The Future of Logistics in Canada: A Delphi-Based Forecast
by Maureen E. Lynch, Sharon J. Imada and James H. Bookbinder

ABSTRACT
The Delphi method utilizes a group of experts in a particular field to derive a set of future scenarios for that field. Initial opinions of each panelist are “fed-back”, anonymously, through one or more supplementary questionnaires to all group members. Their reactions lead to rejection of some scenarios, but to relative consensus on the others. This article employs the Delphi approach to develop a long-range forecast of Logistics in Canada. The findings of the panel are organized into seven broad subject areas, and presented as a series of future trends. These are compared to other published results for North America.

I. Introduction
The distribution of products can be strongly affected by changes in technology, international strategies, industry and management trends, socio-economic issues, and government regulations. These forces can have a great impact on any logistics activity, whether it be inbound transportation of raw materials to factories or the outbound shipments of finished goods to warehouses and retailers.

The objective of this research was to identify potential issues resulting from the various changes affecting society, and subsequently predict the state of Logistics in Canada. Reasonable scenarios for the future of Logistics in Canada were sought using the Delphi approach, developed by Helmer and Dalkey (Bright, 1968). This flexible forecasting method involves administration of a series of questionnaires to a panel of experts; the expected result being a consensus of pertinent future issues.

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The scope of this study encompassed Canada in its entirety, focusing on Canadian domestic business as well as exporting. The forecasts were limited to thirty years into the future.

Previous work on this subject has been carried out in the United States. A 1983 Council of Logistics Management (CLM) Delphi study prioritized trends in business logistics forecasted to occur into the 1990s. In 1987, Robeson continued that research with a second Delphi panel. Pertinent issues forecasted for the mid 1990s were ranked in importance by American leaders in the logistics field (Robeson, 1988). Effects of the future economic and technological environment on the design and management of logistics systems were discussed by Perry (1991). In that article, scenarios were derived for the year 2000.

Past treatments of related subjects include a Manufacturing-Systems Delphi study. This inquiry determined small and medium-sized manufacturers' short and long-range technology needs and plans (Jverson and Jorgensen, 1985). Another Delphi forecast was performed to create scenarios about information systems for road transport, for future years to 2040 (Sviden, 1988).

This paper begins by outlining the details of the Delphi method, and some of its strengths which led us to select this approach. Section II also summarizes the makeup of our panel of experts: the representation was sought by region, industry segment, and functional specialization. Sections III through IX present our findings in terms of future logistics trends, organized into seven broad subject areas. Each of our forecasts is quantified by its IDR (inter-decile range), the interval between the tenth and ninetieth percentile of the panelists' predictions (see the Appendix) of the year in which the given trend will first occur. Where possible, we compare these predictions with other published results for North America.

The article concludes in Section X with some reflections on the choice of panelists, the Delphi method itself, and the difficulties in generating sufficient controversy to be able to identify a new trend before it becomes obvious.

II. The Delphi Method

Definition and Procedures

"Delphi is the name of a set of procedures for eliciting and refining the opinions of a group of people," the group consisting of experts in a particular field (Dalkey, 1972, p. 25). In our work, the Delphi approach was the means to identify and forecast issues and trends pertaining to the future of Logistics in Canada.

Traditionally, the Delphi method has been primarily a tool for forecasting in subject areas such as scientific breakthroughs, population control, automation, space progress, war prevention and weapon systems (Linstone and Turoff, 1975). However, variations on Delphi have been utilized in decision- and policy-making. Numerous Delphi applications have been performed to date, in government, academic, and corporate research.

A Delphi survey involves several rounds. These alternate between written questionnaires to a panel of experts and analyses of responses. These rounds continue until a consensus is reached on the pertinent issues. The flexible nature of the Delphi approach allows the facilitator to design each questionnaire to meet his/her particular objectives.

The Delphi procedure was chosen over other methods of forecasting as it takes advantage of using a committee, yet dissuades the adverse effects of group conference situations. Furthermore, this paper-and-pencil technique accommodated the wide geographic dispersion of the participants.

The Panel of Experts

The panel of experts was designed to have representation from four groups: logistics practitioners from professional associations, industry, government and universities; shippers of goods; third-party logistics companies; and transportation carriers. Contact was made with the majority of experts prior to distributing the first questionnaire, to maximize the level of participation. Care was taken to ensure a group with national geographic coverage. (Further remarks on the composition of the panel are contained in Section X.)

