer to the distance a truck can travel overnight or roughly 1000 km.

the lack of direct connections from Canada to overseas destinations for Canadian and foreign carriers.

Unfortunately, research involving air-truck intermodal movements is lacking. Mahoney's definitive study (1985) represents one of the few efforts to review the contribution that all modes have made to intermodality. A few researchers have dealt with intermodal movements involving air and marine modes.

Fawcett and Vellenga (1988), Erickson et al. (1988), and Taneja (1979) focus on a time-cost tradeoff in analyzing air-sea intermodal movements. Their basic premise is "half the time of sea for half the cost of air". The use of the sea-air concept is the result of an individual country's geographical location in which air and sea are the only two transportation options for international trade (Eriksson 1986). Capacity shortages on container ships from Asia to Europe lent shippers the opportunity to move freight via sea to North American West Coast ports and then transfer it to air for flight to Europe. The service provided users flexible, reliable and timely service. Despite the perception that the two modes do not mix, several factors led to sea-air utilization including; Just-in-Time (JIT) delivery systems, increased emphasis on logistics and the availability of backhaul airlift to Europe (Fawcett and Vellenga 1988).

Closing Remarks

Frederick Smith, the founder of Federal Express Corporation, views transportation as an integral part of the distribution chain and feels the need to shorten the time interval from production through to final delivery. He appears to be overly optimistic about air transport's future when he comments, "throughout history, whenever a faster mode of transport has been made available it has eventually become the primary distribution mode" (1991, p.229).

Sletmo (1986) counters this optimism in his paper on airfreight's effectiveness as a long-term distribution mode in international trade. A constraint to continued growth of any commodity traffic, or route, may arise in markets where demand outstrips the usefulness of air as a direct factory-to-consumer distribution system. Customer demand and increased volumes of sales may allow a manufacturer to produce the item closer to the market, using local inputs. Other reasons for changes in the distribution system include; warehousing large amounts of inventory, local competition, and airfreight rates. In any case, the consequences would be a decline for airfreight services.

The emergence of airfreight as a primary freight distribution channel has been anticipated since the end of World War II. However, an increased role in freight transport has been limited by: the international regulatory environment, high freight costs, capacity limitations of

aircraft. and accessibility. Not withstanding this, airfreight has found a niche market by providing time-definite transportation of shipments.

CHAPTER THREE

IMPACTS OF DEREGULATION

Corresponding to other transportation modes in Canada, the air transport sector had been tightly controlled through federal government regulations. In 1987 new legislation was introduced by the Canadian government to lessen regulation and to encourage innovation and enterprise (NTA 1987). Greater reliance would be placed on competition and market forces to meet the demands of users rather than having price and service characteristics dictated by Ottawa.

Deregulation was met with reservations by the general public and some freight companies, especially over concerns about pricing and quality of service (National Transportation Agency 1990). However, the effects on price and service were overshadowed by more dramatic outcomes. Domestic deregulation in Canada resulted in: the loss of large regional carriers, acquisition of carriers of all levels by other financially stronger operators; the growth of affiliated local feeder airlines; and the rationalization of air networks.

This chapter reviews the impacts of domestic deregulation on Canadian air carrier operations. The

discussion will encompass a brief synopsis of key events during deregulation, the circumstances involved in the forming of the current duopoly between Air Canada and Canadian Airlines International, and impacts on networks and airfreight carriers. The section will close with a review of the international regulatory environment and the limitations on operations by Canadian carriers.

3.1 Domestic Deregulation in Canada

The process of deregulation in Canada commenced in 1978 and culminated with the National Transportation Act 1987. The objective of the Act was to create a more open and efficient regulatory regime. It removed the bulk of economic regulations in southern Canada and opened the domestic air carrier market to new Canadian-owned services. In Northern Canada regulations were still in place, but relaxed substantially.

Prior to 1978, the federal government's regulatory policies emphasized geographical divisions, route protection, and "preferred carrier" status (Ellison 1984). Regulatory controls included: entry into the industry, access to routes, conditions of service (including frequency), fares, geographical restrictions, and merger policy (Transport Canada, 1987). Pressure by business and consumer groups on the Canadian government to make changes in the air transport sector was initiated by deregulation in

the United States.¹ Unlike the revolutionary change in the USA, the deregulation process in Canada evolved over a 10 year period.

Two areas where controls and regulations were most evident were the Regional Air Carrier (RAC) policy and the government owned airline, Air Canada. The RAC designated geographic boundaries for the operational area of the larger regional airlines.² Part of their service was to supplement the trunk carrier service of Air Canada and CPAir, usually on low density routes. The most important aspect of the RAC policy for the regional carriers concerned domestic and international charters. The federal government viewed charters as a "useful supplement" for the regionals and in many ways charters provided the primary source of operating revenues (Barone et al. 1986).

The "preferred carrier" was the government-owned airline Air Canada, which enjoyed preferential treatment. This included monopoly status on many domestic routes and unlimited spending (Ellison 1984). In 1978, in an effort to make Air Canada more accountable, the Air Canada Act 1978 was passed which made the airline subject to the same regulatory controls as all other Canadian air carriers. In

¹ Deregulation in the United States took effect in 1977.

² Regional airlines were Pacific Western (Western Canada); Transair (Manitoba and Ontario); Nordair (Ontario and Quebec); Quebecair (Quebec); and Eastern Provincial (Atlantic Canada).

the following year, 1979, route restrictions involving CPAir were lifted, allowing the carrier to compete head-to-head with Air Canada in previously restricted areas, including scheduled frequency.³ That same year competition and capacity on many routes increased further when the charter carrier Wardair was allowed to operate domestic scheduled charter flights (Oum et al. 1991)⁴.

In 1984, a new Canadian Air Policy was introduced which further outlined measures to relax regulations. The policy divided Canada into two regions: south and north, or the "designated area" (see Figure 1). While regulations remained virtually intact in the north, restrictions were relaxed in the south. The level of government regulation would be dictated by whether a carrier served destinations in the "designated area".

The new policy allowed carriers in the more populated south the freedom to reduce fares and removed all previous conditions (e.g. aircraft type, capacity) on scheduled airline service. The Regional Air Carrier policy was terminated, allowing all Canadian carriers into previously restricted geographical areas. As well, Ottawa's review of airline mergers and purchases were eased. While regulations were eased, entry into the industry was still controlled by

³ CPAir was still restricted geographically (e.g. in the Maritimes) on route selection.

⁴ Wardair concentrated service to major domestic markets.

FIGURE 1
Designated Area

the federal government under the "public convenience and necessity" requirements (Christopher 1989).

The implementation of the National Transportation Act 1987 on January 1st 1988 legislated many of the initiatives of the New Canadian Air Policy. The new legislation retained two distinct regulatory areas of the country. However, both the north and the south were affected by continued relaxing of regulations.

The greatest changes, in both the north and south, occurred with entry into the industry, licensing, airfares, and terms and condition of service (NTA 1987). In the past, a carrier would have to apply for a change in service including; market entry/exit, frequency of service, route selection, and type of aircraft used. As well, for a new carrier to enter the market it would have to demonstrate that its presence would not adversely affect the profitability of existing carriers (Oum et al 1991). These regulatory requirements were termed "public convenience and necessity" (PCN) tests. Control over entry and other PCN requirements was the responsibility of the Canadian Transport Commission.⁵ An air carrier could be, and often was, subjected to public hearings and challenges from competitors over attempts to enter a particular market.

Following the implementation of the Act, entry for new

⁵ In 1988 as part of deregulation, the Canadian Transport Commission was streamlined and renamed the National Transportation Agency.

carriers to operate in southern Canada was simplified to a "fit, willing and able" (FWA) test. The FWA test required the carrier to meet three criteria for entry; to be Canadian owned, to obtain an operating certificate (issued by Transport Canada), and to have sufficient liability insurance (Transport Canada 1987).

The most significant change to regulation concerning the "designated area" was to the PCN requirement. A reverse-onus was placed on existing operators to demonstrate that a new service would decrease or destabilize their existing service. The new National Transportation Agency could still limit types of service, aircraft size and type, routes, points, and schedules through restrictions on licenses.

The objectives of deregulation were to ease procedures for obtaining an operating license and allow carriers the freedom to provide price and service options that were not possible before. The regulations concerning fare levels and decreases in fares were eliminated, allowing carriers to have absolute control over setting airfares. In addition, carriers would be able to enter confidential rate agreements with users. Carriers, however, would still continue to publish fares and would not be allowed to charge above the published level (NTA 1987).

The elimination of license controls which included: flight schedules, routes, destinations, and aircraft capacities provided airlines with the opportunity to expand

their service options. Airlines would now have full control over all aspects of their operations, from which destinations to serve, the aircraft used, to the route chosen.

3.1.1 Takeovers, Mergers and Privatization

In 1982 there were six mutually exclusive carriers,⁶ two majors and four regionals, providing scheduled domestic jet service. The termination of the Regional Air Carrier policy resulted in the loss of protected routes and charter markets, which led to a series of takeovers and mergers. These were led by Air Canada, Canadian Pacific Airlines (CPAir) and Pacific Western Corporation (PWC). Their targets were the regional and local airlines. Table 1 illustrates the intensity of activity from 1983 to 1988.⁷

The regional carriers became takeover targets due to a combination of reasons. Their operational areas in Canada were protected under the Regional Air Carrier Policy; however, many of the routes were low density, and generated small revenues. To compensate, most of the regional carriers expanded into the profitable international charter market and therefore needed appropriate aircraft to fly the longer

⁶ Two majors: Air Canada and CPAir and four regionals: Pacific Western, Nordair, Quebecair, and Eastern Provincial

⁷ For example, during one period in 1985, both Air Canada and PWA owned 24.5% of the local commuter airline Air Ontario. Montreal-based Nordair was owned by Air Canada and CPAir within a two year period.

TABLE 1

Major changes in ownership of airlines in Canada during or following deregulation, 1983-88.

1983

- *PWA acquired 42% of Time Air, third largest commuter carrier.

1984

- *CPAir acquired Eastern Provincial Airways.
- *Innocan acquired Nordair from Air Canada.

1985

- *Air Canada and PWA each acquired 24.5% of Air Ontario.
- *CPAir helps establish Nordair Metro, a new feeder carrier.

1986

- *CPAir acquired Nordair Inc.
- *Nordair Metro acquired Quebecair.
- *Air Canada acquired 49% of Air Nova Inc.

1987

- *PWA Corp. acquired CPAir to form Canadian Airlines International Limited (CAIL).
- *Air Canada acquired 75% of Air Ontario and Austin Airways.
- *Air Canada Acquired Air BC.
- *Time Air acquired North Canada Air Ltd.
- *PWAC acquired 45% interest in Calm Air.
- *PWAC helps establish Ontario Express Ltd.
- *PWAC helps establish Inter-Canadian Inc. (Which combined Quebecair, Nordair Metro, and Quebec Aviation).
- *PWAC increases CAIL's interest in Air Atlantic Ltd. to 45%.

1988

- *Air Canada helps to create a commuter airline based in Quebec, Air Alliance, with 75% ownership.
- *Air Canada acquired 90% of Northwest Territorial Airlines.

Source: Oum and Tretheway (1991)

distances. With the termination of the RAC, the regional carriers were open to competition from a host of smaller local airlines as well as the majors. In many cases, their aircraft were unprofitable and unable to maintain domestic routes economically against more efficient operators. In addition Air Canada entered the international charter market and utilizing its vast resources quickly grew to eliminate competition (Barone et al. 1986).

By 1986 effective competition to Air Canada was consolidated between CPAir and Pacific Western Airlines. Canadian Pacific Airlines had expanded its geographic coverage by acquiring three of the four regional carriers: Eastern Provincial, Nordair and Quebecair. PWC, the parent company of the former regional carrier Pacific Western Airlines (PWA) had earlier solidified its domainace in Western Canada by acquiring Manitoba-based Transair. In the purchase, PWA gained access to the key Toronto market.

The flurry of mergers in the Canadian airline industry reached a peak early in 1987. PWA, the largest and most successful of the former regional carriers, merged with the major trunk carrier Canadian Pacific Airlines to form Canadian Airlines International Limited (CAIL). The merger formed a carrier large enough to compete with Air Canada throughout the country (Oum and Tretheway 1991).

In 1989, CAIL further consolidated the Level I⁸ Canadian air carrier situation by purchasing bankrupt Wardair. Wardair had attempted to become Canada's third major trunk carrier. In spite of its successful domestic scheduled charter operations, Wardair's limited access to feeder routes brought about its downfall.

The deregulation process was completed when Air Canada (AC) was privatized in two separate stages by the Canadian government.⁹ Privatization meant the end of Air Canada's commitment, by government decree, to provide air service to any Canadian community. Although under deregulation financial assistance would be given to any carrier to maintain existing domestic routes deemed essential.

3.1.2 Air System Networks

The result of air transport deregulation and restructuring during the 1980s left Canada with two major airlines whose networks stretched from coast-to-coast. By 1989, Air Canada and CAIL had expanded their service to smaller stations by either creating new airlines or purchasing smaller local carriers to serve specific

⁸ Level I carrier: in each of the two calendar years immediately preceeding the report year, transported at least 1,000,000 revenue passengers or at least 200,000 tonnes of revenue goods (NTA 1991). In 1991, two affiliated carriers Time Air and Air BC were also designated Level I carriers.

