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In a rapidly changing global trade environment, the international competitiveness of Canadian industry is the key to growth and prosperity. Promoting improved performance by Canadian firms in the global marketplace is a central element of the mandates of Industry, Science and Technology Canada and International Trade Canada. This Industry Profile is one of a series of papers in which Industry, Science and Technology Canada assesses, in a summary form, the current competitiveness of Canada's industrial sectors, taking into account technological, human resource and other critical factors. Industry, Science and Technology Canada and International Trade Canada assess the most recent changes in access to markets, including the implications of the Canada-U.S. Free Trade Agreement. Industry participants were consulted in the preparation of the profiles.

Ensuring that Canada remains prosperous over the next decade and into the next century is a challenge that affects us all. These profiles are intended to be informative and to serve as a basis for discussion of industrial prospects, strategic directions and the need for new approaches. This 1990–1991 series represents an updating and revision of the series published in 1988–1989. The Government will continue to update the series on a regular basis.

Michael H. Wilson Minister of Industry, Science and Technology and Minister for International Trade

Structure and Performance

Structure

The guided urban mass transit industry consists of suppliers of a wide range of products and systems serving the market for urban transit. Most of these companies also serve other markets. Under current Statistics Canada product classification codes, rail transit vehicles, parts and other components are combined with railway and various other groups. Data in this profile are therefore derived from company information and should be taken only as indicators. Information on urban buses is available in a separate profile, *Urban and Intercity Buses*.

Guided urban mass transit systems are systems that operate on special guideways (usually steel rails). These systems have two elements: infrastructure, and electrical and mechanical equipment. The infrastructure element accounts for at least 50 percent of the cost. It includes guideways, stations, power substations, shops and yards and requires engineering and project management to build the system. Electrical and mechanical equipment includes vehicles and systems for vehicle control and communications, fare collection, traction power, track and passenger information, and distribution. Since the actual construction of the infrastructure is usually a local activity, this industry profile deals primarily with electrical and mechanical equipment.

The influence of governments on the market is strong and highly visible. Governments, government agencies or organizations largely funded by governments are the customers for guided urban mass transit equipment. Consequently, their policies and procurement practices directly affect the market for equipment.





Until early 1992, two major vehicle manufacturers dominated the Canadian transit supply industry: Bombardier Inc. in Quebec and UTDC Inc. in Ontario. They produced a wide range of mass transit and commuter rail cars and also designed complete systems. Both companies were diversified into other products and served other markets. However, in February 1992, Bombardier acquired UTDC's assets and has become Canada's major international player in this industry.

About 250 other companies in Canada manufacture vehicle assemblies and subassemblies (including propulsion systems) and supply other components of electrical and mechanical equipment. These companies range from large diversified multinationals such as Alcatel and General Electric, which supply major subsystems, to small firms producing specialty products such as digital radios and training simulators.

In 1989, the guided urban mass transit manufacturing industry employed about 4 000 people and had shipments of approximately \$230 million (Figure 1). Exports accounted for \$160 million or 70 percent of total shipments, all of which went to the United States. The Canadian industry is highly export-oriented because the domestic market is not large enough to support full production. Employment in the industry is split equally between Ontario and Quebec.

Domestic sources supply almost all Canadian vehicle demand. Imports consist of components such as motors, computers and other equipment not available from Canadian sources. These components are obtained mainly in the United States. In recent years, the industry has enhanced its competitive position in the international market. Bombardier has purchased several plants in Europe and its acquisition of UTDC has expanded its ability to provide complete transit systems. The component suppliers are also active in export markets. In 1987, the brake suppliers rationalized their operations on a North American basis in order to take advantage of a duty-free exchange between the two markets. In addition, several of the smaller companies such as DSL (training simulators) and Daytech (transit shelters) have opened plants in the United States.

Canada's vehicle manufacturer, Bombardier, faces an estimated 50 competitors worldwide. Some of the major multinational competitors are Kawasaki Heavy Industries and Hitachi of Japan, Siemans and AEG Westinghouse (Daimler-Benz) of Germany, GEC Alsthom and Matra of France, Ansaldo of Italy, Asea Brown Boveri of Sweden and Switzerland, Hyundai of the Republic of Korea and Cobrasma of Brazil.