Three Rounds of Questionnaires

The first-round questionnaire consisted of two open questions: (1) Identify the issues that will have the largest impact on logistics into the next century (1995 to 2020); and (2) What issues will have the largest impact on your work related to logistics in the future? Combinations of responses to the preceding questions resulted in an initial collection of 37 scenarios, separated under the classifications of International; transportation; industry; logistics managers; environment; government; and technology. This set of scenarios was presented to the participants in a second-round questionnaire.

In that second round of the survey, participants were asked to perform four functions: to rate their expertise in the area; estimate the year by which the scenario will occur, or state that it will never occur, or state that they have no opinion on the matter; comment on their forecast, i.e., give reasons why their projected date is correct, or why they feel that scenario will never occur; and to indicate any scenarios which had unclear wording.

The median and interdecile range (IDR - the interval containing the middle 80 percent of the responses) of the participants' forecasts of date of occurrence were analyzed following the second round questionnaire. Scenarios for
Global Sourcing and Production Sharing

Global sourcing and production sharing are international trade matters whose importance is expected to increase in the future. These involve obtaining materials from one location and manufacturing at one or several other locations. Participants in a 1987 Council of Logistics Management (CLM) Delphi study indicated that the U.S. was already very involved in international procurement of raw materials. They predicted that international sourcing would continue to expand, and become an economic requirement in several industries (Robeson, 1988).

Langley (1986) agrees that global sourcing will be an economic necessity. If some companies in an industry expand their procurement to obtain raw materials internationally at lower prices, their competitors will have to find suppliers with the same low costs. Otherwise, they will be unable to compete.

All participants in our Delphi study believe that international sourcing of components and raw materials is already practised by leading-edge companies, and this trend will continue in many industries for several years. Free trade agreements, with more open markets, will create additional pressure to move in this direction.

Ballou (1992) identifies tax incentives as a common means of encouraging companies to locate their manufacturing and warehousing facilities in a foreign (underdeveloped) land. These incentives, along with cheap labour, have enticed companies to ship raw materials from their home countries to be manufactured, and later shipped back to the home markets for sale.

No consensus was reached in our Delphi study on location of manufacturing facilities. Only half the respondents concur that manufacturing of parts and products will be conducted in lowest-cost regions (i.e. regions with cheap labour, or close proximity to source materials). Reasons for disagreement include: tradeoffs between low costs and high quality, differing importance of proximity to source vs. proximity to market, the constant change associated with low-cost regions, and the fact that the concept of "low cost" is only a relative one. Support of manufacturing in these lowest cost regions is based on the existence of free trade agreements, integrated transportation networks, and the separate locations of necessary suppliers and labour.

Increase in International Trade

Glaskowsky, Hudson, and Ivie (1992) expect a continuing increase in international transactions, both in number and types, for which a company must provide logistical services. Johnson and Wood (1990) also identify the importance of expanded international trade. Distribution managers will have to adjust to dealing with foreign logistics operations, especially given the current pace at which conditions are changing.
In the CLM Delphi study, respondents agreed that knowledge and experience in international logistics will be of greater importance for numerous companies. They also felt that logistics employees need to have an understanding of world economic issues (Robeson, 1988).

Participants of our Delphi study unanimously recognized that more companies are starting to compete in global markets. This trend is already underway, as firms begin to rely on their international logistics capabilities.

IV. Transportation

Many factors influence the goods-transportation industry, including cost, environmental concerns, government regulation, and customer requirements. Choice of mode(s) depends on the interrelation of these factors. Several trends have been identified concerning the future of goods transport.

TOFC/COFC

Usage of trailer or container on flat car has gradually increased over the years. In the United States, TOFC/COFC has grown from less than one percent of all railcar loadings in 1955, to 15.2 percent in 1986 (Wood and Johnson, 1989, p. 255).

The increase in this piggyback traffic was the third most important trend selected by trucking-company CEO's participating in a survey of Johnson and Schneider (1990). These executives felt that the role of railroads would expand by furnishing line-haul transportation, since they can provide these services more economically and rapidly than trucks.

Half of our Delphi panel believe that the majority of goods (based on tonnage) that are transported by rail will move via TOFC/COFC services before the year 2000. Although TOFC/COFC are not new, they will re-emerge as essential to rail survival. Rail will become increasingly customer-service oriented, offering more creative and comprehensive intermodal operations. (See also Higginson and Bookbinder, 1990).