⁹ The two dates of stock issues were September 26, 1988 and July 6, 1989.

geographic markets throughout the country, including the far north (see Figure 2).¹⁰

The two majors rationalized their fleets and concentrated their efforts on serving long distance and high density routes. The affiliates functioned in several different roles: first, to maintain service on short haul, low density routes; second, to expand the major carriers' presence into markets which they did not previously serve; and third, to link regional points with the major carrier's national network at designated major hubs.

Prior to deregulation domestic air transportation networks could be described as being linear, constrained to direct point-to-point service between population centres of various sizes.¹¹ With the arrival of deregulation came a restructuring of airline routes by the majors and the new regional carriers. While not to the same degree as occurred in the United States, most Canadian air carriers chose to employ hub-and-spoke configurations. By utilizing hubs Air Canada and CAIL, in conjunction with their affiliates, would be able to provide "single-carrier" service to communities unable to support direct service. Previously, under the

¹⁰ In the case of Air Canada it either owns outright or has a majority share of its affiliated carriers. CAIL for the most part owns minority shares in its affiliates.

¹¹ An example of linear routing is Air Canada's flight from Moncton to Victoria. The flight departed Moncton with stops in; Montreal, Ottawa, London, Windsor, Winnipeg, and Calgary before arriving in Victoria (OAG 1984).

FIGURE 2

Level I Airline Affiliations

Regional Air Carrier policy passengers and airfreight would normally change to unaffiliated air carriers whose schedules would often not match.

The development of hub and spoke systems has occurred at different intensities throughout Canada (Oum and Tretheway 1990). Toronto is the best example of a hub airport in Canada. It serves as the primary hub for east-west domestic connections, as well as international and transborder links. Medium-size or regional hubs exist throughout the country functioning as transfer points for regional carriers and the majors.¹² Nonetheless, weaker hub and spoke networks exist due to Canada's small population which is geographically spread over a narrow band along the northern U.S. border (Barone et al. 1986).

Unlike in the U.S., where hubbing has created single carrier monopolies at many of the larger airports, neither of Canada's two major air carriers has been shut out from providing service to any hub. While this has been beneficial for competition it has also led to a strategy of paralleling flight schedules (see Table 2). For the user, while two airlines and numerous flights are offered, the closeness of the departures reduces the possible availability of alternative flight times which could benefit cargo operations.

¹² Examples of regional hubs are Calgary, Winnipeg, and Halifax.

TABLE 2								
Toronto to Vancouver: Weekday Nonstop Departures								
AC	0700	0850	1100	1315	1520	1700	1859	2110
CAIL		0845	1045	1245	1445	1655	1855	2100

CAIL's FLT. CP11 departs 1000 for Tokyo with a stop in Vancouver.

Source: Air Canada Flight Schedule, April 1992.
CAIL Flight Schedule, April 1992

3.1.3 Impacts on Airfreight Carriers

Airfreight is carried by three different entities in Canada (excluding transport by surface modes): passenger carriers, all-freight carriers, and air express companies. While regulatory changes have had an impact on freight handling, the majority of airfreight continues to be transported on scheduled passenger aircraft. In the past, all-freight carriers have been functioning on a small scale, except for Air Canada's designated cargo fleet. Air Canada, with a fleet of five DC8 freighter aircraft, established an overnight airfreight network in Canada. However, Air Canada announced in mid-1992 that as of November 1, 1992 they would terminate their freighter service (Montreal Gazette, 1992).¹³ This occurrence parallels a similar situation in the US following deregulation, where passenger carriers such

¹³ The service has been extended until the spring of 1994, due to long-term contracts with Purolator and no sales of its freighter aircraft.

as American and United discontinued their cargo fleets in the face of competition from overnight air express companies

Although airlines and air passengers have benefitted from the expansion of feeder networks (e.g. increased flight frequency), in a number of cases it has created problems for airfreight. For some communities the exit of the trunk carrier in favour of a regional carrier meant a change in aircraft gauge. The regional carriers utilize a host of small aircraft depending on passenger market demands, not volumes of freight. The new aircraft serving the route may not have the necessary cargo capacity or the ability to handle unitized shipments (NTA 1990).

The growth of US based small packaged/courier air express companies has been less spectacular in Canada than in the United States due to ownership restrictions. Nevertheless, since deregulation there has been steady growth in their Canadian air networks. The new licencing requirements under the NTA 1987 have helped these companies gain access to Canadian markets. Previously, restrictions concerning aircraft utilization and routing impeded their expansion.

A current hindrance to the expansion of air express companies are the Canada-US bilateral air agreements. Under these agreements American air express companies are restricted from utilizing their US hubs for sorting of

Canadian domestic freight.¹⁴ Some companies have adopted strategies similar to their US operations, wherein sorting hubs have been located at underutilized airports having 24 hour operations. For example, United Parcel Service (UPS) uses Mount Hope Airport in Hamilton, and Federal Express utilizes Montreal-Mirabel for some of their operations. For the most part air express firms that operate their own aircraft utilize linear routes due to the location of the Canadian population. Others take advantage of AC's and CAIL's extensive networks and ship with them.

3.2 International Regulatory Environment

Deregulation in the Canadian domestic sector did not impact the much more pervasive regulation existing in the international environment. In 1944, the Chicago Convention instigated the International Civil Aviation Organization (ICAO) in order to gain a consensus on a multi-lateral air agreement as a base for international civil aviation. The proposed multi-lateral air agreement failed, as attending countries could not agree on a common accord. In its place, individual countries chose to negotiate bilateral agreements with other sovereign states based on the Chicago

¹⁴ for example, a Federal Express parcel to be shipped from Toronto to Calgary cannot be transported from Toronto to the main sorting hub in Memphis, Tennessee and then transported onwards to Calgary.

Convention's agreements of international traffic rights or freedoms (see Appendix 1).¹⁵

The problem with bilateral agreements is the perception individual countries place on traffic rights. Bilateral agreements have been used as a device for state protectionism, rather than as an instrument to stimulate trade (Ludwick 1987). Many countries have impeded negotiations to increase foreign access into their domestic market for fear of losing their limited negotiated traffic rights. Negotiated rights through bilateral agreements have dictated frequency, airport designation, aircraft type and capacity.¹⁶

Thus difficulties involved in negotiating entry and traffic rights have restrained airlines and all-freight carriers from establishing international routes. In many cases freedoms are only exchanged between countries' designated flag carriers. This may, in part, explain why some of the major players in today's airfreight market are the national flag carriers of the state, for example Air France and Lufthansa.

¹⁵ at the Chicago Convention 1944, only the first four freedoms were agreed to by attending nations. In most bilateral agreements these are still the only freedoms negotiated.

¹⁶ for a further discussion on bilateral air service agreements see R. Doganis (1985) *Flying Off Course*.

3.2.1 Canadian Carriers and International Coverage

In 1964, the Canadian Federal Government, with the cooperation of TransCanada Airlines (Air Canada) and Canadian Pacific Airlines (now CAIL), produced a policy to divide the world's air market geographically between the two carriers. The agreement resulted in each carrier operating international routes without direct competition from the other. Air Canada received the United Kingdom, the Caribbean, most U.S. routes, and all of the northern European destinations with the exception of Amsterdam. Canadian Pacific Airlines received the Orient, the South Pacific, Latin America, and the southern European destinations as well as Amsterdam (Erickson et al. 1988). In effect, any negotiating of air agreements would involve one airline or the other, allowing both to establish international networks. In 1987, the agreement was renegotiated to allow the airlines to trade routes, nevertheless at present the geographic divisions remain in place.

The consequences of the "division of the world" agreement has been to thwart the expansion of either airline into each other's market. For example, Air Canada has not been able to secure landing rights for Tokyo (a CAIL destination), and entry into the lucrative Japanese market. Air Canada has gained access, though, to several international destinations to provide a round-the-world

cargo service including stops in Asia. However, its DC8 freighters were considered uneconomical to operate such a service.

3.3 Closing Remarks

The most dramatic changes in the North American airfreight industry occurred in the United States following deregulation in 1977. The lifting of non-competitive controls allowed freight forwarders and surface transport companies to expand their service by utilizing their own aircraft. Prior to US air deregulation the scheduled air carriers and a few all-freight companies controlled the majority of cargo shipments. The greatest impacts have occurred in the small package/courier sector where several companies have grown to dominant positions in relatively short periods of time.¹⁷

These effects are now being felt in Canada, where domestic deregulation has allowed both of Canada's major air carriers to expand and oversee passenger and cargo services throughout the country. In theory, airfreight can now be transported under the control of one operator anywhere in the country, rather than interlining between independent carriers. The accessibility to freight services currently available to shippers was not present in the pre-deregulation era. Even

¹⁷ For example, Federal Express was founded in 1973.

with the increase in destinations served by Canada's air carriers, it remains that not all airfreight can be moved to every destination by aircraft. Chapter Four examines airfreight handling systems and the employment of trucking to extend networks.

CHAPTER FOUR

AIR CONTAINERS AND INTERMODALISM

Since the 1950s there have been two significant changes in the freight transportation system. These innovations provided an increased accessibility for users and reduced transit times. Containerization and the development of intermodal systems have had a profound effect on the shipping industry, its structure, operation, and management.

Sea containers were the initial technical innovation. Sea or surface containers are basically standardized rectangular boxes which allow a shipping company to consolidate general cargo into a single unit. The emergence of containers brought about numerous other technical improvements including: new designs in surface vehicles, ground handling equipment, and terminal operations. The benefits, for all those who took advantage, were increased efficiency and decreased operating costs.

Intermodalism is the basis of a reorganization within the transportation and distribution system.¹ The term refers to a shipment transported from origin to destination

¹ For a more detailed discussion of intermodalism see Y. Hayuth (1987), *Intermodality: Concept and Practice*, and J. Mahoney (1985), *Intermodal Freight Transportation*.

by more than one mode. It is not a new concept, but containerization and deregulation of the transportation industries in Canada and the United States provided an abundance of new routing opportunities within a framework of freight carrier cooperation.

The most successful applications of intermodal systems have been amongst surface modes. The standard rectangular container can be carried smoothly and economically on most surface vehicles. Coordination and synchronization of a number of different vehicle types facilitates the efficient transport of containers from origin to destination.

Intermodalism can be examined from three different perspectives; as a problem, as a challenge, and as a tool (Mahoney 1985). The problem has been and remains the inconsistency in transferring shipments between different freight transport modes. The challenge in intermodalism is to keep goods flowing continuously while being transferred any number of times. Finally, as a tool, intermodalism offers shippers greater choice of routes and a broader geographic coverage.

Airfreight, unlike the surface freight industry, is not considered a full partner in integrated intermodal transfers, but is still confronted with comparable problems and challenges (Hayuth 1987). The most pronounced obstacle is the lack of a suitable air-surface intermodal container. The challenge of maintaining a continuous flow has been in

place ever since the first airmail flight. Aircraft, unlike surface transport modes, cannot make direct deliveries to factories. Thus there has always been a need to move shipments by truck to and from the airport. To facilitate intermodal movements, airfreight firms have developed their own systems of unitization.

The aim of this chapter is to examine airfreight's involvement in intermodalism. The first section of the chapter will provide background on the uniqueness of unit load devices in general and air containers in particular. The second section will discuss the difficulties airfreight operators face with single modal or intramodal transfers. The third section will investigate airfreight's current involvement in intermodalism, including the rise of small air express firms or integrators.

4.1 Unit Load Devices

A unit load device (ULD) is a single unit aiding the consolidation of numerous smaller shipments. The application of ULDs offers many benefits, but also creates problems for the airfreight industry, many of which will be discussed in the following section. ULDs have improved the handling of smaller shipments in the airfreight industry, indeed ULDs have revolutionized the way goods are managed and transported by the major surface modes - sea, rail, truck. The advantages to unitizing cargo include: easier handling

procedures, fewer pieces to be accounted for, fewer items to be lost or stolen, less paperwork due to the smaller number of items to be listed, and easier intermodal transfers (Mahoney 1985).

ULDs used in airfreight have two basic forms: pallets and structural containers. The pallet is a rectangular thin, strengthened-aluminum platform, upon which various smaller sized packages are assembled and held in place with a net or covered by a light shell called an igloo. Structural containers are whole rigid structures designed to restrain cargo placed within. Containers come in a variety of shapes and sizes to correspond to an aircraft's interior dimensions.

4.1.1 Pallets: Advantages and Disadvantages

Each of the two forms of ULDs have advantages and disadvantages. The advantages of pallets are: low tare weight,² lower initial investment, ability to be stacked for backhauling or for storage, and having only a few standard sizes. Disadvantages identified with pallets are; limited use in intermodal movements, problems with theft and damage, their openness to the elements (e.g. rain), and the labour required to assemble and breakdown pallet loads.

The initial pallet dimension of 88" x 108" was designed

² tare weight refers to the empty weight of the pallet or container

to accommodate military aircraft and commercial vans (i.e. 88"). The width was later extended to 125" from 108" to equal the maximum width of narrow-bodied Boeing 707 and Douglas DC-8 aircraft. With the development of the wide-bodied Boeing 747, a new series of pallets was designed to meet the interior dimensions of the aircraft. The new gauge became 96" x 125". Accordingly, the common standard measures of 88", 96" 108" and 125" were established.

4.1.2 Containerization: Advantages and Disadvantages

Similar to other transportation modes, airfreight operators and shippers have derived many benefits from containerization. Unitization, has resulted in a reduction in costs for the cargo firm and tariffs charged to shippers (Hayuth 1987). Lower costs have been associated with decreases in turnaround times at terminals for aircraft and traffic servicing costs.³ Containers have increased the ease of handling shipments, reduced ramp congestion and improved the level of service. They have also allowed shippers the option of self-loading their goods, further reducing the amount of labour required and costs incurred by airfreight companies. Finally, containers protect shipments from theft, loss, damage, and the weather.