Most international sales are large-scale and are often worth more than \$100 million. Vehicles, the largest element in this type of purchase, currently sell for between \$1 million and \$2 million each. For new installations, requests for quotations require either component (vehicles, train control, stations, and other parts of the system put together by the customer) or turnkey bids. Turnkey proposals with BOOT (build, own, operate and transfer) clauses are often used in newly industrialized countries where the expertise available to the transit operator is limited. Equity participation from the private sector is frequently required.

Consortia allow partners to prepare an integrated proposal with compatible equipment. Canadian vehicle manufacturers sometimes take the lead to form consortia and, depending on project specifications and contract conditions, may draw on foreign companies for components or equipment. In specific cases, Canadian companies may participate in a foreign-led consortium. They may also form a partnership with a foreignowned company to bid on particular projects. Consortia also create the core of financial strength required to pursue and win a contract. Subsuppliers often provide bids to foreign consortia or companies to increase their chances of success and reduce their marketing expenses.

Since transit systems have a long service life and orders are large in scale, competition is intense. This competition intensifies even more when there is an indication that the system will expand, because the winner of the original bid usually secures the expansion bid. The ability to provide export financing with competitive terms and conditions is a major factor in securing such sales.



Performance

The guided urban mass transit industry has grown dramatically since the mid-1970s. As Montreal and Toronto built their subways, the Canadian industry developed a supply capability to provide them with equipment. Export sales began in the mid-1970s and have grown steadily. stimulated by the availability of funding in the United States for mass transit projects. These sales account for 61 percent of the industry's \$3.42 billion in total sales over the period from 1983 to 1989. The large increase in 1986 and 1987 (Figure 2) was due to a shipment of more than 800 vehicles by Bombardier to New York City for its subway system. Excluding this order, shipments have remained relatively constant over the period, averaging about \$360 million per year. Until 1987, the industry worked at nearly full capacity, but by 1989 the major Canadian plants were producing at less than 50 percent of capacity. Export sales were down in 1988, although various projects were in the bidding stage. Several of these projects were won and export sales are now starting to increase. Employment has dropped from a peak of 7 000 in 1986 and 1987 to 4 000 in 1989 (Figure 2).

Strengths and Weaknesses

Structural Factors

There are several factors critical to success in this industry, the most important being a proven technological capability to develop and design products and systems. Complementing this factor must be competitive pricing, a reputation for reliability and quality, competence in project management and the financial depth to participate in large-scale projects. A substantial domestic market to support the high development costs is also important.

Purchasers of guided urban mass transit systems place heavy emphasis on quality and reliability. In this respect, Canadian suppliers fully match the performance of their competitors. The suppliers' association with large transit operators in Toronto, Montreal and Vancouver provides them with a unique demonstration of their performance. In addition, Bombardier's sale to the New York City subway and UTDC's Advanced Light Rapid Transit (ALRT) project in Vancouver confirms that the industry can manage very large projects. The completion and effective operation of the equipment has provided the industry with the credibility necessary to pursue other major projects around the world.

The Canadian industry is competitive both in terms of product and price, even though competition is intense and the world mass transit industry is oversupplied. Since most



developed countries have similar technology, pricing has become one of the major factors influencing export sales of guided urban mass transit equipment. Canadian companies are price-competitive to a large degree, as is shown by the fact that Canada has won export contracts in the United States, Turkey and Mexico and is in the final negotiations for a system in Thailand.

Canadian manufacturers have a good reputation for quality and reliability, which is essential to secure future sales. Canadian firms can also supply a broad range of equipment. In the mid-1980s, Bombardier purchased the design rights of Transit America (Budd) and Pullman of the United States, which added to the company's own design capabilities, while UTDC developed its own line of equipment for both conventional and light-rail equipment. Many of the Canadian subsuppliers have benefited from these activities as the major companies develop Canadian sources of supply for components.

Acquisitions have served to broaden the industry's design capability and also to enable it to participate in the U.S. and European Community (EC) markets. Bombardier purchased BN in Belgium in 1987, ANF in France in 1989 and a small manufacturing company, Procor, in the United Kingdom in 1990. All three companies build rail vehicles and are complementary to Bombardier's North American manufacturing operations. The purchase of UTDC by Lavalin allowed it to pursue turnkey projects because it had added expertise in international project management and engineering design and construction.