The other 50 per cent of our respondents think that the majority of goods shipped by rail will never be made up of TOFC/COFC shipments. Bulk commodities would be the major share of rail traffic for the foreseeable future.

The preceding two paragraphs could simply indicate a dichotomy between opinions prevalent in Ontario and Alberta. Examination of responses by individual panelists, however, pointed to no such regional effect.

Government Re-regulation

One of our scenarios considered re-regulation, the possibility that governments would once again impose economic regulations for the air and road transportation industries because of consolidation, alliances and mergers of transportation companies. This scenario is regarded as highly unlikely by the majority of participating experts; 62 per cent believe it will never occur. The direction, if anything, is towards additional deregulation rather than re-regulation.

Those believing regulation will be introduced anew state that possible airline mergers will accelerate this trend, but that industry will not again be regulated to the extent it used to be. One of our respondents comments, "One can only venture to guess which sector will instigate government intervention: carriers themselves who want to remain reasonably protected, even by economic regulation? or shippers, who find themselves captive to 'predatory' carrier practices?"

New/Changed Modal Choices

Despite the Delphi participants' low self-ratings on their expertise for this section, the forecasts will still be presented. (Frankly, we did not understand or agree with their modesty, which may have resulted from more controversial scenarios here than elsewhere).

One third of respondents predict the creation of a high-speed rail freight service in Canada, on its own dedicated track (analogous to the high-speed TGV rail passenger service in France). Reasons cited by the majority (who answered "never" to this scenario) include the large distances, harsh climate, and capital required for right-of-way. We remark, in hindsight, that scenario 6 should have been made more precise. The forecast might have changed greatly, had we limited the freight TGV to Toronto-Ottawa-Montreal, or even to the Quebec-Windsor corridor.

The bulk of our participants also believe that the RoadRailer (trailer unit which can be hauled on the road or by rail through the use of two sets of axles) will never eliminate most long distance trucking.

V. Industry

Changes in industrial practice which will affect logistics include increased business consolidations, Just-In-Time manufacturing systems, and third party logistics services.

Merger, Acquisition, and Consolidation

In the CLM study (Robeson, 1988), the trend in the 1980's toward merger, acquisition and consolidation was forecast to continue, resulting in a smaller number of larger suppliers, producers and customers. Respondents to the CLM study had varying views on this trend, some believing it to be very significant, whereas others viewed it as an unimportant issue.

We remark that in hindsight, this trend does seem to have been correctly forecast, but perhaps for the wrong reasons. The tendency toward acquisi-
In the years before the CLM study is now referred to in the financial community as the "excesses of the 1980s", merger mania during a time of booming economies and fashionably-high debt loads. Today (early 1993), business consolidations are continuing, but now due to downsizing, bankruptcies, etc. as North American firms in all industries (not just logistics) try to cope with severe recession.

As for the trucking-company CEO's surveyed by Johnson and Schneider (1990), 35 per cent thought that by the year 2000, rationalization would be the largest change in the trucking industry. They felt that increasing competition would force carriers to close. The few survivors would monopolize the industry, charging artificially high prices and making phenomenal profits. The rate increases would be much higher than inflation. By the year 2000, small trucking companies would no longer exist, except for ones that found a successful niche. These niches will include exact delivery times for customers using Just-In-Time (JIT) systems (see next section).

The Canadian distribution/transportation industry is in the process of restructuring, which will result in mergers or strategic alliances with American counterparts. Our Delphi participants predict this restructuring will peak in the next two years, and be complete in five or six years. Experts also expect long-term partnerships between carriers and shippers, and between transport modes, to continue. Alliances with carriers and a reduction in the number of carriers will become the norm. Selecting a carrier based solely on cost is a "dead strategy."

JIT, Service Levels and Reduced Inventories

Future utilization of JIT systems will affect the service levels required from transportation suppliers. As its use expands, suppliers' goods will have to be delivered exactly on time if they wish to keep their customers who employ JIT. Suppliers will have to maintain consistently reliable service to remain competitive, and to be able to grow (Johnson and Schneider, 1990).

The CLM study experts predicted increased use of JIT systems. They ranked the following trend 12th out of 20 in importance: "MRP and JIT systems of management will be in place in both discrete and continuous manufacturing processes". The trend ranked 13th stated that JIT will become a reality in all industries, not just in heavy manufacturing. The manufacturing experts ranked these trends 6th and 11th, respectively (Robeson, 1988, page 12).

