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Freight Logistics In The New  
Zealand Context

By

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**TITLE:** Freight Logistics in the New Zealand Context

**ABSTRACT:** It is well known that within an economic region, shippers' practice of logistics is shaped significantly by various factors, such as transportation regulation. The precise purpose of this paper is to describe these factors and their influence on logistics practice in the New Zealand context. We first discuss the various modes of domestic freight transport as well as the deregulation and privatization of the transportation sector of the New Zealand economy. We also examine international shipping and airfreight in the context of New Zealand's foreign trade. We then identify three sets of contextual factors (*structural, regulatory, and developmental*) that, in the New Zealand situation, shape shippers' practice of freight logistics.

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## Introduction

It is well known that various aspects of the freight transportation system of an economic region, such as transportation regulation, significantly influence logistics practice within that region. For instance, in the US, the Motor Carrier Act of 1980 (MC-80) was a stimulant to manufacturers in integrating the inbound procurement of raw materials and components with the outbound distribution of finished products. As noted by Coyle, Bardi, and Langley (1996, p. 6), “the opportunity to negotiate rates with carriers for both inbound and outbound movements provided volume to leverage for reduced rates and improved service”.

The motivation for the study reported here arose from a pedagogical need felt by the author, who is based in New Zealand (NZ), for an in-depth treatment of the NZ situation. While texts on logistics management routinely feature a discussion on the impact of transportation deregulation on logistics practice in the context of, say, the US or Europe (e.g., Lambert and Stock, 1993), a comparable discussion on the New Zealand context is elusive. Moreover, a discussion of the North American or European contexts serves little purpose in the development of courses on logistics and supply chain management for teaching born-and-bred New Zealanders who are career professionals in operations, logistics, marketing, and other disciplines. This was precisely the situation in which the author found himself in 1997, barely a year after immigrating to New Zealand (NZ)!

The author felt the pedagogical need for addressing freight logistics practice in the New Zealand context all the more strongly after he faced a slight embarrassment in his very first year in New Zealand during a lecture on inter-modal transportation to undergraduate students. He had just described trailer-on-flatcar (TOFC) as depicted in the textbook for the course, Lambert and Stock (1993, p. 179), and as practised in the US wherein the trailer rests on its wheels on the flatcar. In the intermission that followed soon after, the author’s tutor sidled up to him and politely advised him, “Oh, by the way – that TOFC that you described won’t work in New Zealand because, you see, throughout New Zealand, railway tracks are of narrow gauge.”

The tutor was correct. Later, the author was to learn that narrow gauge tracks (0.77 metres in width) in NZ reflected the compromise of tight radii and relatively steep gradients which the pioneer rail constructors had to accept (Cavana, Harrison, Heffernan, and Kissling, 1997). Otherwise, even more costly tunnels and major earthworks would have been required.

Tranz Rail, the sole railroading company in NZ, *does* use TOFC, albeit in a different manner - the trailer rests on its belly on the elevated bed of the railcar, instead of on its wheels. Further, in NZ, the use of TOFC is constrained by the limited clearance obtaining in railway tunnels and under-bridges.

Thus, the study reported here seeks to describe freight logistics in the NZ context. It emphasizes the various factors, including but not limited to federal regulation of the transportation sector, that influence shippers’ practice of freight logistics. These factors are grouped into three categories: *structural*; *regulatory*; and *developmental*. *Structural* factors refer to certain invariants in the NZ context, such as the country’s thin density of population and geography. *Regulatory* factors refer to relevant aspects of the regulatory

environment, such as governmental regulation of the transportation sector in NZ. *Developmental* factors pertain to changes that are induced largely by ongoing economic/technological development.

Both primary and secondary sources of data were drawn upon for the present study. The former comprised discussions with logistics practitioners in New Zealand. Some of these discussions were held under the aegis of the executive programmes of the University of Auckland's School of Business, with which the author is affiliated at the time of this writing. Secondary sources of data involved both academic literature and the New Zealand business press.

The paper is organized as follows. In the following section, we present some relevant background information that will hopefully facilitate the reader's understanding of the NZ situation. We then concisely describe New Zealand's freight transportation system. Besides describing domestic freight transport, we also discuss import and export freight transport with special reference to shipping across the Tasman Sea, which separates NZ from Australia. Subsequently, we clarify the three sets of contextual factors mentioned above, by citing relevant indicators of logistics practice of NZ shippers.