Compared with its Japanese and European competitors, the Canadian industry suffers from a small domestic market base. However, its proximity to the important U.S. market has partially offset this weakness. When U.S. demand surged in the 1970s in response to federal funding, the American vehicle manufacturers were too large to handle smaller projects economically. The Canadian builders penetrated the U.S. market by filling these smaller orders. Later, for a variety of reasons, all of the American vehicle manufacturers withdrew from the urban transit industry. These withdrawals allowed Canadian manufacturers to expand further into the market and undertake larger projects. Beginning in 1978, however, U.S. legislation favouring local suppliers increasingly restricted Canadian access to that market.

Export Development Corporation (EDC) financing is a key factor in obtaining export orders in the face of international competition. The use by foreign governments of concessional financing and their subsidy practices however, make it difficult for Canadian companies to compete in many overseas markets.

Manufacturing economies of scale are of marginal importance in this industry since quantities are normally small and usually involve unique specifications. There is, however, a continuing effort by the major manufacturers to utilize modern design and production technologies such as computer-assisted design, computer-assisted manufacturing (CAD/CAM) and robotics, where applicable, to reduce manufacturing costs.

The Canadian industry suffers from an inability to obtain in Canada all the elements needed to build a total system. Products such as traction motors, catenary systems (overhead power supply) and automatic fare collection equipment are not available from Canadian sources. Canadian manufacturers, however, can and do draw on foreign sources in the United States, Europe and Japan for components. This lack of domestic supply can hamper the industry's ability to supply systems bids and can increase the complexity of financing the final project.

Trade-Related Factors

The industry's dependence on exports means trade barriers are of critical importance.

Non-tariff barriers, especially government procurement policies, are significant barriers to Canadian exports to developed countries. These barriers, together with strong indigenous industrial capacity, have virtually closed the European and Japanese markets to Canadian producers.

In the United States, government procurement policies, which apply to federally funded purchases (such as purchases by transit authorities, municipalities, etc.), have been a major barrier to Canadian and foreign producers. In 1978, the United States passed the *Surface Transportation Assistance Act* (STAA) to encourage the acquisition of U.S.-made transit vehicles. "Buy America" provisions contained in the legislation require transit authorities who wish to receive U.S. federal government funding to respect certain conditions calling for U.S. final assembly and a statutory level of U.S. content. These provisions can be waived only under certain stringent conditions.

In 1987, amendments to the U.S. *Surface Transportation* and Uniform Relocation Assistance Act tightened the "Buy America" provisions. These amendments progressively raised the content requirement from 50 to 60 percent and limited the use of the most common waiver to occasions where the purchase of foreign goods results in a 25 percent or better cost saving, up from 10 percent.

"Buy America" restrictions encourage foreign firms to locate production facilities in the United States. Several Canadian companies, including Bombardier, have already opened assembly facilities there while others, such as UTDC, have had to make arrangements for U.S. assembly on an ad hoc basis for specific projects. Many Canadian component suppliers are now considering similar strategies. Having a second plant in the United States for mandatory final assembly places an added cost burden on Canadian manufacturers that their U.S.-based competitors do not face.

In addition to the "Buy America" restrictions, other U.S. federal government legislation is affecting Canada's ability to provide equipment to the United States. For instance, the Disadvantaged Business Enterprise (DBE) and the Women's Business Enterprise (WBE) regulations require manufacturers to include DBEs and WBEs as sources of supply. As well, individual states in the United States have requirements for local content or assembly, which further restrict Canada's access to the U.S. market.

Unlike the U.S. federal government, the Canadian federal government has no non-tariff barriers. In Canada, some provincial governments, however, have their own procurement requirements, which are similar to those of some U.S. states.

Developing countries increasingly require countertrade, (a sale conditional upon a reciprocal purchase or undertaking by the exporter), technology transfer, high levels of local participation, etc., as part of bidding packages. As well, the transfer of technology and the development of local participation increase local content and can increase international competition to the detriment of the Canadian industry.

Because of the various non-tariff barriers described above, tariffs are not a major barrier to world trade in this sector. Under the Canada-U.S. Free Trade Agreement (FTA), implemented on 1 January 1989, Canadian tariffs on U.S. imports in 1990



ranged from 7.5 percent for self-propelled cars to 14.1 percent for non-self-propelled cars. For other countries, the Most Favoured Nation (MFN) rates vary from 10 to 17.5 percent. Canadian exports to the United States face tariffs ranging from 2.3 to 14.4 percent, while MFN rates are 3.9 to 18 percent. There are tariffs in most developed and some developing countries.