Heightened application in Canada of JIT would have a dramatic impact on the service levels required from logistics. The possibility that "Customers favour JIT deliveries of frequent small orders; large inventories and their related infrastructure have disappeared at the retail level" generated some controversy. Most of our participants felt that this was a growing pheno-

menon, assisted by better and timely information. However, some suggested that selling to the public will always require inventories, because consumers are used to selection and availability. Although surplus inventories are a "sin", certain inventory levels will always be necessary in retailing.

The majority of experts agreed that centralization of production to decrease the presence of inventories is an emerging pattern. However, the recession may lengthen the period needed to write off and close facilities. The process will also be slowed by the costs of reduced flexibility. Some of our respondents think centralized production is already commonplace, while one respondent did not believe such a scenario would ever occur, as centralization is not necessarily desirable.

Customer Service

Service continues to be an important issue in logistics. The fact that customers are becoming more sophisticated and requiring specialized treatment was supported by all our experts. Difficulty in accommodating clients' demands stems from the absence of adequate information systems which will take a few years to implement.

Third Party Logistics

In the past decade, third party logistics companies have become popular in Europe (Anderson and Gilles, 1990), handling the complex functions of goods transportation between EC member states (Cooper, Kalapurakal and Bolt, 1990). However, third party logistics was slower to develop in North America. Pre-1980 regulation restricted the services that carriers could provide. A lack of confidence in third party firms stemmed from managers' fears of losing control. Although they needed to reduce costs, logistics directors were not confident that third parties could furnish a solution.

Now, however, third party logistics is flourishing in North America. As customers demand higher service levels, shippers are finding that better service involves substantial investments in their own operations, or the use of third party logistics providers. Also, globalization of markets is forcing companies to expand their distribution to regions where they have inadequate experience (Anderson and Gilles, 1990).

Langley (1986, page 10) projected the use of third parties as a future trend in North American logistics, as he states "increasing attention is being directed to the use of third parties literally to take over the entire distribution and/or logistics function within a firm."

The CLM Delphi study group remarked that third party logistics would become an alternative to in-house logistics in the future. This scenario was ranked 11th out of 20 in likelihood of occurrence.
Logistics and Transportation Review / Volume 30 / Number 1

Ballou (1992) identified a trend towards the formation of third party "chains": third party companies having widespread geographic coverage, working in coordination under an umbrella corporation.

Despite vested interests (in jobs, capital and infrastructure), the experts we consulted anticipated the use of third party services rather than in-house logistics to be commonplace before the year 2000. Competitive pressures are forcing organizations to focus on their core competencies, and to contract out other services.

A study by one of our Delphi participants showed that in 1989, over 70 percent of firms preferred to delegate some logistics decisions and responsibility to third party services, unless the company possessed specialized in-house competence.

Our Delphi results also indicate that third-party companies and carriers will provide a complete logistics service, from procurement to final customer delivery, full services which already exist at a more refined stage in Europe. This "one-stop" distribution is just developing in the U.S., and should thus affect Canada after a lag of four to six years. (Note that the year 2000 is the 90th percentile of the forecasted date of occurrence for scenario 15.)

VI. Logistics Managers

There are many speculations on the future role of the logistics manager. Respondents of the CLM study ranked the changing role of logistics managers as sixth in importance. Their prediction was that logistics management would become more visible as the link between purchasing supplies and selling goods (Robeson, 1988).

Stephenson (1987) noted the beginning of a transition in attitudes of logistics executives. These individuals have become increasingly focused on business aspects rather than just being specialists. He also states that more pressure than in the past is now exerted on them to reduce costs and improve productivity. This will require logistics managers to be fast-thinking, intelligent decision-makers.

Another view of the change is that "today's top logistics managers are actually in the process of working themselves out of a job" (Langley, 1986, page 10). This implies that the logistics function may become so vital to an organization as to lose its separate identity. This does not indicate that logistics is decreasing in significance, but rather shows the difficulty of distinguishing its role from that of corporate management (Langley, 1986).

Diminished Role for Canadian Logistics Managers?

Most of our respondents refuted the statement, "Logistics itself is recognized as so important and is involved in so many activities in the organization that it is controlled by functional managers." One replied: "The (logistics) activities are integrated and must be managed that way."

Some were wary of the idea of "...a diminished role for Canadian logistics managers, with logistics decisions being made at head offices located outside of Canada." As a panellist argued, "If one can build a strong logistics team, it can be located anywhere."