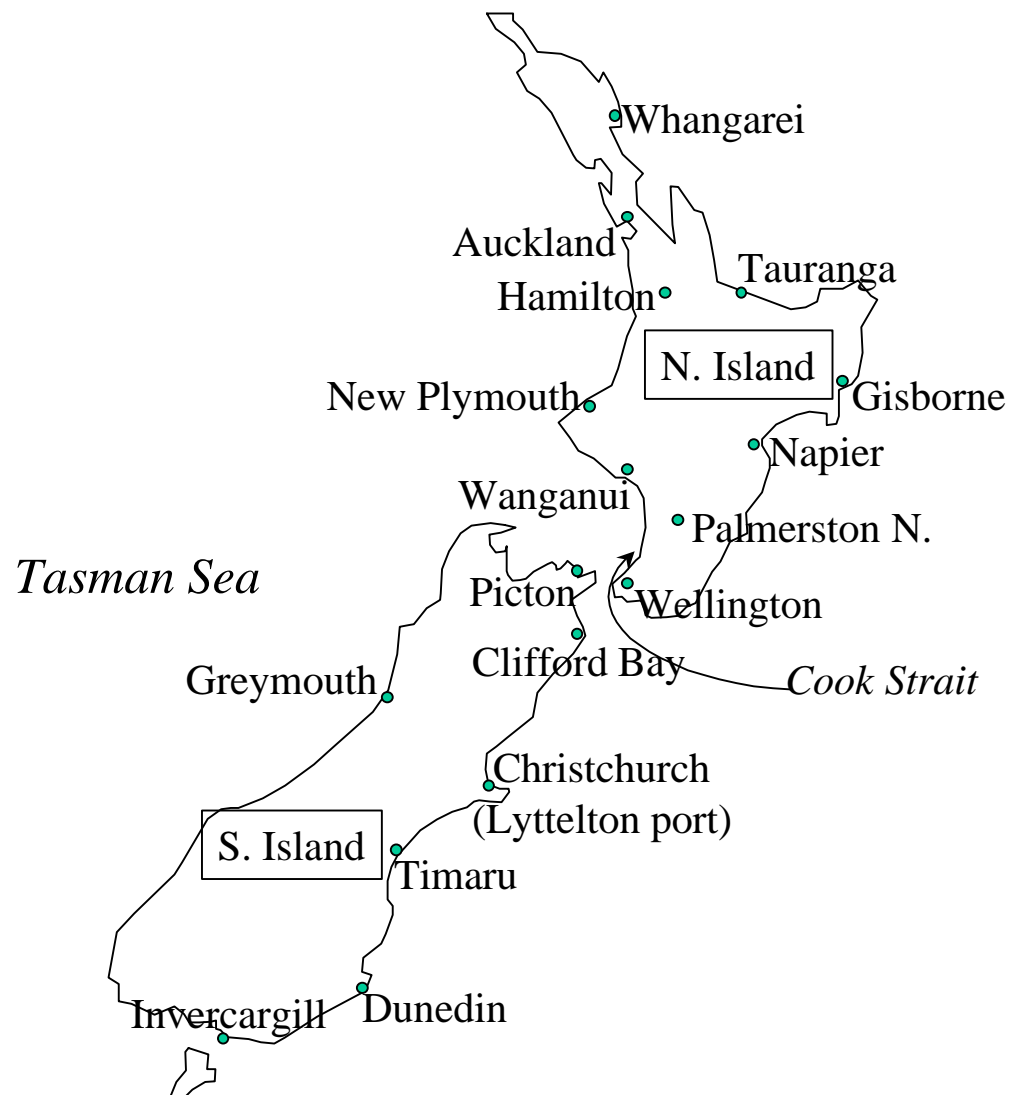
## Background: The New Zealand Context

As a member of the Organisation for Economic Co-operation and Development (OECD), New Zealand begs comparison with fellow-members of the OECD, who numbered 28 as of May 1999. In 1995, NZ's population of about 3.5 million was greater than that of only two of the then-25 OECD member countries, namely, Iceland and Luxembourg (OECD, 1997a). Most of New Zealand's population is spread across two islands that exhibit enormous topographical variation, and whose combined area exceeds that of the UK. Thus, the population-density of NZ is 13.8 per sq km, as compared with 240 for the UK. Further, the figure for NZ is actually over-stated because 30% of NZ's population resides in Auckland. Also, the South Island, which is larger than the North Island, accounts for only a fourth of the NZ population. Moreover, two-fifths of the S. Island's population is centred at Christchurch. Further, since all the major towns of NZ lie alongside the main railway line, about two-thirds of NZ's population is dispersed rather 'linearly'.

New Zealand is geographically remote from major markets; the trade-route between Australasia and the west coast of the US of about 8,000 miles is one of the longest in the world (Byrne and Golden, 1994). Besides, a significant proportion of NZ's foreign trade is conducted with North America. In 1996-7, New Zealand's trade with North America represented, by value, 11.4% of total exports and 18.8% of total imports.

Population	3.7 million.
Area	266,171 sq. km.
GDP (1997)	NZD 86.69 billion.
GDP (1997: manf.)	NZD 15.8 billion.
Exports (1997)	NZD 21.0 billion.
Imports (1997)	NZD 21.3 billion.

**Table I: Some salient statistics on New Zealand**



**Figure 1: A map of New Zealand displaying the two main islands and principal towns**

New Zealand is described as having a “born free” economy, one that achieved high income levels without industrialization (Statistics New Zealand, 1998, p. 363). The principal resource was the combination of land and climate that provided a long grass-growing season and made it possible to rear farm animals cheaply. Thus, the modern New Zealand economy was built around trade in agricultural products, namely, wool, dairy, and meats. In 1994, New Zealand’s level of employment in the primary sector, which encompassed agriculture, forestry, fishing, and hunting, was 10.4%. Of the then-25 OECD member countries, only Ireland had *both* a higher percentage of employment in the primary sector *and* a higher per capita GDP (using purchasing power parities) than New Zealand (OECD, 1997a; OECD, 1997b).

Under the exchange rates in May 1999 (one NZ Dollar [NZD] was roughly 0.55 US Dollars), the annual sales of at least 10 US corporations in *Fortune* magazine’s list of the top 500 US companies exceeded New Zealand’s gross domestic product in 1997. In 1997, 71 percent of manufacturing activity units in New Zealand employed five or

fewer full-time equivalent (FTE) persons. The average number of FTE persons engaged per unit was 11.6 (Statistics New Zealand, 1998, Chapter 21). The average annual sales and other income of a manufacturing unit were NZD 2.35 million. Thus, by international standards, New Zealand's manufacturing is relatively small-scale.