Containers come in a wide variety of shapes and sizes

³ traffic servicing costs include ground handling costs, support facilities and labour costs.

to suit the proportions of main-deck and lower lobe cargo holds of most aircraft. Regardless of the size of the container, its width and length dimensions have been influenced by the previous gauges developed for cargo pallets. Prior to 1966 containers were in limited use, however the advent of wide-bodied aircraft, such as the 747, changed shippers' attitudes toward containerization. The 747, for example, was designed to carry only containers in the lower lobe, with no bulk load provision except in a small separate compartment (Riggs 1986).⁴

Along with the many benefits that containers provide there have been a number of constraints on their use. Some restrictions over the years have become less problematic as the airfreight industry has accepted their widespread use. Difficulties with utilizing containers have been identified in the following areas: design and standardization, backhaul and directional imbalances, intramodal and intermodal transfers, acquisition costs of containers, tare weight penalties, and ground support equipment (Mahoney 1985). While all of the aforementioned characteristics of containers are important, only the first three will be the focus of this paper.

⁴ The 747 freighter can haul a maximum load of 112,400 kg. of freight. It can carry the equivalent of 29 8x8x10' containers or pallets on its main deck plus 30 LD-3 containers on its lower deck.

4.1.3 Design and Standardization

Containers are designed to conform to an aircraft's interior dimensions to utilize all available space. In comparison to surface containers, air containers are in general considerably smaller and few designs are rectangular in shape. The different aircraft and their unique designs have been problematic for airlines wishing to lower costs through standardization of equipment.

Initially, most new container designs were associated with lower deck lobes on wide-bodied aircraft, that being the location where baggage and cargo are carried on passenger flights. The new generation of wide-bodied aircraft offered increased capacity which exceeded the needs of passenger baggage. Some air carriers placed an emphasis on improving lower deck utilization, and in doing so they realized the important contribution air cargo makes to increasing revenues.

The initial design objectives of air containers were two-fold: 1) to design containers to conform to interior dimensions and therefore maximize available space; and 2) to accomplish the first objective by minimizing the number of container types in the system (Kehe 1986). The first objective was met. Regarding size and shape, air containers were made to fit into virtually every kind of aircraft space. The second objective encountered more obstacles. The lack of standardization in container design was a reflection of the

numerous aircraft types that were in existence.

As important as size and shape were, air containers needed to fulfil two additional criteria: 1) they must be lightweight; and 2) they must be strong enough to take a limited amount of physical abuse (Kehe 1986). The goal throughout was to reduce the tare weight, while not sacrificing container strength. For the most part this has meant higher acquisition costs for containers made with "space age" materials.

Two major flaws still existed in the design of air containers. First: containers constructed with lightweight materials suffered an inordinate amount of damage during ground handling. Second: airfreight operators were still not satisfied with the tare weight.⁵ With all the exotic materials tested, the most popular, lightweight, durable containers are those constructed from aluminum (Tyler 1986).

4.1.4 Backhaul and Directional Imbalances

Trade or directional imbalances on routes has been identified as one of the oldest problems in transportation. In airfreight operations this has often resulted in air containers "stacking up" at one place while at the same time being needed in another location. Due to the structural

⁵ The LD-1 container was designed in 1966 with a tare weight of between 86 and 125 kilograms; in 1936 the design weights were from 79 to 179 kilograms depending on construction materials (Mahoney 1985).

rigidity of air containers, the dilemma has been how to transport non-revenue containers on the backhaul portion of a route. Backhaul is the return portion of a trip where demand for space is often less than on the outbound haul.

No easy solutions have been found to deal with the difficult backhaul issue outside of returning non-revenue empty containers on a space available basis (O'Connor 1989). Companies have offered lower freight rates on the backhaul portion in an attempt to attract shippers who would not normally choose airfreight (Hayuth 1983a). Other alternatives include; transporting empty containers by surface vehicle, and employing collapsible or throw-away cardboard containers. One favoured solution has been to maximize the use of pallets. Pallets can be stacked requiring minimal space on the return trip.

4.1.5 Intramodal Transfers

Within the airfreight sector additional weaknesses pertaining to containers occur. Their limitations consist of problems with intramodal transfers⁶ whether they be online or interline. Generally intramodal transfers are easier to accomplish than intermodal movements because vehicles and containers are fairly standard within most modes.

⁶ Intramodal transfers refer to movement of goods between carriers of the same mode, online transfers are between aircraft of the same firm, and interline transfers are between two different companies' aircraft (Mahoney 1985).

Airfreight, however, struggles with more vehicle exchange problems than other modes. Two interrelated reasons for this situation are: lack of overall standardization of container designs, and a wide variety of aircraft types being used.

The lack of container standardization can be directly attributed to aircraft designs; "in containerized cargo operations, the number of different size containers in use normally increases with the size and types of aircraft in use" (Tyler 1986, p.516). Aircraft manufacturers (e.g. Boeing, Airbus, Lockheed, McDonnell-Douglas) have designed their aircraft to meet a host of different size specifications. In many cases these do not necessarily coincide with other manufacturers' designs. For example, the initial container developed for the 747 was the LD-1.⁷ The problem with the LD-1 design was its inability to interchange with other wide-bodied aircraft (DC-10 and L1011). The LD-1 was redesigned to fit on the lower deck of all three aircraft, therefore allowing operators the option to transfer containers between aircraft without sacrificing space. The new container was designated LD-3.⁸ In later

⁷ LD standing for lower deck

⁸ While the LD-3 became the most manufactured air container, it still did not resolve standardization problems. It was incompatible with newer narrow-bodied and wide-bodied aircraft, such as the 767, 757 and A320. The 767, for example, required a new series of containers to match its interior lower deck dimensions, especially its width. The containers could still be transferred, but
(continued...)

years the European consortium, Airbus, designed the lower deck of their A300 and A310 aircraft to accept LD-3s without a major loss of space.⁹

The difficulty with containers has been that they may not be compatible for transfer to another aircraft, unless the connecting aircraft is of similar type and design. The airfreight operator has had to select the type of container to allow a shipment to be onlined without having to be reloaded (Morin 1992). Otherwise it becomes a time consuming procedure to breakdown the loaded container and either reload it into a suitable container or assemble a pallet to conform to the interior dimensions of the different aircraft. This may result in increased labour costs and additional time required to transfer the contents of a container. As well, shipments become susceptible to damage, theft and loss.

While there have been problems with transfers of lower lobe containers, transfers of main-deck containers have fared somewhat better. The standard air container developed

⁸ (...continued)
because of their dimensions there would be a loss of revenue space on another aircraft.

⁹ The Airbus A320 uses a variation of the LD-3 except the height is 18" shorter (i.e. 46"). The new container is designated as LD-3-46. Similar to other derivatives it can be onlined/interlined, but due to its height limitations is not fully able to utilize all available space.

for the main-deck of the 747 measures 8'x 8'x 10'/20'.¹⁰

These containers are transferable only within wide-bodied DC-10 and L1011 aircraft: however, only the 747 allows the containers to be placed side-by-side.

Where containers have posed numerous transfer problems, pallets have been more readily usable for intramodal movements. The main decks of all aircraft can utilize 88" or 96"x 125" pallets. Similar to containers, the problem remains that pallet loads are moulded to match the interiors of a particular aircraft. Any transfers between different size aircraft has resulted in a loss of revenue space.

The development of hub-and-spoke networks also has had an effect on intramodal transfers. Since deregulation in North America there has been an increased use of smaller aircraft to match service levels (Courtney 1984). This has been an outcome of hub-and-spoke networks created by the major air carriers affiliated with regional airlines, and air express companies. In turn, this has resulted in many cases of smaller non-container type aircraft serving non-hub airports. Cargo, if possible, is bulk loaded. Thus, the difficulty at the hub remains the transfer of cargo between aircraft of different sizes.

Individual company solutions towards container transfer problems vary. Air Canada, for example, would be

¹⁰ 1 T.E.U.: the standard sea container measurement equivalent is 8'x8'x20'.

representative of most air carriers involved with unitized cargo. It can be difficult for Air Canada to transfer a pallet or container from one of their narrow-bodied aircraft onto a wide-bodied plane without sacrificing revenue space for online convenience.¹¹ Even transfers between the wide-bodied fleet can be difficult. Air Canada's solution has been to minimize the number of container types used and to sacrifice revenue space, in turn decreasing ground handling of shipments (Morin 1992).

Small packaged air express companies, such as Federal Express and United Parcel Service, have designed their own containers to maximize capacity and allow for transfer to all fleet aircraft. Their advantage over airlines is that cargo is only transferred between their own aircraft. This has allowed them to fully integrate container designs into a fairly standardized fleet of aircraft (Tyler 1986).

4.1.6 Intermodal Transfers

The container revolution in the freight transportation industry provided shippers with creative possibilities for intermodal transfers between all modes. Airfreight has been involved in two types of intermodal movements; air-truck and air-sea. However, the lack of compatible air-surface

¹¹ Air Canada has a fleet of narrow-bodied DC-8s, DC-9s, 727s, and A320s while also operating wide-bodied 747s, 767s, and L1011s. In addition, Air Canada's affiliated regional feeder services operate small jet and propeller-driven aircraft which cannot carry containerized traffic.

containers has retarded the smooth transfer of unitized shipments between air and surface modes. The challenge for airfreight is maintaining a continuous flow while shipments are being transferred between modes.

4.1.6.1 Air-Truck

The best examples of intermodal movements of airfreight has been between aircraft and trucks. For the most part this has been associated with local pick-up and delivery operations. However, long distance movements of airfreight by means of truck transport have been common for many years. In 1941, Air Cargo Incorporated (ACI) was formed in the United States by a group of airfreight companies. Among its various functions, ACI acted as a broker on behalf of air carriers to negotiate contracts with trucking firms for pick-up and delivery of airfreight from communities lacking air service.¹² Since its formation, ACI has grown to become the negotiating medium for a number of foreign air carriers operating in the U.S., including Air Canada.

The deficiency of airfreight services in many medium-size cities has restricted potential shipments from being transported by aircraft. A non-hub airport may be served

¹² While several advantages existed for air carriers in utilizing the surface mode, including lower rates and door-to-door charges, the service met with limited acceptance by trucking firms. Difficulties with the combination service ranged from lack of trucker interest, to disputed liability, to disagreement over rate structures (Stevenson 1982).

with a number of passenger flights throughout the day, but cargo capacity may be limited. In addition, it is too expensive for freighter aircraft to stop at every station. In many instances trucks are used to transfer airfreight. Trucks provide an economical mode of transportation to link non-hub places to hub airports.

The truck-for-air substitution between airport cities has had many advantages for shippers and airfreight operators. First: it has encouraged the use of airfreight by connecting airport cities with larger traffic hubs having superior service. Second: it has enabled airfreight companies to offer single entity responsibility between more places. Third: it has enhanced airfreight firms' operational flexibility. Fourth: it may have lowered rates in some cases (Stevenson 1982, p.237). Successful intermodal operations have been contingent on providing shippers in these smaller cities with the same priority and service as those in major airfreight centres.

Trucking firms involved in transporting airfreight have redesigned their equipment to handle the special needs of airfreight. Trailers have been equipped with a roller bed system to handle direct interchange of containers and pallets. As well, some trailer designs incorporate air ride suspensions to provide a similar motion to an aircraft to accommodate fragile shipments, such as computer equipment (Morin 1992).

Air Canada and CAIL have been using truck substitutes from large and small centres in both Canada and the United States. In the United States, AC utilizes the services of Air Cargo Inc. to increase its freight network. Agents throughout the US mid-west send freight to Air Canada's Chicago hub via ACI to be consolidated into containers and pallets. Depending on the urgency of the shipment Air Canada does not transport the unitized loads via air but rather by truck to its main cargo facility in Toronto. Canadian operates a similar service through various agents and brokers.

The decision to use trucks instead of aircraft has been influenced by several factors. First; the aircraft used on the routes are smaller jets (DC9 and 727) which are not equipped to handle containers or pallets. Second; pallets and containers loaded in Chicago are matched to connect in Toronto with onward flights using wide-bodied aircraft. It is currently more efficient to consolidate shipments in Chicago rather than Toronto. Third; unbalanced trade exists on the route, making the use of larger aircraft uneconomical. Fourth; the ability of trailers to efficiently handle various combinations of pallets and containers has been fully exploited.

The use of trucks for airfreight feeder services in Europe has been ongoing for decades, however the concept had been slow to develop in North America due to a heavily

regulated trucking environment. Restrictions on licensing, weight-to-axle ratios, trailer length, route selection, ownership, and competition had previously frustrated the operation of an efficient integrated freight transportation system. With the advent of domestic deregulation of the air and trucking sectors in North America many of the rules governing freight movements were eased. The result for the airfreight industry has been the rapid rise of small package air express firms or integrators¹³ and the decline of all cargo air carriers.

In the United States, the integrators prior to deregulation were mostly performing the job of freight forwarders. U.S. anti-trust regulations prohibited a freight transport company from owning more than one form of transport (Mahoney 1985). The freight forwarders controlled their ground operations and utilized air carriers to move their shipments. Deregulation, amongst many changes, ended the restrictions on vehicle ownership and routing. The larger freight forwarders purchased used passenger aircraft to move their shipments. This has enabled integrators to control both ground and air movements with their own vehicles including: dovetailing ground and air schedules.