Logistics Education and Recognition

All experts agreed that within eight years, goods transportation and logistics will be highly recognized as a profession. Some of our participants acknowledged that presently, logistics is in its infancy, with marginal, simplistic training.

VII. Environment

Environmental issues have become major concerns in our society. In this section, we discuss recycling and government environmental regulations on transport services.

In the future, more packaging and products will need to become recyclable, either because of raw material scarcity or government-imposed regulation. New channels may be created to accommodate this emerging backhaul; existing channels could be altered to work as well in reverse (Johnson and Wood, 1990).

In our Delphi study, the majority of respondents believed that by 1995, "recycling would be the norm, and would create a natural cost-saving backhaul through the distribution network". However, some agreed that this would not happen consistently until later years, when it became government-imposed or economically beneficial. One participant, opposed to this statement, commented that the return volumes and patterns will not duplicate those of the front haul.

Mandatory rail travel (e.g., TOFC, COFC) for specific corridors, such as Toronto-Montreal, caused controversy among our panellists. It was noted that as roads become excessively congested, there is a chance that government might impose this form of transport. Whether for environmental reasons or to avoid capital spending on highway construction or expansion, mandatory shipment by rail was said to be far into the future (beyond the year 2000). Others thought it impossible that a government could so restrictively legislate transportation to so specify the choice of mode.

VIII. Government

Other types of governmental regulations affect all industries. Here we consider the impact of bureaucratic interprovincial barriers; free-trade agree-
ments; and re-regulation of trucking.

Removal of Interprovincial Trade Barriers

The removal of bureaucratic interprovincial barriers across Canada would enhance east-west trading patterns. However, fifteen percent of our participants felt that eliminating these barriers will never occur, as there is "too much entrenched interest." The majority of panellists believe that the barriers would be broken by 1998. Those that forecast a later date of occurrence argue that, "Even though obstacles to the manufacture and sale of beer, for example, are lessening, and pressures from free trade with the United States and Mexico may persuade government to act to remove these and other barriers, the government is so out of touch with the realities of business it will always be trying to catch up."

Re-regulation of Trucking

Some CEOs of American trucking firms expect that the increased consolidation in this sector, leading closer to a monopoly, will trigger re-regulation of the motor freight industry. Regulations will once again be imposed on rates, protecting small and medium sized trucking companies from the competitive pricing of large carriers (Johnson and Schneider, 1990).

Most of our Delphi participants did not foresee a return to regulation in this country. Their other views on restructuring of the Canadian trucking industry were presented earlier in Section V.

IX. Technology

Technology may have a great impact on the future of logistics in Canada. In the 1987 CLM study, the three top issues of interest were in the computer and information processing area. Specific trends concerned the ideas that managers must be able to adapt to this new technology, the importance of EDI, and the effects of an increase in information exchange (Robeson, 1988).

Such issues, plus our other findings concerning technology, are presented below. It was found for those trends discussed, most forecasted dates were far into the future.

Information Technology

According to our participants, the use of information technology to control both order processing and inventory, e.g. EDI, bar coding, RF terminals, will enable many companies to manage extensive logistics networks from central locations. However, one panellist noted that education will be required for this to occur. Another believed that information technology is adopted only slowly by Canadian corporations; Canadians remain suspicious of new methods of conducting business.

All of our respondents believe that, in the future, information will increasingly replace inventories, warehousing, and transportation resources.

One panellist, arguing for an early date of occurrence, stated that optimization of inventory levels by use of improved communications is presently taking place. However, another participant counter-argued that before information becomes key, people must rethink logistics as 'value-adding' rather than just 'cost-reducing.'

Artificial Intelligence

According to our panellists, routine logistics decisions will be made by expert systems in the future. The lag of usage is due to human mistrust, as in the previous section; "Canadians are wary of technology and expert systems will not readily be perceived as useful."

Electronic Data Interchange (EDI)

Two issues were discussed on the subject of EDI. First, a reduced emphasis on the middleman (direct electronic communication between customers and manufacturers) sparked debate. Thirteen percent were opposed, with reasons such as: There will still be a role for middlemen but it will be different; transactions are too complex to rely solely on technology; technology does not supplement, it only enhances.