## The Freight Transportation System

Cavana et al. (1997) note that the freight transport task in New Zealand is conditioned by many factors. These include the island character, topography, climate, and the pattern of natural resource distribution as well as the resultant patterns of historical settlement and varying regional economic growth. Competition between various modes of freight transport in NZ has heightened following the deregulation and privatization of transportation. Nevertheless, intermodalism and the creation of integrated solutions to the total door-to-door freight transport task are on the rise. For instance, Tranz Link, the freight-moving division of Tranz Rail, which is NZ's sole railroading company, ships freight by road and sea besides rail, and has a road network of over 300 owner-drivers (Statistics New Zealand, 1998, p. 477).

Table II presents some summary statistics on freight haulage in the NZ context, and its breakdown by mode of transport. As indicated in the table, domestic airfreight is not significant, accounting for just one-fifth of a percent of net tonne kilometres. Hence, it will not be discussed further. Further, as will become evident later on, in the NZ context, international shipping and Trans Tasman shipping are closely coupled with coastal shipping. Hence, all three are discussed together.

Mode	Tonnes (thousands)	Net tonne kms.		Average distance (kms)
		(millions)	(%)	
Rail	8800	2735	16.7	311
Road	N/A	8854	53.9	N/A
Sea (coastal)	7384	4800	29.2	650
Air (domestic)	48	29	0.2	597
Total	N/A	16418	100.0	N/A

**Table II: Summary statistics on domestic freight volumes in NZ, 1989-90  
(the most recent year for which data for all modes is available).  
(Source: Cavana et al., 1997.)**

### *Motor*

NZ has a roading system that is 95000 km long. However, like Australia, NZ does not have the road infrastructure that is needed to support large transport volumes (Byrne and Golden, 1994). Many "highways" are simply one to two lanes in either direction with sections passing through towns. In fact, the growing resentment over logging truck fleets passing through towns and cities has meant that rail is capturing even short-haul forestry trade from motor transport (Gil, 1996).

Trucking was deregulated in the mid-1980s. In late 1983, the 150-km restriction on road haulage where rail routes were available was lifted. In mid-1984, the licensing

system that imposed route, load, frequency, and time-of-day restrictions, was effectively removed. The resulting emergence of owner-drivers created a price war, and average returns to owner-drivers have steadily eroded since then.

NZ reportedly has 5300 transport companies that operate an estimated 17000 freight trucks (Edlin, 1997a). The competition is aggravated by the presence of some operators whom the managing director of Tranz Rail regards as “irrational” because “they regard the amount of money they receive in depreciation as income rather than as a provision for re-equipment,” thus distorting the structure of rates (Small, 1988). Small (1988) also notes that “while such operators are not a large part of the market, they have quite an impact and some of them stay around a while.” In a similar vein, a senior executive of *Mainfreight Transport*, one of NZ’s major transport operators, observes: “I have seen the rates of some of the other road operators and in all honesty, I do not know how they are surviving” (Grant, 1997).

The larger transport companies, such as *Mainfreight* and *Owens Road Transport*, are increasingly seeking to differentiate themselves by “adding value,” rather than competing on price (Grant, 1997). ‘Value addition’ includes the provision of the following: accurate tracking information about freight; seamless, door-to-door services; expertise in warehouse management; etc. Such a strategy is directed at players with relatively ‘deep pockets,’ who perceive distribution as a source of competitive advantage. Curiously enough, in the Web page of Mainfreight’s freight forwarding division, the company notes under the heading ‘Price and Cost Competitiveness,’ that “Mainfreight’s leadership in information technology provides it with a competitive advantage,” thus deflecting the reader’s attention from price to service quality (Mainfreight, 1999)!

## *Rail*

The total length of tracks in NZ’s rail network is about 4000 km. The rail network comprises a main trunk line that connects NZ’s major cities, and branch lines to service major provincial populations and production centres. It also encompasses a roll-on/roll-off ferry service across the Cook Strait between the North and South Islands, which began in 1962 with a service between Wellington and Picton (Davis, 1972). The strait is not amenable to bridging or tunnelling for providing land connections.

The rugged terrain of New Zealand, besides the shorter travel distances, results in relatively higher examination and maintenance costs for wagons and tracks, in comparison with Australia (Edlin, 1993b). It has also called for the proverbial “Kiwi ingenuity” to solve baffling problems in freight haulage, as the following example illustrates.

Coal contracts in the central S. Island account for about 10-15% by weight of the total freight hauled by rail in NZ. Coal is mined at the West Coast near Greymouth by Solid Energy, a state-owned enterprise, formerly known as the Coal Corporation of New Zealand. It is then railed to Lyttelton port near Christchurch, where it is loaded on to ships for export.

However, an annual increase of more than 40% in Solid Energy’s exports of low-quality thermal coal is prompting it to consider building a coal export jetty on the West Coast

(Macfie, 1996c). The major constraint in Tranz Rail's ability to handle Solid Energy's anticipated increase in coal export volumes is the 8.5 km Otira tunnel which traverses the Southern Alps with an incline of about two degrees. While hauling trains with expanded capacity, electric locomotives overheat as they travel very slowly through the tunnel. Tranz Rail has come up with an ingenious solution to the problem by building a giant barn door over the tunnel at Arthur's Pass, which is the exit of the Otira Tunnel. Thus, the longer, heavier trains push air against the closed tunnel door while they travel, forcing it back down the tunnel and creating the airflow needed to cool the engines.

Beginning with the mid-1980s, NZ Rail, which was a state-owned enterprise until 1993 when it was sold to Tranz Rail Limited, encountered heightened competition from motor transport as a result of the deregulation of trucking. In response to the competition, NZ Rail underwent a massive restructuring that resulted in a considerable reduction of the workforce, from 21,600 in 1982 to 5,300 in 1993. The managing director of Tranz Rail, Dr. Francis Small cites the reduction in staff numbers as being "probably the single most important factor" in NZ Rail's achievement of profitability (Edlin, 1993b). Work methods and procedures were greatly streamlined following a productivity deal for locomotive staff that was signed in 1985.