¹³ The term integrators has been used to describe small package air express firms such as Federal Express and UPS. These companies have implemented total control over the movement of a shipment by utilizing their own vehicles and staff for pick-up and delivery to sorting to the line haul portion.

designing intermodal containers to match their equipment, and offering door-to-door service on an expanded route network (Tyler 1986).

4.1.6.2 Air-Sea

Air-Sea movements combine two freight transportation modes with divergent characteristics to provide a cost/time tradeoff. The concept was developed to take advantage of low maritime tariffs and the speed of aircraft to minimize cost and transit time. Air Canada is considered the innovator of this type of service. In the late 1960's it persuaded a group of Hong Kong shippers to transport their goods via containership to Vancouver where the cargo loads were transferred onto an aircraft for Europe (Eriksson 1986). Since that time various sea-air links have been created. Their utilization and success has generally coincided with periods of capacity shortages on other non-air modes (Fawcett and Vallenga 1988).

4.2 Closing Remarks

There is no doubt that the development of containers has had global ramifications for the freight transportation industry. Airfreight is just one of the many modes to benefit since their inception. For example, the increase in trade and the location of new manufacturing industries in Asia has been greatly supported by containerization and

airfreight (Hayuth 1990).

The deregulation of the transport sectors in Canada and the United States has opened a multitude of opportunities for companies to increase their transport networks. Whether airfreight becomes a full partner with surface transport modes is difficult to foresee without the design of a compatible air-surface container. At present, the small package air express firms, with their integration of air and ground services and successful adoption of hub and spoke systems, are setting the standard for intermodal movements in the airfreight sector.

Most freight is still transported on passenger flights. However, non-hub airports, such as Ottawa, have been hindered in their ability to move airfreight by the domainance of narrow-body passenger aircraft serving them. In addition, all-freighter aircraft in many cases are prohibitively expensive to operate in smaller cargo markets. The utilization of trucks to supplement airfreight networks has provided a valuable link to hub airports.

CHAPTER FIVE

GEOGRAPHICAL BACKGROUND OF OTTAWA

Ottawa is the national capital of Canada. It is located on the Ottawa River 200 kilometres west of Montreal and 450 kilometres northeast of Toronto. The region has developed within close proximity to the centre of Canadian economic activity - the Montreal-Toronto corridor - and the US economic heartland (see Figure 3). The population of Ottawa and the surrounding National Capital Region (NCR)¹ based on the 1991 census was 920,857 (Statistics Canada 1992), making it Canada's fourth largest metropolitan area. In comparison to Canada's three leading cities of Toronto, Montreal, and Vancouver, the NCR ranks as a medium-size urban area.

Trying to evaluate Ottawa's hierarchical position amongst Canadian cities produces different outcomes. Politically, its function as the chief political-administrative centre for the federal government has made Ottawa's influence, on a national scale, felt throughout the

¹ The National Capital Region (NCR) is defined as the geographic area consisting of cities, towns, and villages within a radius of 50 kilometres from the centre of Ottawa in both Ontario and Quebec (City of Ottawa 1987). Cities within the NCR include: Nepean, Gloucester, Orleans, Vanier, Kanata, Hull, Alymer, and Gatineau.

FIGURE 3
Ottawa and Nearby Major Cities

country. Internationally, Ottawa's political influence has been much weaker. Economically, apart from government policy and legislation decisions, Ottawa's small industrial base has little influence inside or outside of the country.

This chapter will briefly investigate Ottawa's economic base, the function of Ottawa Airport as a regional node in the Canadian airport system, and examine the past and current status of national and international passenger and cargo airlinks.

5.1 Economic Base

The federal government and its large employment base are the dominant feature of Ottawa's economy but a small specialized manufacturing sector does exist. The NCR is home to a sizeable number of Canadian and foreign firms involved in manufacturing and exporting high technology products and services.² This includes companies involved in the development of computer hardware and software, as well as firms providing only services.

The origins of Ottawa's high technology industry can be traced back to the federal government's creation of the National Research Council (NRC) in 1916. The NRC in part was responsible for attracting a large number of scientists and

² According to Doyletech (1991), there are 350 high technology firms located in the Ottawa area. Toronto has the highest concentration of high technology industries made up of a large number of foreign branch plants.

researchers to the area (Steed and DeGenova 1983). Following the Second World War a number of private independent firms formed to produce computer hardware to support the military. Subsequently, these initial firms became the source of local entrepreneurs who generated successive spin off industries.

After sustained growth through the 1970s the sector stagnated in the following decade (Doyletech 1991). The 1980s were identified by a slowdown in the creation of spinoff firms, decreases in government research funds, companies expanding in offshore locations, and an overall lack of local venture capital (RMOG 1992). As well, several major Canadian-owned firms (eg. Mitel, Leigh Instrumental) were purchased by larger transnational corporations. Although early optimism over the development of a leading Canadian high technology complex has declined, the area has been emerging as Canada's software capital (RMOG 1992). Progress made in the less capital-intensive software sector has been significantly greater than the hardware side. This new growth has been led by spinoff firms such as Corel and Cognos. At present the hardware sector remains anchored by long time residents Bell Canada, Bell Northern Research, Northern Telecom, and Digital.

Both the federal government and the high technology industry require reliable transportation links. Ottawa's inland location, the great distances to other Canadian cities, and the products produced has meant that the two

sectors have become major users of airfreight services in Ottawa. The federal government is a primary information supplier to the population of Canada. Much of the information supplied can be considered perishable, requiring fast and reliable transport. The government's utilization of airfreight services has been and continues to be concentrated heavily on small packages and envelopes which are sent either through Canada Post or by courier. In addition, the Department of External Affairs employs airfreight to move possessions of its personnel to and from Ottawa.

The high technology industry has been described as "footloose" (Steed and DeGenova 1983).³ Their manufactured products are characterized by being time-sensitive with a high-value-to-weight ratio. Accordingly, these are the type of products airfreight has been able to attract. Ottawa's high technology sector has been a primary source of larger shipments. The strength of the high technology sector has been its export potential. Steed and DeGenova (1983), in their survey of the Ottawa high technology complex, found that sales by local firms were evenly split between Ottawa, the rest of Canada, and offshore. They concluded that there was no differentiation between the size of a firm or its

³ Footloose industry: an industry with no strong market orientation or material orientation in its locational requirements, because transport involves only a very small element of its total cost structure (Dictionary of Human Geography 1988, p.159).

ownership, in terms of a company's propensity to export. Future estimates of worldwide trade in high technology products foresee an increase over the next decade (Doyletech 1991). As Ottawa's high technology industry exports many of its products and the accessibility to markets depends on the available transportation infrastructure.

5.2 Intercity Transportation Infrastructure

The NCR is served by rail, road, and air. The Ottawa River is unnavigable for commercial marine operations. Priorities for most shippers, such as the federal government and the high technology industry, lie with road and air connections. Ottawa's location is within close proximity (100 kms.) of Highway 401, the primary transport link between Montreal and Toronto. However, not being located adjacent to the route has been troublesome for Ottawa's intercity transportation needs.

Road connections to and from the Ottawa region have been criticized by local interest groups (RMOC 1992). Figure 4 illustrates the current major road links. Ottawa's road links appear to reflect the importance Montreal has had as a transportation centre and gateway for Canada. The only expressway (four-lane) from the area connects Ottawa with Montreal. While that may have fulfilled the region's needs in the past changing trade flows and the accelerated growth of Toronto have created new transportation requirements.

FIGURE 4

Ottawa: Primary Intercity Road Links

Even with vigorous lobbying by regional governments and freight firms, Ottawa lacks adequate road links.

Longstanding differences between the federal government and the Quebec provincial government have resulted in the absence of an expressway link between Ottawa and Montreal-Mirabel International Airport. As well, access to Southern Ontario and US border crossings must utilize congested two-lane highways. The Ontario provincial government has proposed widening Highway 16 to four lanes to connect Ottawa with Highway 401. Nevertheless, construction on the project will take five to seven years to complete.

Airlinks to and from Ottawa have also been heavily criticized by local governments and other users. The following sections more closely examines Ottawa's air transportation infrastructure, beginning with the role of Ottawa International Airport.

5.3 Ottawa International Airport

As the gateway to the nation's capital, Ottawa International Airport functions predominantly as a regional terminus rather than as the main entry port for the country. The airport was first constructed during World War I, although it was not until 1960 that it was designated as an international airport. As an international airport it has functioned in a minor role in the Canadian airport system.

Ottawa's airport, similar to all major Canadian

airports, is owned by the Canadian government and managed by Transport Canada. Transport Canada's mandate has been to provide uniform safety and service standards for the airports which it controls throughout the country. This has included all airside⁴ and groundside operations.⁵ A criticism expressed by many larger communities has been with Transport Canada's lack of recognition of the economic benefits and the competitive position of individual airports (Feldman and Milch 1983). While the proposal of privatizing some of Canada's major airports has been discussed for a decade, it has only been since 1992 that a few cities have "taken over" their airport.⁶

In 1987 Ottawa's airport underwent large scale renovation to the passenger terminal and cargo facilities. The upgrade increased the passenger terminal gate capacity to sixteen, including five gates to handle wide-body aircraft.⁷ On the cargo-side, the privately owned Ottawa Air Cargo Centre (OACC), a 60,000 square foot complex, was

⁴ airside operations include air traffic control, runways, and taxiways

⁵ groundside operations include passenger and cargo terminals, and airport access

⁶ In June, 1992 Calgary was the first city to gain control of its airport. This resulted in the city setting up a non-profit airport authority which in turn leases the airport from Transport Canada (Cattaneo 1992). Transport Canada still owns the airport lands and controls airside operations.

⁷ Only one gate can accommodate a 747.

built in the Gloucester Industrial Park to house air carriers, freight forwarders, customs brokers, Canada Customs, and small package courier firms.⁸ The tarmac area was strengthened as well to handle heavier 707 and DC8 cargo aircraft. The Gloucester Industrial Park located on the north side of the airport also incorporated a Canada Post sorting facility, Cara Catering, and First Air's cargo and maintenance complex.

Not all cargo operations have been located in the Gloucester Industrial Park. Long time residents, Air Canada and CAIL, maintain their own separate cargo facilities west of the passenger terminal, however, neither has access to tarmac space for aircraft at their terminals. Additional freight forwarders and courier companies have chosen to locate in industrial parks throughout Ottawa.⁹ To a large degree this has been due to limited airport cargo facilities and the high rental charges for that space. For example, while Federal Express has occupied a small cargo stall at the airport its main sorting facility has been located at an industrial park near the airport. Their airport location has been used solely to transfer sorted shipments between aircraft and trucks.

⁸ Firms occupying space in the OACC include: Federal Express, KLM, USAir, Emery, Burlington, and Peace Bridge Brokerage.

⁹ This includes leading courier firms such as UPS, DHL, Purolater, and most freight forwarders.

As part of the 1987 construction, the federal government constructed a two-lane expressway (Airport Parkway) to link the airport with other federal parkways. The objective of the Airport Parkway was to be part of a larger transportation network of "ceremonial routes" for dignitaries and other visitors to the capital (National Capital Commission (NCC) 1991). Similarly to other federal parkways, the Airport Parkway restricts commercial vehicles except for taxis and Canada Post vehicles from using it. For all cargo companies and other delivery services the only means to access the airport has been via city streets.

5.4 Ottawa's Air Links

Ottawa has been and continues to be a national airport having good domestic passenger connections, yet limited transborder, international, and all-cargo links. The process of domestic deregulation affected Ottawa as it did other Canadian airports. While present government policy allows airports to develop international links, previously established routes, infrastructure, and the operating strategies of carriers have shaped Ottawa's current airlinks.

5.4.1 Domestic

Ottawa, prior to deregulation and since that time, has exhibited features characteristic of a non-hub airport. This includes a majority of short-haul flights to hubs at Dorval

and Toronto, an increase in flights by affiliated airlines, the operation of smaller jet and propeller aircraft, and limited direct links with transborder and international destinations.

Changes in service to Ottawa between 1987 and 1992 reflect the overall upheaval in the airline industry for the decade leading to domestic deregulation. While Ottawa did not experience dramatic changes some consequences were felt. Table 3 reveals the changes in carriers serving Ottawa between 1987 and 1992. With the exception of First Air, all the carriers serving the airport in 1992 were affiliated with either Air Canada or CAIL.

TABLE 3

Domestic Carriers serving Ottawa: 1987-1992

<u>1987</u>	<u>1992</u>
Air Canada	Air Canada
CPAir	CAIL
First Air	First Air
Wardair	Air Atlantic(1)
City Express	Canadian Partner(1)
Nordair	Air Ontario(2)
Quebec Aviation	Air Nova(2)
Voyageur	Air Alliance(2)
Quebecair	
Skycraft	
Tempus	

(1) CAIL affiliates

(2) Air Canada affiliates

Since deregulation, Air Canada and CAIL have rationalized their route structures to concentrate on long haul and high density short haul routes. In Ottawa's case this has meant a number of changes including: the loss of some long haul direct links, increased scheduled frequency to regional hubs,¹⁰ and maintaining high levels of service to Toronto-Pearson International Airport. Table 4 compares Air Canada's and CAIL's links from Ottawa before the National Transportation Act 1987 was legislated to the present pattern. While the overall number of daily flights by the two airlines did not change, there are noticeable shifts in destinations served and frequencies. Apart from service to Air Canada's and CAIL's dominant hub at Toronto-Pearson, direct service from Ottawa has focused on regional hubs at Halifax (AC and CAIL), Dorval (AC and CAIL), Winnipeg (AC), and Calgary (AC and CAIL) (see Figure 5).