The second issue, that EDI systems would create a paperless environment, also caused some controversy. Those who agreed that this scenario would occur forecast dates far into the future. Some of our respondents, in answering "never," emphasized a lack of faith in electronics even on the part of emerging generations. One expert noted an increase in paper usage since full automation in the workplace.

X. Conclusions

The present paper has some similarity to those of Robeson (1988) and Perry (1991). The latter studies and ours were based on opinions of knowledgeable practitioners, although the Perry (1991) article appears not to have had as formal an underlying survey methodology as the Delphi approach, used here and by Robeson.

Features of the Present Work

Two aspects of our work, however, are somewhat distinctive. First, we have obviously specialized in the Canadian context. Logistics in Canada differs from that in the United States in that deregulation is about a decade less advanced here than south of the forty-ninth parallel. The rail networks are
dissimilar; our spatial geometry is also more one-dimensional than planar; and there may be other, subtle contrasts between the two countries.

Second, the treatment throughout this paper has been to discuss the findings of our Delphi panel in light of facts and opinions from the published literature. We feel that this emphasis, in comparing final thoughts of the respondents to those expressed in journal articles and books, is a strength of the present work relative to the studies cited just above.

The Panel Revisited

In traditional survey methodology, sample size is extremely important. So, too, is the concept of a random sample, one in which every member of a population has an equal chance of being chosen. Neither of these ideas is relevant to the Delphi approach.

Here one seeks a (biased) sample composed of experts holding widely diverse opinions. Assuming the actual panel of respondents covers the different sectors (shipper, carrier, etc.) and various regions, sample size is not an issue. Twenty experts took part in our survey. Colleagues who have used the method assure us that, especially in the Delphi context, this is not a small panel.

Having made the above comments, we must also point out that profound conclusions are difficult to come by. Panelists' opinions did converge to several trends noted in the text. No radical predictions were forthcoming. This may have resulted because each of our survey experts was known by one of the authors, or at least was recommended by someone we did know. That common thread could have worked against controversy. Certain participants lived up to their reputation for non-mainstream opinions, although most trends they identified were judged unlikely by the remainder of our experts. We added one or two 'far-out' trends ourselves (not a standard Delphi practice), but these also were voted down.

Perhaps, similar to a minority opinion of dissenting members of a judicial inquiry, each non-routine trend identified in Round One could have been retained. Even if Rounds Two and Three should reach consensus that never would such trends occur, eliminating them does decrease the likelihood of forecasting a turning point in the industry.