Interestingly, 80% of road freight is still carried 100 km or less (Edlin, 1997a). Thus, the hegemony of rail over long-haul freight transport that had been legislated for earlier continues to prevail, albeit now due to market-forces. According to a senior executive of a major transport operator in NZ, a rough estimate for the cost of line-haul transport from Auckland to Christchurch is NZD 90/tonne via rail and NZD 180/tonne via road (Wilson, 1999).

Tranz Link employs a state-of-the-art freight management system, referred to as *Ontrac*, which uses barcoding technology to track freight consignments from pick-up to delivery. *Ontrac* operates in conjunction with *Amicus*, a system for on-line tracking of wagons on the rail network.

### *Ports and Shipping*

NZ has 14 ports that engage in international container trade. The total volume of this trade (980,000 containers in 1997-98) is less than that handled by single ports elsewhere in the world, such as Singapore. It is a reflection of the relatively small size of the NZ economy, as well as NZ ports' being end locations, rather than hubs or in-transit points, for shipping lines. The Ports of Auckland alone account for 51% of NZ's international container trade. Several NZ ports (e.g., SouthPort, located near Invercargill) do not enjoy economies of scale and have therefore found it difficult to invest substantially in craning and related infrastructure. Hence, historically, ships that have plied the NZ coast have been equipped with cranes on board and roll-on/roll-off container-handling facilities.

With regard to NZ's exports, sea freight accounts for nearly 85% by value and over 99% by volume. With regard to the country's imports, sea freight accounts for about 75% by value and over 99% by volume (Statistics New Zealand, 1998, p. 470). For the Ports of Auckland, container trade makes up 90% of the total cargo business by value and 70% of the total cargo volume (Kennedy, 1999). At the Ports of Auckland, imports and exports respectively represent 57% and 43% of the international container trade.



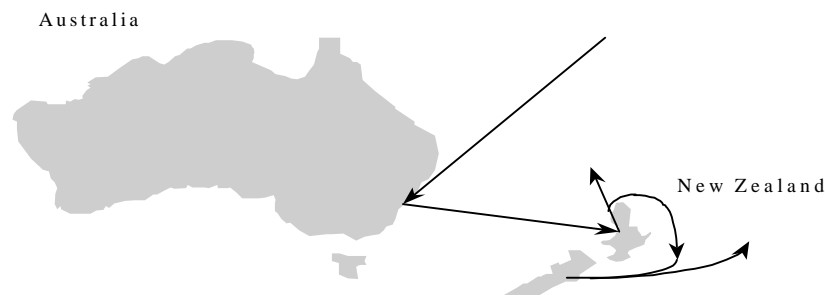
Thus, Auckland is considered an ‘import port,’ in contrast with, for instance, Lyttelton, which is regarded as an ‘export port.’

Following sweeping reforms in the late 1980s, which included corporatization, NZ’s ports have become very efficient. Three of them (Lyttelton, Auckland, and Wellington) figured among the top ten ports in a recent survey of 38 ports worldwide (NZPA, 1996). Between 1989 and 1996, labour productivity at the Ports of Auckland increased fourfold and the turnaround time for ships reduced from 39 hours to 15 hours (Gaynor, 1996). Ships can now traverse NZ’s coast in 6.5 days as opposed to 10 days prior to the reforms.

As a spin-off of the Employment Contracts Act, coastal shipping was officially deregulated on February 1, 1995. This meant that foreign-flagged ships that employed foreign crew whose wages could be as low as a third of those of NZ seamen could carry coastal cargoes in NZ. Moreover, overseas shipping companies that ply to-and-fro Australasia can carry coastal cargoes on a marginal-cost basis. Also, foreign-flagged shipping lines receive incentives from their home countries, while domestic shipping lines are subject to various taxes and levies.

Following a public outcry about the impact of deregulation on both domestic shipping companies as well as the jobs of NZ seafarers, the government “tempered” it by stipulating that only shipping companies that already carried international cargoes to-and-fro NZ could carry coastal cargoes (Edlin, 1997b). A persistent criticism of government policy is that unlike their foreign counterparts, the domestic shipping companies are subject to various levies and taxes, and are hence, not playing on a level field. In response to the competition from overseas shippers, the surviving domestic shipping companies, such as Pacifica Shipping, are competing on the basis of service rather than price, such as by providing an overnight service once a week from Auckland to Christchurch (Kennedy, 1998b).

The small volumes of coastal cargoes in NZ as well as the emergence of very large container ships in the 1990s imply that international shipping companies can realise significant gains by “hubbing”, i.e., having their ships call at only one or two NZ ports. By hubbing, each ship can squeeze in an extra voyage annually to-and-fro Australasia. The hubbing phenomenon is fostering intense competition among NZ ports for container traffic (Goulter, 1997). As a result of hubbing, the prospects for coastal shipping remain positive “not because of, but rather in spite of, the open coast” (Rod Grout, chief executive of *Pacifica Shipping Company*, as quoted in Macfie, 1996b). According to the business development manager of *Mainfreight Transport*, the presence of international ships on the coastal trade has had virtually no impact on the intra-island freight market. The foreign-flagged ships either call on only at Auckland, or call first on Auckland, then travel along the eastern seaboard of the N. Island, and finally travel to the S. Island to pick up dairy products and meats before heading for Europe and Asia (Ministry of Agriculture and Fisheries, 1994). On the return journey, the overseas lines tend to not call upon Auckland. This pattern of freight movement is depicted in Figure 2.