Under the FTA, Canadian and U.S. tariffs were to be removed in 10 annual, equal steps starting 1 January 1989, or more quickly where subsequent agreement is possible. For passenger cars, and their components, Canada and the United States agreed to remove all tariffs effective 1 July 1991.

Technological Factors

The Canadian industry is competitive in terms of product technology. In some instances, Canada has a lead.

Bombardier has acquired up-to-date product designs through licensing (Kawasaki designs for the New York City subway) and purchasing (Disney's Monorail and the WED-WAY people-mover system). Other acquisitions, such as BN of Belgium and the Transit America and Pullman designs, have provided Bombardier with a complete line of transit equipment and the technology to produce this equipment in aluminum, core ten (a type of specialty steel) and stainless steel. Bombardier has facilities for R&D and testing and has recently been awarded a contract to develop, build and test an advanced technology prototype subway train for the New York City Transit Authority. Its CAD/CAM production technology is on a par with that of its competitors.

With its acquisition of UTDC, Bombardier received two major facilities in Ontario to develop its designs, each with a test track to evaluate its vehicles. Its ALRT project utilizes linear induction motors, steerable axle trucks and automatic train control. All of these products were new to the industry. UTDC also designed a new streetcar for North American use, known as the Canadian Light Rail Vehicle (CLRV); special freight bogies (wheel assembly and undercarriage) for the rail industry; the unique bi-level commuter car, for which there appears to be a good market in heavy suburban corridors; and the lightweight subway car, now used in Toronto.

Product development for the vehicle subsuppliers is dictated by the large manufacturers. Individual components must be compatible with vehicle systems and must meet specifications dictated by the transit operator. These suppliers are competitive, as is shown by the fact that the car builders use their components. Other Canadian system suppliers, such as Alcatel-SEL and London Mat, have been quite successful in developing innovative products (e.g., Automatic Train Control) for this industry.



Canada's major international competitors appear to be committing more resources to product development than are Canadian companies. Their programs are supported by domestic policies regarding procurement and financial assistance for technology development. Their competitiveness is considerably improved as the costs of these new technologies are underwritten, to a large degree, by their production for a captive domestic market. The Canadian market is too small to support a high level of technology development.

Other Factors

For some projects, especially turnkey projects, Canadian consortia lack the financial depth of other competitors. Some European and Japanese consortia have been organized to bid on megaprojects by drawing on combined assets greater than those of the whole Canadian industry. These consortia can therefore arrange items such as large performance bonds much more easily than could a Canadian group.

A stable Canada-U.S. exchange rate is important to Canadian competitiveness in the guided urban mass transit manufacturing industry. The industry has expressed concern about the relatively higher value of the Canadian dollar in recent periods vis-à-vis the American dollar (Figure 3). On the other hand, under certain economic conditions, it is widely recognized that a significantly lower value is likely to be inflationary. The resulting higher domestic costs and prices can erode, over time, the short-term competitive gains of such a lower-valued dollar.



Evolving Environment

Population trends in developing countries will create important market opportunities. Some of the world's largest cities are located in these areas and, with continuing rapid urbanization, the demand for mass transit systems will increase. The opening of the economies of Eastern Europe and the Commonwealth of Independent States could provide significant new markets for Western manufacturers. For example, the cost of upgrading the East German transit systems to West German standards is estimated at 30 billion Deutsche Marks (\$22.5 billion) over the next 20 years.

The world market for electrical and mechanical equipment for guided urban mass transit is expected to be significant. Outside Japan, Europe and the Commonwealth of Independent States, demand is estimated at \$30 billion to \$50 billion over the next 15 years. Canadian domestic demand will account for only 1 percent of this world market and will occupy only 10 percent of domestic productive capacity, making exports essential to the survival of the Canadian industry.

International competition will intensify as non-traditional competitors (Brazil, the Republic of Korea and Australia) consolidate their positions in the market. There will continue to be a major role for international joint ventures as consortia attempt to put together the most attractive financing and marketing packages. Canadian companies are already participating in international consortia in specific cases.

Export financing will continue to play a central role. Government institutions, such as the United States' Eximbank, France's Coface, Britain's Export Credits Guarantee Department (ECGD) or Canada's EDC, were set up to provide export insurance against the political risk that customers would be unable or unwilling to pay. They now provide financing of various sorts to their respective exporters.