REFERENCES


## Appendix: The Future of Logistics in Canada - Final Delphi Results

<table>
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<tr>
<th>Scenario</th>
<th>Final Forecasted Dates</th>
<th>%</th>
<th>Never</th>
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<tr>
<td><strong>International</strong></td>
<td></td>
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<tr>
<td>1. International sourcing of components and raw materials is often required to compete economically.</td>
<td><img src="image1" alt="Median" /> <img src="image2" alt="IDR" /></td>
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<td>2. Most manufacturing of parts and products is conducted in lowest-cost regions, e.g., regions with cheap labour, or close proximity to source materials.</td>
<td><img src="image1" alt="Median" /> <img src="image2" alt="IDR" /></td>
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<td>3. Many companies which previously did not export are now competing in global markets. They rely on their international logistics capabilities in order to be competitive.</td>
<td><img src="image1" alt="Median" /> <img src="image2" alt="IDR" /></td>
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<tr>
<td><strong>Transportation</strong></td>
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<tr>
<td>4. To keep competitive, railways have increased their attention to trailer/container on flat car (TOFC/COFC) services. Now, the majority of goods that are transported by rail are via these services.</td>
<td><img src="image1" alt="Median" /> <img src="image2" alt="IDR" /></td>
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<td>5. The monopoly created through consolidation, alliances and mergers of transportation companies leads to the return of government-imposed economic regulations for the air and road transportation industries.</td>
<td><img src="image1" alt="Median" /> <img src="image2" alt="IDR" /></td>
<td>62</td>
<td><img src="image3" alt="2020" /></td>
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<td>6. There is a high-speed rail freight service in Canada, on its own dedicated track. This is analogous to the high-speed TGV rail passenger service in France.</td>
<td><img src="image1" alt="Median" /> <img src="image2" alt="IDR" /></td>
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<td>7. The RoadRailler is a trailer unit which has the capacity to either be hauled on the road of by rail; it has two sets of axles. One example usage of the RoadRailler is: trailer units are driven to a rail terminal in Toronto. Drivers sleep eight hours as required by law, arrive in Chicago, deliver and pickup within a five hundred mile radius, and drive back to the rail terminal for the reverse run. The RoadRailler has eliminated long distance trucking with few exceptions.</td>
<td><img src="image1" alt="Median" /> <img src="image2" alt="IDR" /></td>
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<td><strong>Industry</strong></td>
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<td>8. Large multinational carriers dominate the long-haul trucking industry; small carriers are reduced to short-haul and remote area operations.</td>
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<td>9. The re-structuring of the distribution/transportation industry results in mergers and/or strategic alliances with American counterparts. Resources are shared among allied companies, and procurement and distribution decisions are taken globally.</td>
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<th>Scenario</th>
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<td><strong>Industry (continued)</strong></td>
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<tr>
<td>10. Due to a globalization of trade and a trend towards the integration of transport functions, long term partnerships are arising between carriers and shippers, and between transport modes.</td>
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<td>11. Customers favour just-in-time (JIT) deliveries of frequent small orders. Large inventories and their related infrastructure have disappeared at the retailer level.</td>
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<td>12. As a means to lessen the presence of inventories in the logistics system, there is a great centralization of production. The number of levels in the distribution channel is also reduced for most firms.</td>
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<td>13. Customers are more sophisticated and have high service expectations. Their concerns are directed at service quality rather than strictly on price and product quality. They demand reliable, consistent, and guaranteed service levels - 100% error free.</td>
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<td>14. The use of third-party services (transportation, warehousing, supply-chain management) is commonplace, as an accepted alternative to in-house logistics. This is the only way for smaller companies to compete.</td>
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<td>15. An integrated logistics network is a full logistics service, from sourcing/procurement to final customer delivery. This 'one-stop' distribution service is commonly offered by third-party companies as well as carriers, for domestic and international business.</td>
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<tr>
<td><strong>Logistics Managers</strong></td>
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<td>16. The role of the logistics manager has been reduced. Logistics itself is recognized as so important and is involved in so many activities in the organization, that it is controlled by functional managers, e.g., in production and marketing.</td>
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<td>67</td>
</tr>
<tr>
<td>17. In the past, the transportation/logistics industry lacked qualified human resources, as inadequate education and training was prevalent. Now, there is a great recognition of goods transportation and logistics as a &quot;profession&quot;, accompanied by growth in logistics associations and related training at educational institutions.</td>
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<td>18. North American rationalization of production facilities, free trade, and advances in information technology result in a diminished role for Canadian logistics managers. That is, logistics decisions are made at &quot;head office&quot; which, for many industries, is not in Canada.</td>
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<td>33</td>
</tr>
</tbody>
</table>

Legend: median - o; IDR -
### Appendix: The Future of Logistics in Canada - Final Delphi Results

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Final Forecasted Dates</th>
<th>%</th>
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</thead>
<tbody>
<tr>
<td>Environment</td>
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<tr>
<td>19. Environmental concerns and costs have constituted a move toward much reduced packaging. In addition, recycling is now the norm, which has created a natural backhaul through the distribution network. Concepts, equipment, and systems have originated to accommodate the cost-saving backhaul process.</td>
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<td>20. Because of environmental concerns, the government legislates mandatory rail travel, i.e., TOFC/COFC, for through shipments in specific corridors such as Toronto-Montreal.</td>
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<td>Government</td>
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<td>21. Bureaucratic interprovincial barriers across Canada are removed so that it is considered as one zone in the North American block.</td>
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<tr>
<td>Technology</td>
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<tr>
<td>22. Information technology to manage both order processing and inventory, such as electronic data interchange (EDI), bar coding, radio frequency (RF) terminals, on-line inventory records, satellite communication, and computerized planning and control systems, is used throughout industry. The ability to exchange information effectively enables a company to manage a large logistics network from a central location.</td>
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<td>23. Information is increasingly replacing inventories, as well as warehousing and transportation resources.</td>
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<td>24. Routine logistics decisions are made by expert systems. These systems use a set of decision rules, and direct any non-standard problems to human decision makers.</td>
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<td>25. EDI has changed the channels used for goods distribution. The role of the middleman/intermediary has been reduced, with direct electronic communication between customers and manufacturers.</td>
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<td>26. EDI systems, connecting shippers to consignees, customs officials, and multi-modal transportation companies, have yielded a paperless environment in local, regional, and international operations.</td>
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</tbody>
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