**Figure 2: Illustrating the dominant freight patterns across the Tasman Sea.**

Thus, in NZ, Auckland is emerging as the major hub, while Lyttelton serves as a minor hub for the S. Island. As described earlier, Auckland is an ‘import port;’ hence, overseas carriers generally carry empty containers on board while travelling south along NZ’s coast. As a result, southbound rates (e.g., Auckland-to-Lyttelton) are dropping much faster than northbound rates, and the foreign-flagged shipping lines are capturing southbound, inter-island trade from their domestic counterparts.

Further, the marked reduction in northbound rates that had been envisaged as a fall-out of deregulation by certain stakeholders (such as S. Island grain farmers) has not materialized. Current estimates are that international shipping lines have captured between seven and nine percent of the coastal trade.

Foreign-flagged shipping companies that traverse the Tasman Sea while calling on Australasian ports from overseas (the so-called ‘cross-traders’) also carry Trans-tasman cargoes between Australia and NZ at very competitive rates. In 1983, free trade was established across the Tasman under the Australia New Zealand Closer Economic Relations Trade Agreement (CER). The CER has been a major catalyst in the development of an internationally competitive and export-oriented manufacturing sector in NZ (Statistics New Zealand, 1997, p. 490). Under the current Rules of Origin (ROO), goods that achieve an Australia/NZ content level of 50 percent qualify for duty-free treatment in either country. However, that might be relaxed with the continued expansion of a combined New Zealand/Australia “domestic” market.

Nevertheless, the historically high cost of shipping across the Tasman Sea, which separates Australia and New Zealand, has been cited as a factor in the relocation of export-oriented corporations, such as Cedenco Foods (Bedford, 1996), from New

Zealand to Australia (whose markets are bigger). The Tasman has historically been one of the most expensive shipping lanes in the world - till recently, the cost of sea-freight across the Tasman was not much less than that of air-freight (Green, 1996).

Shipping across the Tasman was never formally regulated. In 1931, the Australian and New Zealand maritime unions signed a treaty whereby they would picket any foreign-flagged ships that employed foreign crew and that carried transtasman cargo. The treaty was designed to protect the jobs of maritime workers on either side of the Tasman and was not supported by either government.

Cross-traders first began to sneak into transtasman trade in 1994. The cross-traders could carry transtasman cargo on a marginal-cost basis, unlike the dedicated operators who needed to recover even the overheads for transtasman voyages; hence, the rates of the former were very competitive. Following related developments, the two maritime unions modified the treaty in 1997 to allow cross-traders to carry transtasman cargoes so long as they had working arrangements with one of the dedicated operators (i.e., those that plied only across the Tasman), that sought to protect maritime jobs (Edlin, 1997c). However, in early-1999, the last dedicated shipping line ceased to operate across the Tasman, thus nullifying the treaty between the two unions.

It should be noted that even prior to the deregulation of transtasman shipping, the actual 'blue waters' costs of shipping across the Tasman comprised just 40% of the total. Inside the wharf gate, cargo handling costs are 40% higher in Australia than in NZ, and the total port cost per ship visit is estimated at about 300% higher in Australia than in NZ (Edlin, 1993a). Thus, Australian waterfront costs are seen as a barrier for NZ exporters, and reforms in the Australian waterfront are the true means of lowering shipping costs across the Tasman.

### *International Airfreight*

Taken by weight, less than one percent of either NZ's exports or imports is freighted by air. However, as is to be expected, by value, the percentages are higher; 25.1% of NZ's imports and 15.4% of NZ's exports are freighted by air. (In the year ending June 1, 1997, overseas air-cargo accounted for NZD 5.24 billion in imports and NZD 3.32 billion in exports [Statistics New Zealand, 1998, Chapter 25].)

Air NZ accounts for about half the country's airfreight capacity. Time-sensitive products account for 80% by weight of the air-cargo that is outbound from NZ on the major air carriers (Weston, 1996). An example of such products is marbled beef, which is obtained by blast-chilling grain-fed beef just prior to loading it on to the aircraft, in order to preserve the marbled effect that is sought after by Japanese consumers (Kelly, 1994).

## Freight Logistics Practice Of Nz Shippers

Having provided a description of freight transportation in the NZ context that is appropriate for the purpose of the present paper, we proceed to elaborate the various sets of factors that influence freight logistics practice of NZ shippers. Table III summarizes these sets of factors, as well as their associated (and illustrative) indicators of logistics practice.

TYPE OF FACTOR	FACTORS	IMPACT ON SHIPPERS' PRACTICE OF FREIGHT LOGISTICS
<b>Structural.</b>	<i>Cook Strait.</i>	The need for a twin-warehouse strategy to maintain high levels of service nationwide; difficulties in consolidating the manufacture of perishables.
	<i>The dominance of Auckland.</i>	The need for Auckland-based shippers to manage backhauls; direct deliveries from plants to Auckland-based end-customers of hard-to-move consumer goods.
	<i>Thin market density.</i>	Consolidation of distribution by shippers of complementary product.
	<i>Preponderance of trade in primary products.</i>	The inclination for shippers of primary products to employ proximate ports.
	<i>Geographical isolation.</i>	The push for importers and exporters to consolidate shipments for reducing freight costs.
<b>Regulatory.</b>	<i>The removal of the 150-km restriction on trucking.</i>	Reduction in the number of warehouses used by shippers.
	<i>Deregulation of coastal shipping.</i>	Complex inter-island freight patterns that employ international lines for shipping non-urgent, southbound cargo.
	<i>The Closer Economic Relations Trade Agreement between NZ and Australia.</i>	The trend of Australasian fmcg manufacturers to restrict manufacturing in Australia for realizing economies of scale, and to focus on only marketing and distribution within NZ.
<b>Developmental.</b>	<i>Technological advances in freighting perishables.</i>	Overcoming the barrier of distance in maintaining freshness of product in overseas markets.
	<i>Paring down ferry transit times across Cook Strait.</i>	The proclivity of shippers to employ a single warehouse in the lower North Island.
	<i>'Inland ports.'</i>	The alternative to exporters and importers to avoid shipping through their nearest ports.