Routes that were deemed low density by Air Canada and CAIL were shifted to their affiliated carriers. As well, the affiliates acquired new destinations through abandonment by smaller local carriers. The strength of being aligned with a major carrier and the reduction of regulatory controls have allowed the partners to expand their own networks. Competition on most routes has been reduced to the duopoly of Air Canada, CAIL, and their partners.

¹⁰ This includes Winnipeg, Calgary, and Halifax.

FIGURE 5

Air Canada and CAIL Destinations

2 OF/DE 2

PM-1 3 1/2" x 4" PHOTOGRAPHIC MICROCOPY TARGET
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TABLE 4

Daily Direct Non-stops from Ottawa: 1987 versus 1992				
	CAIL(1)		Air Canada	
City	1987	1992	1987	1992
Calgary	0	2	1	2
Char'town	0	0	1	0
Edmonton	0	0	1	0
Halifax	2	1	2	2
London, Ont.	1	0	0	0
Montreal (Dorval)	1	2	5	4
Toronto	13	15	15	15
Vancouver	1	1	1	2
Winnipeg	2	0	2	3
Total	20	21	28	28

(1) CAIL formerly CPAir and Pacific Western Airlines

Source: OAG, June 1987; Air Canada Flight Schedule, April 1992; CAIL Flight Schedule, April 1992

For Ottawa the changes in route structure by AC and CAIL between 1987 and 1992 meant a loss of non-stop connections with Regina, Edmonton, and Charlottetown. However, the affiliated regional carriers either introduced new service or increased frequency to other smaller centres including; Fredericton, London, Sudbury, Quebec City, and North Bay (see Table 5 and Figure 6). Other routes from Ottawa, pioneered by now defunct carriers, are to smaller airports in Toronto.

FIGURE 6

Affiliated Carriers: Direct Nonstop Links

TABLE 5

Affiliated Carriers: Daily Direct Non-stops from Ottawa		
Destination	CAIL(1)	Air Canada(2)
Fredericton	0	1
London, Ont.	0	3
Montreal, Dorval	3	10
Montreal, Mirabel	0	1
North Bay	2	0
Quebec City	0	1
Sudbury	2	0
Toronto(3)	6	9

1. CAIL affiliates are Air Atlantic and Canadian Partner
2. Air Canada affiliates are Air Ontario, Air Nova, and Air Alliance.
3. CAIL's Toronto flights use Buttonville Airport, Air Canada's flights use Toronto Island Airport.

Source: Air Canada Flight Schedule, April 1992; CAIL Flight Schedule, April 1992.

Ottawa does have a number of long haul direct routes, but many originate or are destined for other cities. These are not as inefficient as earlier "milk runs" so often prevalent under the previous regulatory environment, yet Ottawa remains an intermediate stop for some transcontinental flights (see Tables 6 and 7). In fact there are only five long haul flights which originate in Ottawa, and of these only three are point-to-point service (ie. Air Canada's flights 131, 139, and 616). Consequently, both passenger and cargo space on shared flights has been partly allocated to other cities. A route may be popular with

shippers, but cargo space may be in short supply.¹¹ As well, aircraft have definite loading priorities, with fuel, mail and passengers all having higher priority than airfreight (Dewans 1992).

TABLE 6

Air Canada Ottawa Departures: Direct Non-stop Long Haul			
Destination	FLT #	Flight Origin	Itinerary
Vancouver	139	Ottawa	Ottawa-Vancouver
	101	Halifax	Halifax-Ottawa-Vancouver
Winnipeg	179	Dorval	Dorval-Ottawa-Winnipeg
	181	Dorval	Dorval-Ottawa-Winnipeg
Calgary	185	Ottawa	Ottawa-Winnipeg-Calgary-Vancouver
	113	St. John's	St. John's-Halifax-Ottawa-Calgary
	131	Ottawa	Ottawa-Calgary
Halifax	138	Vancouver	Vancouver-Ottawa-Halifax-St. John's
	616	Ottawa	Ottawa-Halifax

Source: Air Canada Flight Schedule, April 1992

¹¹ This has been especially true for emergency shipments.

TABLE 7

CAIL Ottawa Departures: Direct Non-stop Long Haul			
Destination	FLT #	Flight Origin	Itinerary
Vancouver	907	Halifax	Halifax-Ottawa-Vancouver
Calgary	901	Dorval	Dorval-Ottawa-Calgary-Vancouver
	905	Ottawa	Ottawa-Calgary-Edmonton
Halifax	902	Vancouver	Vancouver-Ottawa-Halifax

Source: CAIL Flight Schedule, April 1992.

Another consequence of deregulation has been the intense competition between AC and CAIL. Ottawa's flight schedule is representative of most Canadian cities with both carriers offering practically simultaneous departure times on their long haul flights (see Table 8).

TABLE 8

Ottawa Departure Times: Air Canada and CAIL Long Haul Flights		
Destination	CAIL	Air Canada
Calgary	0830	0940
	1700	1635
Vancouver	0830(1)	0830
	1800	1835
Halifax	(2)	0730
	1700	1715

1. Flight stops at Calgary.
2. CAIL's affiliate, Air Atlantic, has a 0700 departure from Ottawa to Halifax via Dorval.

Source: Air Canada and CAIL

A similar situation exists with service to Toronto-Pearson by AC and CAIL. Each carrier operates hourly flights with CAIL's departures on the hour and AC's 15 minutes before the hour. Flights are concentrated between 0645 and 1900 reflecting the departure demands of passengers. The consequence for freight forwarders and other shippers has been that there is little choice between the two carriers services.

Apart from scheduled passenger jets, all-freight flights¹² to and from Ottawa have been specialized and targeted to specific markets. The independent carrier First Air began daily all-cargo flights to its northern hub at Iqaluit, NWT, in the late 1980s after making Ottawa its southern hub (see Figure 7). Since deregulation a few of the small package express companies (Federal Express and Purolater) have scheduled flights, but these are strictly for envelopes and small light-weight items.

In the mid-1980s Northwest Territorial Airways operated a weekly scheduled cargo flight to Western Canada, but the service lasted only a few months (Sypher-Mueller 1988). Air Canada has never scheduled stops in Ottawa for its fleet of cargo aircraft.

¹² excluding ad-hoc charter flights

FIGURE 7

First Air Destinations: Nonstop Service

5.4.2 Transborder

Ottawa's transborder airlinks have been and continue to be limited. Geographically, US destinations connected with Ottawa have been restricted to the eastern seaboard - Boston, New York, Baltimore (see Figure 8). Other US destinations with which Ottawa has had scheduled direct airlinks¹³ are Syracuse, New York and Washington DC.¹⁴

Although Ottawa has developed strong links with several transborder destinations over the past decade (see Table 9), there have been continuous problems with flight frequency, operating carrier stability and destinations.

TABLE 9

Ottawa Daily Transborder Links: 1981-1992(1)								
City/Year	81	84	87	88	89	90	91	92
Baltimore	1	1	0	1	0	1	2	2
Boston	0	1	2	1	4	1	1	3
Dayton(2)	0	1	1	1	1	1	1	1
New York (3)	1	2	1	1	1	3	1	1
Syracuse	0	0	4	4	4	4	0	1
Washington DC	1	2	2	0	0	0	0	0

1. Daily, non-stop, direct flights (June)
2. All-freight flight.
3. Pilgrim began service in December. All daily flights have been destined for J.F. Kennedy Airport. In 1990 First Air operated two daily flights to Newark Airport.

Source: Official Airlines Guide

¹³ This excludes seasonal scheduled charter flights.

¹⁴ In the early 1980s, Ottawa was the origin for a daily Nordair flight to Pittsburgh with a stop in Hamilton.

FIGURE 8
Transborder Destinations

American carriers have provided almost entirely all of Ottawa's direct non-stop transborder service. However, US domestic deregulation has affected the Ottawa market. Since 1981 a host of large and small US carriers have served Ottawa including; Continental, Delta Connector, Eastern, Empire, Piedmont, Pilgrim, and USAir. Table 10 presents the changes which have transformed Ottawa's transborder links.

Of the many Canadian carriers which have served Ottawa only First Air ventured non-stop transborder service. First Air initiated service to Boston in 1984 with a single daily flight. Service was terminated in 1991 due to competition from Delta Connector, uneconomical aircraft, and limited passenger flows. First Air had similar reasons for discontinuing service to Newark, New Jersey.

Other Canadian carriers who endeavoured to provide Ottawa with direct service, albeit with stops, to the US include Nordair's daily flight to Pittsburgh from 1979 to 1984. Two of Air Canada's affiliates currently operate flights originating in Ottawa to Newark. Air Ontario operates a direct flight via Toronto Island Airport, and Air Alliance operates a direct flight via Dorval and Quebec City. Air Canada, which holds the overwhelming majority of US traffic rights, has never had any flights originating in Ottawa for any US destination. Any Ottawa passengers or cargo destined for the US which utilize Air Canada must connect through its Toronto hub.

TABLE 10

Ottawa-US Airlinks: Changes in Operating Carrier

Baltimore	service initiated by Eastern Airlines; terminated in 1987 when Continental Airlines purchased Eastern; service was moved from Baltimore to Washington Dulles Airport for a two year period beginning in 1987, however service restored to Eastern in 1988; 1990 Eastern closed due to bankruptcy, service taken over by USAir
Boston	service initiated by First Air in 1984; in 1991 Delta Connector began daily service; First Air terminated service in 1991
New York (JFK)	service initiated in 1981 by Pilgrim Airlines; terminated in 1987 when Delta Airlines purchased Pilgrim; Allegheny Airlines began service in 1988; in 1989 Piedmont took over service; in 1989 Piedmont purchased by USAir who continues service
New York (Newark)	First Air began and terminated service in 1990; First Air still maintains rights to the route
Syracuse	service initiated by Empire Airlines in 1985; in 1985 Piedmont took over service with purchase of Empire; 1989 Piedmont purchased by USAir; USAir terminated service in late 1990; service restored by USAir in 1992 to a daily flight
Washington DC	service initiated by Eastern airlines, but in 1986 all flights switched to Baltimore; service returned in 1987 by Continental Airlines who took over Eastern, but they later terminated service in 1987

Source: Official Airlines Guide, Sypher-Mueller 1987;1988
Statistics Canada

While shippers have had to contend with the uncertain effects of US deregulation on passenger service, a stable freight service was established by Emery. Emery has provided the only direct all-cargo flights¹⁵ from Ottawa via Montreal to its main sorting hub located at Dayton, Ohio. Service began in 1983 as a scheduled charter operation utilizing one of First Air's aircraft. Emery's concentration has been heavier shipments of freight and not small package and envelopes.

Local lobby groups, such as the Ottawa-Carleton Economic Development Corporation (OCEDCO), have argued for improved air service. OCEDCO has listed three priorities: first: a direct link with a major US midwestern hub, preferably Chicago,¹⁶ second: a direct link with a hub in the US southeast, preferably Atlanta, third: a direct link with USAir's major hub at Pittsburgh, although this offers the poorest onward connections of the three choices.

Ottawa's main problem has been that it lacks high enough levels of demand to any one US destination to justify point-to-point service. Rather a large number of cities have individually minor but collectively significant volumes of passengers and cargo (Sypher-Mueller 1988). Hence the need

¹⁵ Prior to Canadian deregulation the flight was operated as a international scheduled charter.

¹⁶ Chicago's O'Hare airport is a major hub for both American Airlines and United Airlines, the US two leading domestic carriers.

for a link to a major US hub. While OCEDCO has primarily focused on improving passenger links, any progress could assist the local airfreight industry. Improving transborder airlinks can provide a further benefit for those firms considering locating in the Ottawa area.

There are several reasons for Ottawa's seemingly poor links with the US. From the passenger carrier perspective a primary complaint has been the lack of US customs pre clearance availability at Ottawa. The result for both passengers and cargo is that customs inspection takes place at the point of entry or the first stop for the flight in the US. This procedure may be more of a nuisance for passengers, but for cargo it often results in time delays and missed connections.

A significant problem in obtaining new transborder links with Ottawa has been with Canada-US bilateral agreements. Little progress has been made since 1974 on creating new airlinks. The concern by the federal government that Canadian carriers need protection in certain key markets (ie. Toronto, Vancouver, and Dorval) has stifled negotiations. Deregulation had major effects in the US and Canada on domestic aviation, but minor consequences in regards to new routes between the two countries.¹⁷

¹⁷ At present Canada and the United States are negotiating an "open skies" agreement.

5.4.3 International

Surprisingly, given that it is a national capital, Ottawa has been completely devoid of international airlinks until quite recently. It was not until 1986 that the Canadian charter carrier Wardair initiated weekly summer service from Ottawa to Gatwick Airport outside of London, England. By 1988 Wardair was operating three weekly flights year round. While Wardair concentrated solely on the passenger travel market it demonstrated that Ottawa could support international flights. When Wardair was purchased by CAIL in 1988, the new carrier discontinued the former service. However, Air Canada acquired the route and by 1992 established tri-weekly service to Heathrow via Mirabel rather than Gatwick.¹⁸

The federal government's initial preference for negotiating international landing rights at only a few points of entry - Montreal, Toronto, and Vancouver - assisted Air Canada and CAIL in forming dominant hubs. These hubs have been important not only for their domestic networks, but in funneling Canadian traffic to their own international flights. The situation for other Canadian cities hoping for the opportunity to establish international connections has been difficult, but it is changing.