In recent years, there has been an intensification of competition for export projects on the basis of subsidized, highly concessional export credits. Canada has been critical of the use of mixed credits and other similar practices on the grounds that they involve costly subsidies, distort normal competitive factors and tend to divert resources away from sectors of the economy where they may be used more efficiently. In an attempt to control this activity, the Organization for Economic Co-operation and Development has drawn up an agreement limiting the amount of subsidized credit that exporters can give their customers, although this agreement is broken more often than not.

The United States will continue to be Canada's best potential market. Estimates of the U.S. market exceed \$15 billion from now to the year 2000. American transportation agencies are expected to acquire new light rail, heavy rail and commuter rail systems, and to implement large scale high speed rail networks. Canada, with its expertise in all these areas, is well positioned to supply many of those needs.

The stringent "Buy America" provisions combined with growing American protectionist sentiment represent a strong inducement to all firms to locate production in the United States. Foreign firms have opened U.S. assembly plants, and competition in the United States has intensified.

The only provision of the FTA directly affecting this industry is the removal of Canadian and U.S. tariffs on urban transit equipment. Canadian manufacturers will now have a price advantage over foreign suppliers who will still face tariffs on exports to the United States and Canada.

The Internal Market Program of the European Community, commonly known as EC-92, is proving to be a catalyst in the rationalization of the European transit manufacturing sector. The largest Canadian manufacturers of mass transportation equipment have taken steps to ensure their participation in European markets through acquisition and licensing agreements. As they will be regarded as domestic entities, the principal Canadian manufacturers will be in a position to participate in the European marketplace. These licensing agreements and acquisitions, however, have the ultimate effect of greatly reducing Canadian content. Another area of concern is the enhanced competition that Canadian manufacturers will face from European manufacturers in non-European markets as a result of the increased strength of the rationalized European production base.

Competitiveness Assessment

The Canadian guided urban mass transit industry has demonstrated its ability to compete in world markets. Overall, the companies are competitive in both price and technology. In certain product technologies, they are the world leaders. Several factors have implications for the future of the industry. Bombardier's acquisition of UTDC strengthens its position as the North American leader for the design, development and supply of transit equipment, and as a major international supplier.

In the United States, the Canadian companies face increasingly restrictive procurement barriers. While Canadian manufacturers are expected to remain competitive, state and federal content legislation (e.g., "Buy America" provisions) will cause a reduction of the Canadian content over the medium to long term. In developing country markets, the



companies are handicapped by their lack of financial strength. Success in offshore markets will depend on arranging attractive financial packages comparable to terms offered by foreign competitors.

The FTA is expected to have a minimal impact on this industry in the short to medium term.

For further information concerning the subject matter contained in this profile, contact

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PRINCIPAL STATISTICS^a

	1983	1984	1985	1986	1987	1988	1989
Establishments	250	250	250	250	250	250	250
Employment	5 400	5 500	6 000	7 000	7 000	5 400	4 000
Shipments ^b (\$ millions)	355	365	515	695	880	380	230

aISTC estimates.

^bShipments represent vehicle sales only.

TRADE STATISTICS^a

	1983	1984	1985	1986	1987	1988	1989
Exports (\$ millions)	115	45	205	620	825	130	160
Domestic shipments (\$ millions)	240	320	310	75	55	250	70
Imports (\$ millions)		-	s e		1 <u>11</u>		-
Canadian market (\$ millions)	240	320	310	75	55	250	70
Exports (% of shipments)	32	12	40	89	94	34	70
					_		

aISTC estimates.

DESTINATIONS OF EXPORTS^a (% of total value)

	1983	1984	1985	1986	1987	1988	1989
United States	22	50	100	100	100	100	100
European Community		-	÷1	-	-	-	-
Asia	-	-	-	-	-	-	₩.
Other	78	50		-	-	-	-

^aISTC estimates.

REGIONAL DISTRIBUTION^a (average over the period 1987 to 1989)

	Atlantic	Quebec	Ontario	Prairies	British Columbia
Establishments (% of total)		45	55	-	-
Employment (% of total)	-	50	50		÷
Shipments (% of total)	-	65	35	-	-

aISTC estimates.



MAJOR FIRMS

Name

Alcatel Canada Inc. (SEL Division)

Bombardier Inc.

Country of ownership

France

Canada

Location of major plants

Don Mills, Ontario

La Pocatière, Quebec Kingston, Ontario Thunder Bay, Ontario

INDUSTRY ASSOCIATION

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