**Table III: Shippers' practice of freight logistics in the New Zealand context.**

## *Structural factors*

*Structural* factors refer to certain invariants of the NZ context, such as its thin density of population and geography, which yet have a strong bearing on shippers' practice of freight logistics.

### **Cook Strait**

Since the deregulation of trucking, many firms have followed a twin-warehouse strategy; a warehouse at Auckland maintains a full line of product and serves the N. Island market as also a secondary warehouse in Christchurch, which in turn serves the S. Island market. This strategy, which enables service standards of next-day delivery throughout the country (Craig, 1994), is necessitated partly by Cook Strait. Transport across the Strait is often disrupted by weather during winter as southerly storms frequently whip up swells that on occasion peak at seven metres, and as wind gusts up to 175 km/h lash the Strait (Bromby, 1999b).

Cook Strait also thwarts efforts at consolidation in the manufacture/processing of perishable products, such as milk. We cite the example of the New Zealand Dairy Group (NZDG), which is the largest group of dairy companies in NZ and is based in the Waikato region of the North Island (which includes the town of Hamilton). Rather than ship milk across Cook Strait from the N. Island, the NZDG collects, processes, and distributes milk in the S. Island through two licensees (McManus, 1997).

### **The Dominance of Auckland**

The sheer dominance of Auckland attracts many secondary industries that are not closely tied to local input materials. (The Auckland region accounts for 36.3 percent of full time equivalent employees in NZ's manufacturing sector, despite accounting for only 30 percent of the population.) Firms that seek to supply the whole national market tend to locate in the Auckland area close to the principal market, causing an imbalance of freight flows between that region and others further south (Cavana et al., 1997). As a result, the search for backhaul business is an important management task in the NZ context. For example, a recent strategic review of the NZ subsidiaries of a well-known Australasian conglomerate called for improved co-ordination of inter-plant freight movements between Auckland and the rest of the country (Hunter, Wilson, and Sankaran, 1998).

The market-concentration in the Auckland region also enables a significant proportion of direct deliveries from plants to end-customers of hard-to-move consumer goods. As part of ongoing efforts in supply chain engineering, *Farmers*, which is the second largest chain to retail general merchandise in NZ, has gainfully employed the principle of logistical postponement (see for example, Bowersox and Closs, 1996, p. 473) in conjunction with major suppliers of hard-to-move consumer goods (Ninness, 1996). Accordingly, *Fisher & Paykel*, a well-known NZ manufacturer of whitegoods, and *Sleepyhead*, a New Zealand furniture manufacturer, ship product directly from their plant premises in Auckland to Auckland-based retail-customers of *Farmers*.

## Thin Market Density

While the consolidation of distribution by shippers of complementary product has been described as a less common logistical response of companies to perceived cost or service disadvantages (Heskett, 1977, p. 87), it is especially important in the NZ context because of the country's small and thinly spread population. The linear dispersion of about two-thirds of NZ's population heightens the need for consolidation in distribution, especially for sparsely populated regions such as Taranaki, which includes the town of New Plymouth that is situated about 100 miles off the main trunk line.

A good example of such consolidation in the 'cool chain' is the arrangement between *Mr Chips*, a food manufacturer focusing primarily on french fries, and *Primary Producers Co-operative* (PPC), a producer of meats. According to a senior executive within *Mr Chips*, the two partners have experienced 'organic' growth through the association by tapping into each other's customer base.

Consolidation of distribution, especially in the grocery sector, is also being eventuated through the use of third party logistics operators such as Linfox Logistics, a division of Linfox Australia. According to the managing director of Linfox, grocery lines represent the only business in NZ with volumes that are high enough to warrant category multi-user warehousing at a single site. Linfox recently established the first such site in NZ, focusing on service for food and beverage clients (Kennedy, 1998a).

## Preponderance of Trade in Primary Products

The NZ economy has traditionally centred on trade in primary products - even in 1996-97, dairy, meats and edible offal, wool, and horticulture accounted for nearly forty percent of NZ's exports by value (Statistics New Zealand, 1998, p. 512). Since the value-to-weight ratios for primary products are low as compared to secondary goods, the cost of inland transport of such products to a more distant port is prohibitively high, and was all the more so prior to the deregulation and privatisation of the transportation system. Thus, the profusion of ports in NZ exemplifies the impact of the value-to-weight ratio on logistics and distribution (Cooper, 1993). (For example, products with low value-to-weight ratios have empirically been found to be manufactured close to the market [DuBois, Toyne, and Oliff, 1993].)

NZ exporters continue to use provincial ports (on a f.o.b. basis) for shipping primary products, such as logs, whose ratios of value to weight are also comparatively low. However, as forestry corporations increasingly add more value within NZ, they use fewer ports for export than before - the ratio of value-to-weight increases not just because of the increased addition of value but also because of the concomitant reduction in bulk. For instance, Carter Holt Harvey, a subsidiary of International Paper, currently processes two-thirds of the logs that it harvests and uses only three ports as compared to nine earlier (Macalister, 1997; Reynolds, 1997).

## Geographical Isolation

The geographical isolation coupled with the relatively small size of NZ's economy, strongly pushes for shipment consolidation on the part of both importers and exporters

to reduce freight costs through increased freight volumes. Thus, according to its managing director, *Farmers* is “consolidating shipments from different suppliers in Asia to reduce shipping costs” (Walden, 1999).