¹⁸ Air Canada's triweekly service was upgraded in the fall of 1992 from biweekly service; however, Ottawa does not have point-to-point service.

In 1988 the federal government negotiated an agreement with the United Kingdom that opened every international airport in each other's country to the the respective airlines of the other. In conjunction with this agreement, the Ministry Task Force on International Air Policy concluded that any airport with the capability to support international flights should be allowed to do so (Barone 1992). Prior to these two initiatives Ottawa was designated as an entry point in bilateral agreements only with China and Cuba.

A new willingness on the part of the federal government to open more airports to international service and foreign carriers has led to Ottawa obtaining two new services. In 1989 KLM Royal Dutch Airlines and in 1990 JesAir (Bulgaria) initiated biweekly flights to Amsterdam¹⁹ and Sofia respectively (see Figure 10). Even with a more open policy to allow foreign carriers access into new Canadian markets the domination of existing services in Montreal and Toronto has made it exceedingly difficult for Ottawa to attract more carriers.²⁰ As Table 11 demonstrates even with seven international flights service is only provided on four days.

¹⁹ KLM operates a 747 combination passenger-cargo aircraft to Amsterdam via Halifax.

²⁰ While this would seem to be the case it still has not deterred some carriers from investigating new possibilities. Lufthansa (Germany) recently studied the potential market in Ottawa (Ottawa Citizen 1992).

FIGURE 9

International Destinations

TABLE 11

International Flight Departures							
	Mon	Tues	Wed	Thurs	Fri	Sat	Sun
AC		X			X		X
KLM			X		X		
JES			X				X

Source: Air Canada, KLM, Jesair

5.5 Closing Remarks

Due to Canada's population distribution it is more difficult than in the United States to accurately describe airports as being either a hub or a spoke. Ottawa exhibits characteristics of both. Approximately half of its direct flights are to one of Toronto's three airports, yet it still has enough demand to warrant a number of direct long haul flights to regional hubs.

Airlinks in the past and at present have been determined by a combination of passenger demands, federal government air transport policies, Montreal's historical role as a international gateway, and a small industrial base. Airlines serving the National Capital Region have concentrated on passenger demands and this has been reflected in their flight schedules and choice of operating equipment. The limited number of all-freight flights has

meant that the majority of cargo is still transported on passenger flights. Chapter Six will focus on the Ottawa airfreight market and examine how airfreight operators utilize passenger flights, all-freight flights and trucking to transport cargo to and from Ottawa.

CHAPTER SIX

OTTAWA'S AIRFREIGHT SERVICES AND FLOWS

The competitive nature of the air cargo business is evident by the assortment of airfreight firms and freight forwarders locating in Ottawa even though the area is not considered a major centre for airfreight traffic. Ottawa does have airfreight needs and three major users are the federal government, Canada Post, and the high tech industry. An idea of what shippers are looking for from airfreight service in Ottawa has been gained through interviews with a sample of users. While most of those sampled expressed satisfaction with existing services, there were some complaints voiced.

This chapter reviews the survey findings, examines statistical information on airfreight flows to and from Ottawa International Airport, and provides a descriptive account of Ottawa's airfreight services. It assesses importance of trucking and intermodalism and the influence of Mirabel Airport. Accurate statistical analysis is difficult given the inadequacy of official data recorded. Nonetheless, basic statistics do exist and are reviewed.

6.1 Airfreight Statistics

Trying to determine the amount of air cargo transported from Ottawa is exceedingly difficult. The only statistical record kept is by Transport Canada. The aviation statistics publication, Air Carrier Traffic at Canadian Airports, provides aggregate data of cargo enplaned and deplaned at Canadian airports administered by Transport Canada. A second publication, the Air Charter Statistics publication, is more comprehensive, recording origin/destination data and levels of cargo for international air cargo charter flights.¹

The cargo data published in Air Carrier Traffic are recorded in three categories; domestic, transborder, and international. The publication indicates quantity of cargo transported on all scheduled flights and international charter flights. While published data provides a rudimentary measure of domestic and international cargo volumes, there are numerous deficiencies in terms of how cargo information is collected, recorded, and categorized.

Unlike passenger statistics, cargo volumes are recorded as an aggregate, with no origin/destination survey performed. Data are collected from air carriers, who are responsible for filing a daily airport activities report. None of the air carriers other than Level I (ie. Air Canada and CAIL) have ever been required to submit cargo data.

¹ International charter flights refers to both transborder and international.

Prior to deregulation in 1987, the carriers filed cargo and mail volumes, but since deregulation mail statistics are no longer required. As well, domestic charter cargo shipments have never been monitored. To complicate matters further, since 1987 the publication no longer distinguishes between scheduled and charter cargo statistics.

A significant problem lies within the method of categorizing cargo movements. Cargo statistics are logged on a next-station/last station basis. Representative of how cargo is indexed is KLM's bi-weekly flight from Ottawa to Amsterdam via Halifax. The Ottawa-Halifax portion would be categorized as domestic, even though all the cargo loaded in Ottawa is bound for Amsterdam, an international destination. The Halifax-Amsterdam portion would be shown as international.²

The ability to collect statistical information regarding the level of cargo originating in Ottawa is further constrained when airfreight is transported by another mode. Any freight that is delivered via truck to another station, such as Mirabel or Toronto, is not recorded as originating in Ottawa (only the last station cargo was enplaned at records the shipment). Consequently it becomes extremely difficult to determine the volume of airfreight shipped from Ottawa, especially transborder and

² Only cargo loaded in Halifax would be logged as international to eliminate double counting.

international cargo.

The most significant change made to Air Charter Statistics was the elimination of courier data after 1987. These include all traffic transported by small package carriers such as Federal Express, UPS, and Purolater who operate flights on a charter basis. Prior to this change, Ottawa's cargo market logged a significant level of courier traffic. Now only entity³ cargo statistics are maintained.

Despite the discrepancies of the data, several observations can be made for the period 1980-1991. Table 12 exhibits the volumes of inbound and outbound cargo on domestic and international, including transborder, scheduled flights. For most of the decade there was an imbalance of inbound cargo over outbound. However, by 1989 this situation had changed with higher levels of outbound cargo being recorded. As well, the increase in cargo volumes between 1987 and 1990 was significant. Reviewing the period prior to 1988 (ie. 1980 to 1987), the amount of cargo being recorded had actually decreased from 1980. From 1987 to 1990, there was an increase in inbound cargo of 1620 tonnes per year or 65%, and outbound cargo volumes increased 2163 tonnes or roughly 100%. The decline in 1991 can be

³ Entity cargo is defined by Transport Canada as when the cost of transportation of goods is paid for by one person, company or organization, without any contribution, direct or indirect, from any other person.

to the recession in the Canadian economy. The decline in 1991 can be attributed, in a large part, to the recession in the Canadian and American economies.

TABLE 12

Ottawa Cargo(1): Total Domestic and International(2)
Inbound and Outbound (tonnes)

	1st Q		2nd Q		3rd Q		4th Q		Total	
Year	In	Out	In	Out	In	Out	In	Out	In	Out
1980	674	582	785	682	807	674	687	599	2953	2537
1981	622	563	773	660	767	649	642	645	2804	2517
1982	554	600	673	641	636	609	559	576	2422	2426
1983	546	518	653	603	677	569	610	529	2486	2219
1984	558	523	713	638	668	649	610	599	2549	2409
1985	540	508	583	550	616	530	509	529	2249	2119
1986	488	502	654	636	629	607	593	552	2363	2296
1987	576	537	673	579	707	520	558	547	2513	2183
1988	546	698	819	750	945	770	812	883	3123	3101
1989	833	911	881	925	1205	1206	1100	1157	4019	4141
1990	983	1129	1031	1162	1134	1023	984	1032	4133	4346
1991	896	1060	903	807	981	719	1122	711	3902	3297

1. Does not include mail.

2. Includes transborder flights.

Source: Statistics Canada, Catalogue #51-005 and #51-207

The increase in cargo volumes can be traced back to the commencement of international service by Air Canada and KLM in 1988 and 1989 respectively. The cargo increase appears in volumes for international and domestic in Tables 13 and 14. The difficulty of correctly interpreting traffic statistics without knowledge of flight schedules and recording techniques becomes evident in these tables. For example, KLM's cargo loaded in Ottawa is reflected not in the international category but in domestic cargo volumes, on account of 'next station-last station' basis of logging the flight through Halifax. The changes in international cargo volumes between 1988 and 1990 reflect Air Canada's shifts in operating direct flights to London-Heathrow from Ottawa or via Montreal.

The most difficult category to assess is international charter (Tables 13 and 14). Courier charter accounted for all of the cargo recorded in this category. The high levels of cargo recorded are due to Emery's service to Dayton, Ohio. In 1987, the large cargo volumes were due to Emery's decision to transport all of its Montreal cargo to Ottawa via truck to be consolidated with local shipments for Dayton.

TABLE 13

Ottawa Cargo: Scheduled and International Charter
Outbound (tonnes)

Year	Dom	Tb	Inter'l	Charter	Total
1980	2,501	36	0	17	2,554
1981	2,470	47	0	2	2,519
1982	2,328	98	0	0	2,426
1983	2,101	112	0	255	2,474
1984	2,273	135	0	490	2,899
1985	2,015	104	0	456	2,576
1986	2,172	109	15	453	2,749
1987	2,102	80	1	1,893	4,076
1988	2,737	320	44	17	3,101*
1989	3,810	312	19	38	4,141*
1990	4,098	145	103	17	4,346*
1991	3,030	146	121	0	3,297*

Tb = Transborder

Inter'l = International other than United States

Charter = all Transborder and International Charter

* charter figures included in Tb and International data for that year, however, after 1987 charter courier statistics were no longer recorded

Source: Statistics Canada, Catalogue #51-005 and #51-207

TABLE 14

Ottawa Cargo: Scheduled and International Charter
Inbound (tonnes)

Year	Dom	Tb	Inter'l	Charter	Total
1980	2,821	132	0	7	2,960
1981	2,659	145	0	0	2,804
1982	2,305	117	0	0	2,422
1983	2,356	130	0	83	2,569
1984	2,388	161	0	618	3,167
1985	2,088	156	4	594	2,842
1986	2,185	146	32	690	3,053
1987	2,314	110	89	2,377	4,890
1988	2,870	105	148	17	3,123*
1989	3,870	170	37	19	4,019*
1990	3,800	153	180	0	4,133*
1991	3,104	192	606	0	3,902*

Dom - Domestic

Tb - Transborder

Inter'l - International other than United States

Charter - all Transborder and International Charter

* charter figures included in Tb and International data for the respective year, however after 1987 international courier traffic was no longer recorded.

Source: Statistics Canada, Catalogue #51-005 and #51-207

The decrease in volumes in the charter category from 1988 onwards is because courier statistics are no longer required to be filed. Although Emery has moved into heavier freight shipments in more recent years cargo volumes are still not recorded. The explanation lies in which carrier is required to file statistics. Emery leases First Air's freighter to operate the service, but it is the

responsibility of First Air to log cargo volumes. However, because First Air is not a Level I Canadian carrier it is not required to file any cargo statistics with Transport Canada.

The instability of US air carriers providing service to Ottawa through the 1980s did not appear to affect cargo volumes, especially inbound levels (Table 14). In reviewing the cargo volumes of the charter category against those of the transborder (prior to 1988) it becomes obvious that large volumes of airfreight transported to and from Ottawa are not being recorded.

A category no longer recorded since deregulation has been mail and courier packets. Table 15 helps illustrate the importance of the federal government in Ottawa as an information supplier. Mail statistics from 1980 to 1987 are heavily skewed in favour of outbound mail compared to inbound. The importance of mail to the Ottawa airfreight market can be best demonstrated by comparing total volumes of mail against cargo (Table 16) for the years 1980 to 1987. Mail volumes throughout the period increased for the most part while cargo levels were erratic, reflecting the stagnation in the high technology industry.

TABLE 15

Ottawa Mail: Total Scheduled Domestic and International
Inbound and Outbound (tonnes)

Year	1st Q		2nd Q		3rd Q		4th Q		Total	
	In	Out	In	Out	In	Out	In	Out	In	Out
1980	459	911	445	933	406	873	463	985	1773	3703
1981	460	938	467	990	302	708	511	1139	1740	3775
1982	391	919	399	1019	365	929	480	104	1632	3971
1983	416	999	416	1001	404	964	482	1122	1718	4086
1984	482	1073	505	1180	491	1137	573	1222	2051	4612
1985	573	1116	571	1134	518	887	580	1193	2244	4329
1986	567	1154	568	1215	560	1029	666	1291	2361	4690
1987	636	1105	620	989	555	803	463	723	2274	3619

1st Q= Jan-Mar 2nd Q= Apr-Jun 3rd Q= Jul-Sep 4th Q= Oct-Dec

Source: Statistics Canada, Catalogue #51-005

TABLE 16

Mail versus Cargo: 1980-1987 (tonnes)

Year	Total Mail	Total Cargo
1980	5476	5490
1981	5515	5321
1982	5603	4848
1983	5804	4705
1984	6663	4958
1985	6573	4368
1986	7051	4659
1987	5893	4696

Source: Statistics Canada, Catalogue #51-005 and #51-207

6.2 Airfreight Services

Ottawa serves as an origin-destination for both domestic short-haul and long-haul flights as well as international flights. Although a non-hub airport, Ottawa Airport is still a consolidation and distribution node for the immediate area. Airfreight firms in Ottawa offer an assortment of freight services to meet shippers' different demands. These services include: same day, next day, second day and deferred delivery schedules, door-to-door pickup and delivery, and confidential contracts. The complexities of the Ottawa market can be illustrated more fully by examining air service to domestic, transborder, and international markets.