Such shipment consolidation extends to exporters as well. In an attempt to reduce costs and improve returns to growers who supply apples, pears, and kiwifruit for export, the Apple and Pear Board and the Kiwifruit Marketing Board recently announced joint initiatives on end-to-end logistics (Tocker, 1997). For both organizations, logistics represents a significant component of cost. For instance, in 1996-7, the revenue of the Apple & Pear Marketing Board was NZD 874 million and logistics costs were NZD 250 million (of which NZD 140 million were shipping costs alone).

Likewise, *Naturally New Zealand* is an alliance formed by a dozen NZ exporters in part to share freight costs for supplying to the US market. The exporters supply non-competing food items, and include a yoghurt producer, a free-range egg exporter, and an ice cream manufacturer.

Such joint initiatives are not restricted to just suppliers of complementary products. Even competitors such as Carter Holt Harvey and Fletcher Challenge Forests, undertake joint shipments of logs to far-off destinations such as the Middle East.

### *Regulatory factors*

*Regulatory* factors refer to relevant aspects of the regulatory environment, including governmental regulation of the freight transportation sector in NZ.

### **The Removal of the 150-km Restriction on Trucking**

Prior to the removal of the earlier-mentioned 150-km restriction, NZ was dotted with warehouses (Edlin, 1997a). For example, a leading NZ freight carrier used to serve Whangarei from a warehouse in the North Shore of Auckland in order that the distance traversed between the warehouse and Whangarei would be just under 150 km (the stated distance between the two cities is 169 km).

Highway 1, which runs North-South across both islands, is the country’s main highway. The principal towns on Highway 1 also lie along the main trunk line of the railways. Hence, judging by distances along Highway 1 (e.g., Auckland and Wellington are 666 km apart), one can infer that under the 150 km restriction, a manufacturer would have required at least about five warehouses along Highway 1 in the North Island alone. Likewise, in the South Island, at least about four warehouses would have been required along Highway 1. Thus, all told, nine warehouses, as opposed to the prevailing norm of two, would have been required at the very minimum. According to a senior executive of a major transport operator in NZ, prior to deregulation, a typical manufacturer maintained six warehouses in the North Island and four in the South Island (Wilson, 1999).

### **Deregulation of Coastal Shipping**

Given the downward pressure on rates for shipping southbound cargo, shippers based in Auckland and in the eastern sea-board of the North Island are increasingly using

overseas shipping companies to ship non-urgent cargo to the South Island (Macfie, 1996b). For instance, *Fisher & Paykel* used to load out two double-articulated trucks each day to the South Island from Auckland. However, according to the commercial manager, with the deregulation of coastal shipping, the company can afford to send one of the two daily shipments through an overseas shipping company “because they’re cheap... and if you are holding two weeks’ stock, you can afford to wait five days.”

Further, as noted earlier, domestic shipping companies are competing for inter-island trade on the basis of service. Thus, the pattern of domestic freight movements of NZ shippers is becoming increasingly complex (Hunter, Wilson, and Sankaran, 1998).

### **The Closer Economic Relations Trade Agreement between New Zealand and Australia**

The CER has enabled value-adding NZ manufacturers to make inroads into niche markets in Australia, at least in part because of the greater flexibility of the workforce in NZ as compared with Australia. McKechnie Metals, winner of the Tradenz (the NZ Trade Development Board) Major Business Exporter of the Year award in 1997, is an excellent case in point. It moved into the Australian market in the early 1980s (when the CER was signed), and as of 1997, was the only major overseas supplier of non-ferrous products into Australia.

However, the CER has also prompted Australasian manufacturers of fast moving consumer goods (fmcg) to consolidate manufacturing in Australia in order to realise economies of scale, and to focus on only marketing and distribution within NZ. Unifoods, a subsidiary of the Unilever Group, is a prime example of this phenomenon.

Such consolidation makes economic sense in light of the greater size of the Australian market (the population of Australia is nearly five times that of New Zealand). Practitioners in the NZ transport industry note that this is an indication of NZ’s becoming “an Australian state,” economically speaking. According to the General Manager of Warehousing and Distribution of *Mainfreight Transport*, this trend on the part of Australasian manufacturers has served to push the third-party logistics industry in NZ.

#### *Developmental factors*

*Developmental factors pertain to changes that are induced largely by ongoing economic and technological development.*

### **Technological Advances in Freightling Perishables**

The preponderance of NZ’s exports in primary products has already been highlighted. However, distance from major export destinations remains a barrier to overcome for shipping perishables. As the President of the Vegetable and Potato Growers’ Federation, Max Lilley, notes, “If we could cut the 21 to 27-day freight time [by sea] to Japan and Asia by half with technological gains, we’d really be in the game.”

An alternative to cutting freight time is finding ways of maintaining the freshness of perishables. Demeter Pacific, a Christchurch-based produce exporter, has transformed



containers to keep vegetables, such as onions and potatoes, fresh while they are shipped to Pacific Island and South East Asian markets (*The Press On-line*, 1999b). It has added open-weave curtains to the sides of the specialised open-sided containers that are used to ship odd-shaped products, and stowed the containers in well-ventilated, cooler positions on ships. These measures have served to maintain the quality of the exported produce, by preventing oxidation. In fact, Demeter Pacific has won an export award from Tradenz for its work on shipping methods to keep vegetables fresh.

Another example of technology-enabled freshness of perishable exports concerns fisheries exporters of recent origin, such as Moana Pacific and Ngai Tahu Fisheries that emerged in the 1990s. These exporters use an innovative technology to airfreight fresh lobsters, as opposed to the lower-margin *chilled* or *frozen* product, to lucrative Asian markets. Shortly before the aircraft's departure, the lobsters are chilled in tanks fitted with temperature controls. This slows down their metabolism so that they can live longer outside of water. On a just-in-time basis, the lobsters are harvested from the tanks and packed into polystyrene foam boxes, which are then loaded on to the aircraft. The fresh lobsters fetch premium prices of about NZD 50 a-piece in Hong Kong and other Asian markets (Hutching, 1993).

### **Paring down Ferry Transit Times across Cook Strait**

As noted previously, Cook Strait is not amenable to bridging or tunnelling restrictions. Nevertheless, as a result of ongoing economic development, transit times are continually being pared down, rendering the Strait less formidable an obstacle than previously. Practitioners in the freight transport industry believe that as a consequence of the changes described below, in due course, at least some firms might maintain a single warehouse in the lower N. Island (e.g., Palmerston North) to serve the entire country.

A recent development is Tranz Rail's acquisition in late-1998 of the roll-on/roll-off Aratere ferry ('Aratere' means 'quick pathway' in Maori) that can make the crossing 20 minutes faster than its predecessor, the Aratika, which took about three hours. Moreover, the Aratere makes six crossings a day, two more than the Aratika (Bromby, 1999a). Thus, service levels for freight transport are increasing all the more.

Additionally, Tranz Rail is planning a relocation of its inter-island terminal in the S. Island from Picton to Clifford Bay, a move that would halve the travel time across the Cook Strait (Hutching, 1997). Further, trains will not need to cross two steep grades just outside Picton.

Yet another innovation is the pioneering use by Tranz Rail of 'Ironsailor,' an automatic mooring machine that enables faster turnaround for roll-on/roll-off ferries, such as the Aratere. The Aratere can dock in four seconds and cast off in two; in contrast, while using ropes on the average ship, it takes at least 15 minutes and 12 people to berth or cast off (Fox, 1999).

### **'Inland Ports'**

As noted earlier, as a consequence of hubbing, NZ ports are increasingly competing against one another for container trade. The competition is resulting in the emergence

of 'inland ports,' whereby exporters and importers of containerised cargoes in a certain region do not necessarily ship product through the port nearest them.

An example of an inland port is Metroport, an inland container terminal whose construction was completed by Tranz Rail in early 1999 in Southdown, which is one of Auckland's major industrial zones. Metroport is serviced by both road and rail transport. Thus, Tranz Rail rails containers to-and-fro Southdown and the Sulphur Point Terminal of the Port of Tauranga. This enables shipping lines such as the Australia New Zealand Direct Line to call on Tauranga in lieu of Auckland. Thus, importers and exporters in the Southdown area are shipping through the Port of Tauranga instead of the Ports of Auckland (*The Press On-line*, 1999a).

Similarly, in the foreseeable future, at least some exporters in the vicinity of Christchurch may ship containerised cargo through the port of Timaru rather than Lyttelton. At the time of this writing (October 1999), no container ships called on Timaru. However, in light of the magnitude of dairy manufacturing in South Canterbury (which encompasses Timaru, while Christchurch belongs to North Canterbury), the New Zealand Dairy Board expects to boost its dairy exports through Timaru (Hunter, 1999). This could, in due course, prompt one or more shipping lines to use Timaru in lieu of Lyttelton as their hub for the South Island.

## Conclusion

As described in the outset, the present investigation arose from a pedagogical need perceived by the author to address the impact of transportation deregulation and other factors on shippers' practice of freight logistics in the NZ context. To that end, we have provided a self-contained discussion of freight transportation, and then proceeded to elaborate three sets of factors that influence logistics practice. One of these pertains to the regulatory environment, which subsumes governmental regulation of the transportation sector. A second set of factors refers to structural aspects of the New Zealand situation, which are invariant except perhaps in the long run, and therefore exert a continual influence on logistics practice. Examples of such factors include the market concentration in Auckland and the thin market density. The third set of factors is developmental and includes, for instance, the reduction of ferry transit times across Cook Strait, which could mitigate the need for warehousing in each island.

An interesting issue that emerges from the above three-way classification is the interaction between some of the factors. For instance, technological developments such as the relocation of ferry terminals across Cook Strait could undermine the Strait's influence on dual warehousing. Similarly, recent experiments in moving milk across Cook Strait have established that during the two-week peak in October-November of the dairy season in each island, train and ferry can move milk between the two islands. This development would save capital being spent on capacity that is seldom used (Birss, 1999).

The continued development of technology for exporting time-sensitive product to distant markets will thwart the influence of NZ's geographic isolation from major export destinations. However, such developments will only enhance, and not diminish, NZ's preponderance of trade in primary products. Having said that, perishables such as

fresh lobsters have high ratios of value to weight, unlike logs. Therefore, the continued dominance of trade in primary products might not cause further proliferation of ports. Some interesting issues that beg further research emerge from the above discussion, and for the sake of brevity, we discuss just one of them. Despite NZ's historically thin market density, the example of *Mr Chips* and *PPC* with regard to the consolidation of distribution appears to be more the exception than the rule in the NZ context. Such consolidation, if effected, would constitute a 'proprietary asset' for the concerned manufacturers (Lambert and Stock, 1993, Chapter 1) and a potential source of competitive advantage for them all; the shippers will be able to improve service levels to customers while keeping costs under control.

The distribution arrangement with *PPC* has been cited as a major reason for the increase in the ratio of pre-tax profit to sales for *Mr Chips*; between fiscal 1998 and fiscal 1999, while *Mr Chips*' revenue increased by 11.2%, its pre-tax profit increased by 26.5%. Therefore, in light of the significance of the consolidation of distribution in the NZ context, the barriers to the formation of such lateral supply chain partnerships by NZ manufacturers of complementary products would be worthy of empirical investigation.

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