There are substantial restrictions on cargo movements via air passenger carriers due to the function and size of the aircraft. First; in Ottawa's case the majority of flights primarily focus on the passenger market. The exceptions to be discussed subsequently are First Air, KLM, and Emery. Neither of Canada's major trunk carriers operate an all-cargo flight or joint-production style aircraft into Ottawa. The problem of plane size also affects regional carriers' ability to transport cargo. They have chosen small jets and propeller driven aircraft for their operations. These styles of aircraft are incapable of handling large volumes of cargo.

Second, Ottawa is the origin of numerous flights, but most are short-haul destined for the main hub at Toronto. While a connecting passenger can move quickly through the terminal to an awaiting aircraft, cargo does not. Cargo requires assistance at every connection. As a result connections for cargo shipments in Toronto can require a minimum of four hours to allow for transfer to a connecting aircraft.⁴ Another difficulty arises when the cargo requires a change of gauge. For example, cargo arriving on a flight from Ottawa that was bulk loaded may be required to be containerized in Toronto due to stowage differences between aircraft.

Third, all cargo operators and courier companies that purchase space on passenger aircraft are dependent on passenger schedules. Due to the nature of the airfreight business late night departures are most sought after. In Ottawa there are very few late night departures. This means that "cut-off" times for freight pickups to meet next day deliveries have to be early afternoon in order to allow for sorting and early evening departures.⁵ In addition, there is the possibility of cargo being bumped from a passenger

⁴ A shipment may not require as much time, but this requires that the paperwork and guaranteed space has been processed days in advance.

⁵ For example, Air Canada's last departure to Toronto is 2200, but if a shipper wishes to send a shipment to Vancouver they either have to send it on Air Canada's direct flight at 1835 or via Toronto at 1900.

flight at a connecting station. As stated in Chapter Five, passengers have priority over cargo.

Fourth, all domestic and transborder passenger flights are conducted with narrow-bodied aircraft which have limited cargo space and bulk loading capabilities. Although Air Canada and CAIL are converting to newer A320 container equipped aircraft, the containers are not designed to handle large amounts of cargo. Due to the design of most narrow-bodied aircraft, containers and pallets are not used. Bulk loading is the only method available and shipments are limited to 250 pounds. This is the maximum weight a ramp conveyor for loading can handle.

Fifth, based on previous demands and estimates, cargo space on many passenger flights has been previously allocated to other shippers or in the case of shared flights, to other cities. Those shippers needing to send an emergency or unplanned shipment may not be able to because of lack of available space.

6.2.1 Ottawa's All-Freight Services

For the most part, Ottawa's freight needs are handled by passenger carriers aboard passenger aircraft, however, there are a number of carriers offering all-freight or combination service. Domestically, First Air is an independent regional carrier which predominantly serves communities in northern Canada and which designated Ottawa

Ottawa was chosen as the southern hub for several reasons. First Air was formerly known as Bradley Air Service. Bradley previously operated from Carp, Ontario, 30 kilometres west of Ottawa. The effects of deregulation and the termination of service by Nordair provided the opportunity for First Air to extend route coverage in the Arctic and link northern service to southern Canada. The extension of routes allowed First Air to bid successfully on government contracts to transport cargo northbound.⁶

Geography and climate have meant that air services play an important role in linking Arctic communities with each other and to southern Canada. Not only is First Air involved in passenger traffic but, to an even greater extent, in cargo shipments from southern Canada. It operates several 727 joint production aircraft⁷ and one 727 freighter from Ottawa.

The freighter serves First Air's northern hub at Iqaluit, NWT once per week. As well, the joint production aircraft serves Iqaluit and Kuujuaq, Quebec, five days per week. Almost all of the cargo traffic is northbound, with little returning on southbound flights. Foodstuffs make up the bulk of cargo shipments.

⁶ Contracts won included the lucrative DEW line service, Canada Post, and Department of Indian and Northern Affairs contract.

⁷ A joint production aircraft is a plane equipped to carry cargo on its main deck as well as in the belly hold.

the bulk of cargo shipments.

Freight service to transborder destinations via passenger carriers has been sporadic due to changing destinations, carriers, frequency of service, and carrier attitude. For example, USAir offers the only jet service to transborder destinations. It provides the only direct service to New York City, however its service is to John F. Kennedy International Airport. The airport is the international terminal for New York and has too many problems (eg. congestion, limited domestic flights) to serve as a transshipment point for US bound cargo. In addition, USAir's service to Syracuse is limited for airfreight. Syracuse is not a major hub and offers poor onward connections.

The limitations of the USAir network and the airline's previous attitude towards air cargo provides another problem for shippers. USAir has epitomized the cargo philosophy of many air carriers in which cargo is a by-product of the more important passenger market. USAir does provide limited cargo service to its customers, but excludes shipper demands for guaranteed delivery times and shipment tracing.

Fortunately not all is lost for transborder cargo shippers. Emery Worldwide provides all-freight service, operating a leased First Air 727 freighter⁸ six nights a

⁸ 727 freighter has a capacity for 45,000 pounds of freight. A standard 727 passenger model has the capacity for 2,000 pounds.

week via Mirabel⁹ to its main US hub at Dayton, Ohio. Shipments are consolidated and assembled on to pallets at Emery's warehouse located at Ottawa Airport. At Dayton, shipments are sorted and transferred for onward movement. This flight supplies shippers a late night transborder departure (2200 hours) which no other operators match. The benefit to shippers and to Emery is being able to extend the late afternoon "cut-off" time for pick-ups.

The nature of some cargo shipments requires that a company finds alternative means of transport. Nordion, a Kanata-based high tech firm for example, uses its own aircraft to move shipments of radio active material to Syracuse and Philadelphia. The reasons cited were scheduling problems with freight carriers, the high levels of radiation that prohibit the material from being transported on passenger flights, and the problems with forwarders handling customs clearance into the U.S.

Internationally, the three passenger carriers involved operate larger wide-body aircraft meaning additional cargo space onboard the aircraft. KLM operates the largest aircraft, a 747 joint production model¹⁰ capable of loading pallets and containers on its main deck. Air Canada's and JesAir's aircraft accommodate containers in their belly

⁹ Under negotiated air agreements with the United States Emery is not allowed to off-load cargo at Mirabel.

¹⁰ The 747 can load 13 pallets, 96"x125" or 88"x125", on its main deck up to a combined weight of 88,400 kilograms.

holds.¹¹ Shippers are provided with a direct connection from Ottawa to Europe. The disadvantages are that the flights are not operated daily (seven flights over four days), making it difficult for users requiring daily service.¹² In addition, not all cargo space available on the flights operated by AC and KLM is reserved strictly for Ottawa due to the flights being shared with another city.

Including the cargo services of Air Canada and JesAir, the choice of direct routing is limited to a few European destinations; however, Heathrow and Amsterdam are two of Europe's leading cargo gateway airports. Delays may occur due to customs or terminal problems at these destinations. For example, any cargo being transferred through London's Heathrow Airport is impounded for 24 hours for security reasons.

6.2.2 Air Express/Courier Companies

The air express companies operate domestic and international courier services to and from Ottawa. Only a few companies - Federal Express, United Parcel Service (UPS), and Purolator - maintain total control of all aspects of freight movements from Ottawa. Other courier companies operating in Ottawa, such as Right-of-Way and Express

¹¹ Air Canada operates a 767 and JesAir a A310.

¹² As well, service by Air Canada and JesAir is biweekly on passenger aircraft.

Airborne, have negotiated contracts with passenger carriers to block space on their flights. These companies still are able to provide for the competitive next day delivery market.

Although Federal Express and UPS are American owned and, under Canadian regulations, unable to operate domestic services, they still have been able to integrate aircraft into their domestic Canadian operations. In both cases, the companies utilize small propeller-driven aircraft from Ottawa which they use to move small packages and envelopes of the most time-sensitive material. Both carriers have been able to circumvent Canadian ownership and licensing restrictions. UPS simply employs Canadian-owned charter aircraft. Federal Express maintains its control by leasing its own aircraft back through a Canadian company.

Federal Express utilizes two hubs in central Canada. Shipments destined for Canadian addresses are flown to Mirabel. There they are sorted and loaded onto a 727 freighter for overnight delivery. Transborder and international shipments are moved through the Toronto hub and transferred to a 727 freighter destined for Federal Express's main sorting hub at Memphis, Tennessee. UPS uses only one Canadian hub, at Hamilton, Ontario, for sorting both domestic and transborder traffic. They also charter a 727 freighter for deliveries across Canada. Transborder and international shipments are moved to their US sorting hub at

Louisville, Kentucky either via air or truck.

Ottawa is the hub for Purolater's operations. Domestically, shipments are moved by Air Canada via its passenger and all-freighter service. For transborder shipments, Purolater works in conjunction with Airborne Express. Airborne's aircraft flies daily between Ottawa and its hub in Wilmington, Ohio.

6.3 Airfreight and Trucking

It is important for any company involved in the highly competitive airfreight industry to be able to accommodate any service request by a shipper. Trucks provide a reliable source of transport while increasing the flexibility and options available to airfreight companies. In many cases, non-hub cities, such as Ottawa, do not have enough airlift - either in terms of frequency or aircraft capacity - to transport airfreight, thus utilizing trucks furnishes an alternative. By employing trucks, airfreight firms are able to extend service and protect a market by providing access to an area that would not normally be served by an aircraft. As well, trucks can provide airfreight companies with the means to maintain control over all aspects of the shipment's movement.

An airfreight company's operating philosophy dictates whether to operate its own vehicles or contract out. The air passenger carriers concern themselves only with handling

cargo during the flight portion. They prefer to contract to local firms to oversee all aspects of ground movement. The larger freight forwarders and integrated firms have the opposite viewpoint. They control all facets of the ground haul portion with company vehicles. Smaller courier companies, on the other hand, utilize owner/operators to handle their ground transportation needs.

The use of trucks gives airfreight companies the freedom to provide services in a number of ways. First, trucks are used to maintain scheduled service to a larger station with superior air service. Second, trucks provide overnight service on short haul routes to expedite next day delivery. Third, they are utilized as inexpensive transport for deferred service.

6.3.1 Transfer to Next Station

One reason for transporting airfreight by truck from Ottawa is the proximity of superior air service at another station. Superior air service is associated with access to more carriers and larger air networks including direct flights and better international service. For instance, a significant portion of Ottawa's international cargo is transported via truck to Montreal-Mirabel airport.

Mirabel has extensive international connections with a number of different overseas carriers, including all-freight flights. Most carriers utilize wide-bodied aircraft which

have large capacity for cargo. The use of trucks to transport freight to another station eliminates the need to rely on air passenger flights and schedules. This includes the uncertainty of whether there will be enough space aboard a passenger flight for a carrier's shipments. Contracted and affiliated trucking firms schedule mid-evening departures to correspond with late evening international air departures. This enables freight operators to make connections with flights and still conduct late afternoon pick-ups.

Several carriers with flights operating to and from Ottawa also move freight to Mirabel. Air Canada moves cargo via truck to its Mirabel hub to meet with its international flights¹³ as well as its domestic cargo network which is serviced by all-freighter aircraft. KLM also trucks cargo from Ottawa on non-flight days to Mirabel to be loaded on to its daily flight to Amsterdam.

Ottawa's freight forwarder community utilizes Mirabel airport extensively for its connections to international flights. Many forwarders located in Ottawa are branch offices of larger Montreal operations. Shipments are trucked to their parent operations at Mirabel, where loads are consolidated and assembled on to pallets or containers before delivery to the air carrier.

¹³ This includes other airlines for which Air Canada is the Canadian agent, including Sabena, Swissair, and El Al.

Another station which has an important role is the Canada-US border crossing at Ogdensburg, New York. The crossing is the closest entry point to the US from Ottawa. It is also situated within easy access of the US Interstate Highway System. Ogdensburg represents a transfer point for trailerloads more so than accessibility to another airport. Airfreight companies and other firms, such as Emery, TNT and Newbridge take advantage of the border crossing as a transfer point for transborder shipments. An attraction for Canadian shippers is the availability of low-cost US domestic trucking.

6.3.2 Next Day Delivery

Guaranteed next day delivery has been the cornerstone of the small package/courier express firms. Rather than have the high costs of employing aircraft, trucks are substituted to move airfreight overnight on short haul routes for next day delivery. In many instances, road feeder service is as effective as aircraft for time-sensitive deliveries. After all, a customer only needs a package to be in a destination the next day at a certain time: how it got there is not important. Ottawa's geographic location, close to the Montreal-Toronto corridor, places the city within easy access for overnight delivery service by truck.

Next day, time-definite deliveries are important for companies involved in JIT manufacturing. A number of high

tech firms use corporate distribution centres located in the US to control movement of inventory for firms involved in JIT manufacturing. The close proximity of a distribution centre (ie. within a 10 hour drive) means that trucks can be used rather than aircraft to deliver daily trailer loads of raw materials and end products. The raw materials are scheduled for the assembly line while the end products are distributed to Canadian customers either by truck or air.¹⁴

The use of trucks to deliver raw materials and finished goods to Ottawa represents only a portion of the movement of any one input. The central distribution centres have gathered material from suppliers around the world. In doing so, the use of aircraft is the most important form of transport for deliveries from overseas suppliers. The short shelf life of many high technology inputs and products negates the use of slower marine transport.

6.3.3 Deferred Shipments

A third area where airfreight companies utilize trucks is to transport deferred shipments. Shippers choosing second day or beyond delivery schemes may have their shipment moved in part or entirely by truck. For instance, poor connections with transborder destinations have resulted in many airfreight and courier firms hauling shipments via truck to

¹⁴ Delivery of a product is the customer's responsibility and its urgency determines how the shipment is transported.

another station. The deferred shipment may be hauled from the connecting station via truck again.

Emery has scheduled road feeder service (RFS) from Ottawa to Toronto nightly and then onwards to Dayton, Ohio. From Emery's combination air/truck hub a shipment may be moved via truck to its final destination, despite the shipper's presumption that their shipment is moving by air. The same scenario holds true for the integrators, which have successfully established trucking networks to feed their air systems.

The increased utilization of trucks by airfreight companies comes in response to the growth of expedited service offered by dedicated trucking firms. Deregulation of the trucking industry and relaxation of provincial licensing standards has increased competition from trucking companies on airfreight services. Companies such as Reimer, for example, can provide expedited trucking service to Vancouver from Ottawa in four days.

6.3.4 Intermodal Movements

A portion of Ottawa's airfreight is transported via truck. Two means to prepare freight for truck movement are either pre-loaded shipments onto a pallet or in a container, or else to bulkload. There are several companies that assemble loads on to air pallets for movement by truck to and from Ottawa. Air Canada, KLM, Emery and Federal Express

all utilize this concept in whole or in part depending on volumes and destination.

These companies involved in intermodal movements have integrated their air services with the trucking side of their own firm or a subsidiary. Air Canada employs its subsidiary Dynamex to move loads to its cargo hub at Mirabel. Emery uses its parent company Consolidated Freightways to transport freight to Toronto then onwards to Dayton. Federal Express uses its own trucks to move domestic shipments to Montreal and transborder shipments to Toronto. KLM is the exception, contracting a trucking firm to move a few pallets to Mirabel, but preferring to bulk load .

Trucks used in these networks are designed with a roller bed system similar to that aboard aircraft to facilitate loading of pallets and containers. A 48' long trailer can accommodate 4 pallets or combination of pallets and containers. Shipments are consolidated and loaded onto ULDs at their respective Ottawa terminals and then transferred via truck to the next station. There the ULDs are conveniently transferred onboard an awaiting aircraft. This achieves three objectives: it expedites cargo transfer at the connecting station, it avoids problems of lost shipments, and above all the company still has control over the entire unitized shipment. With respect to these objectives, ULDs have become an integral part of the transportation system for these companies.

While some Ottawa freight operators expressed interest in intermodalism, generally volumes were too low to support such systems. Others felt there was no need to become involved with extravagant trailer designs with roller beds, air ride suspensions and air containers. Improvements in packaging, standard trailer designs, and safety on the road eliminate the need for special handling except for a small percentage of ad hoc cargo.

6.3.5 Bulk Loaded Shipments

It is difficult to assess or even estimate the level of cargo that departs Ottawa assembled onto air pallets or containers compared with cargo which is bulk loaded. There are several reasons why Ottawa's airfreight firms choose bulk loading over ULDs. The first factor is that individual company volumes are too low to warrant assembling shipments onto air pallets or containers. Often these shipments are less-than-truckload (LTL) and are consolidated into a trailer load by a trucking firm at its terminal. In other instances, firms will maintain control by using a truck to fit the load. Often this means a smaller truck or van not equipped to handle pallets or containers.

The second factor is that firms such as airfreight forwarders and some carriers leave the responsibility of arranging shipments onto a pallet or into a container to the next station. This allows the larger station the

flexibility to consolidate all loads gathered from outlying stations.

The third factor concerns shipments destined for the transborder market. Shipments in Ottawa are bulkloaded to try and ease customs procedures. If a portion of a shipment is requested by customs for inspection it can be easily reached and removed with minimal disruption to the trailer load. This may also be the case with shipments which are to be held at the customs post. Rather than delaying the entire load a portion can be removed and transported at a later time.

The fourth factor is that companies are restrained by the receiving aircraft's inability to accept containers or pallets. This is the case for most domestic and transborder passenger flights operating from Ottawa. This is also the case with integrator services. For example, Burlington Airfreight operates a Road Feeder Service (RFS) from Ottawa Airport to Dorval airport to meet with its company's aircraft. The aircraft is small and narrow-bodied, unable to handle containers or pallets, and consequently all shipments are bulk loaded.

6.4 Proximity of Montreal-Mirabel Airport

During interviews conducted with various cargo managers and freight forwarders, it became clear that Montreal's Mirabel airport plays a significant role in Ottawa's airfreight scene. Geographically it is conveniently located between Ottawa and Montreal.

Mirabel offers the superior service which is lacking in Ottawa. Mirabel's attractions for airfreight companies include no congestion, 24 hour-a-day operations, minimum ground transportation from Ottawa, numerous international carriers and good flight frequency. In addition, several federal government programs to entice air carriers and cargo operators to use the airport may be partially responsible for its preferred status. Program incentives such as discounted landing fees for frequent users, removal of fuel tax, and 5th freedom cargo rights have helped attract cargo carriers to Mirabel Airport. In addition, all-cargo jet aircraft are prohibited from operating at Dorval Airport.

Mirabel is a hub for Federal Express and Air Canada's domestic cargo systems as well as a stop for many international carriers operating routes to Europe, North Africa, the Caribbean and South America. Ottawa can be considered more of an extension of the Montreal market, with Mirabel being the consolidation centre and transfer point for the region.

Forwarders use their expertise and the services from Mirabel to extend options to customers in Ottawa. An added bonus for forwarders is that carriers will rebate the line haul portion from Ottawa to Mirabel. This in turn is passed on to the shipper in the form of lower rates. For the most part this only affects international shipments and not domestic or transborder. A complaint voiced by one Ottawa-based carrier over these rebates is that Ottawa is a "dumping-ground" for Mirabel-based carriers. These carriers are trying to attract additional traffic to fill their planes due to shortfalls in the Montreal market.

6.5 Closing Remarks

While it would be beneficial for those concerned to have all of Ottawa's airfreight transported directly to and from Ottawa International Airport, it is not feasible given cargo volumes and the array of destinations. Cargo planes cannot stop everywhere and when passenger flights are not available alternative feeder services are found.

Ottawa's airfreight companies utilize a number of different methods to transport cargo to and from the area. Choosing the best means to transport a shipment often depends on the destination. According to Ottawa's airfreight firms, the majority of domestic and transborder cargo is moved via aircraft; however, the majority of international cargo is transported via truck to Mirabel Airport. Even with

the availability of international flights from Ottawa, limited scheduled frequency necessitated moving shipments to Mirabel.

Toronto's Pearson airport, with a few carriers providing direct service to Asia/Pacific markets, does receive some of Ottawa's international-bound freight. However, Mirabel-based all-freight and passenger carriers aggressively market direct connections, via Europe, to the Asian market in competition with Toronto's freight community.

Another concern is with emergency and same-day delivery of non-courier type shipments to domestic and transborder destinations. In some cases, the lack of late evening departures and direct links means alternative means must be found. Trucking has helped provide a valuable method of moving freight to other airports with superior service.

Depending on a particular airfreight firm's volume of cargo, some utilize intermodal systems to transport shipments. Still, the difficulty remains of the lack of a compatible intermodal container for air and surface modes. The prospects for finding a solution to this problem are not immediate.

CHAPTER SEVEN

CONCLUSIONS AND FUTURE RESEARCH ISSUES

Conclusions

This thesis has examined the impacts that domestic deregulation and international air service agreements have had on the Ottawa airfreight industry. It has been argued that while Ottawa has good domestic air connections and a few international and transborder links, surface transport is still required to move a significant portion of airfreight. Airfreight firms ship freight by aircraft whenever feasible, but varying conditions have resulted in the use of trucks to transport airfreight a portion of the haul. It is difficult, beyond the estimates of individual airfreight companies, to know the full impact of trucking on the local airfreight market.

For the most part, Ottawa's air links and flight schedules have been dominated by passenger-side demands. Other influences shaping current links are a combination of government regulations and policies, international bilateral agreements, individual air carrier strategy, the availability of superior service at nearby airports, and the traffic requirements of a small industrial base. Although recent government changes in domestic and international air

policy reflect an openness towards Canadian airports attracting new services, they may be of little consequence. Investment in infrastructure at non-hub airports and changes to air routes may not be in the best interest of air carriers and airfreight operators.

Ottawa represents a small market for airfreight; nevertheless the presence of the federal government and an active high technology industry has resulted in a competitive cargo market. Its geographical location in close proximity to major hubs at Montreal (Mirabel and Dorval) and Toronto provides airfreight operators and freight forwarders with ready access to superior air services including all-freighter aircraft. The relatively short distance to truck cargo to either of these stations does not add significantly to a shipment's transit time.

While trucks are used to varying degrees by different firms to transport airfreight, the employment of intermodal movements of air pallets and containers has remained relatively restricted in day-to-day operations. Several major airfreight operators (e.g. Federal Express and Emery) have successfully integrated surface and air operations, including transporting ULDs by their own trucks. The impediments to other firms in implementing similar systems are cargo volumes (or at least their share) and individual cargo shipments are too small to justify investment in more sophisticated equipment. As a result, there has been a

limited demand for independent trucking firms to provide specialised equipment for airfreight intermodal services in the Ottawa market.

Future Research Issues

Several issues for future research arise from this thesis. During the recent period of air transport deregulation, the trucking sector has been undergoing similar deregulation. In a broader context, how has deregulation in the trucking sector impacted on airfreight in the domestic market? For example, apart from emergency and same-day delivery of airfreight, a question to be asked is how crucial are direct airfreight connections from Ottawa? Whether a shipment takes a direct or indirect route or moves via truck for a portion of the haul is irrelevant to the shipper in most cases.

A second issue deals with Canada's ongoing "open-skies" negotiations with the US. Recent instability in the domestic airline industry has intensified speculation over where the industry is heading. With both air carriers incurring substantial losses, neither has the financial capital available to invest in improving cargo-side operations. US-based air express companies have so far been limited by Canadian regulations in capturing a larger share of the airfreight market. How would an "open skies" agreement impact the domestic airfreight industry?

A third issue is how does the domestic airfreight network link into international airfreight networks? Can Canadian air carriers capture more Canadian traffic? Several recent developments have seen alliances formed by Air Canada and CAIL with US air carriers - United and American. As well, Air Canada became part owner of Continental Airlines (US 5th largest). In CAIL's case, an agreement with American could mean an infusion of new capital. The agreements may help both carriers maintain and possibly increase their share of the lucrative transborder freight market which is currently controlled by US firms. Cooperation between allied carriers may mean the potential for improved service to transborder destinations. In Ottawa's case, local cargo operators could benefit greatly from direct access to United and American hubs at Chicago, the second largest US cargo hub and gateway to the industrial heartland of the US mid-west.

A fourth research issue concerns the ability of the air mode to overcome restrictions which so far have limited its full participation in intermodalism. While the need for a truly intermodal container has always been argued as the key, the integrated air express carriers have overcome many of the technical restrictions in developing their own systems.

APPENDIX 1

TRAFFIC RIGHTS

- First Freedom: Privilege to fly across territory without landing.
- Second Freedom: Privilege to land for technical but not commercial purposes.
- Third Freedom: Privilege to set down traffic taken on in the territory of the state whose nationality the aircraft possessed.
- Fourth Freedom: Privilege to take on traffic for the state whose nationality the aircraft possessed.
- Fifth Freedom: Privilege to take on and set down traffic originating in and destined for states other than those whose nationality the aircraft possessed.
- Sixth Freedom: Combining Third and Fourth Freedom rights on separate routes secured from two different countries, a Fifth Freedom right is produced by traffic via the carrier's home state.
- Seventh Freedom: This privilege is similar to the Fifth Freedom but applies to operations unconnected with the state whose nationality the aircraft possesses.
- Eighth Freedom: The privilege of cabotage, that is participating on another state's domestic market. It is possible to carry cabotage under Sixth Freedom.

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LIST OF INTERVIEWS

Tony Dewans	Cargo Supervisor	Air Canada
Claude Morin	Manager Cargo Marketing	Air Canada
Derrick Monk	Cargo Manager	CAIL
Dave Bolstad	Manager Cargo Marketing	CAIL
Richard Leduc	Cargo Manager	KLM
Marcel Anctil	Director, Cargo Marketing	First Air
Jim Brazeau	Station Supervisor	USAir
Rick Chessman	Terminal Manager	Emery
Mike Pescod	Senior Manager	Federal Express
Mike Tierny	Senior Manager	UPS
Mike Guth	Operations Manager	TNT Worldwide
Torry Kerr	Operations Manager	Express Airborne
Matt Welch	Branch Manager	Schenker
B. Santos	Operations Manager	Baisley-Richer
Roger Smith	Branch Manager	Right-O-Way
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Darlene Spence	Transportation Manager	Nordion
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Wendy Tremblay	Traffic and Customs	Newbridge
Roxanne Skinner	Traffic Manager	Corel
Joan Garling	Traffic Department	Theratronics International

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