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INDUSTRY PROFILE

Industry, Science and Technology Canada
Industrie, Sciences et Technologie Canada

Surveying and Mapping Services

Canada

INDUSTRY PROFILE

SURVEYING AND MAPPING SERVICES

1988

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FOREWORD

In a rapidly changing global trade environment, the international competitiveness of Canadian industry is the key to survival and growth. This Industry Profile is one of a series of papers which assess, in a summary form, the current competitiveness of Canada's industrial sectors, taking into account technological and other key factors, and changes anticipated under the Canada-U.S. Free Trade Agreement. Industry participants were consulted in the preparation of the papers.

The series is being published as steps are being taken to create the new Department of Industry, Science and Technology from the consolidation of the Department of Regional Industrial Expansion and the Ministry of State for Science and Technology. It is my intention that the series will be updated on a regular basis and continue to be a product of the new department. I sincerely hope that these profiles will be informative to those interested in Canadian industrial development and serve as a basis for discussion of industrial trends, prospects and strategic directions.

Robert de Cotret

Minister

1. Structure and Performance

Structure

The surveying and mapping (geomatics) industry in Canada includes land surveying, geodetic surveying, photogrammetry, hydrography, cartography, engineering surveying, mining surveying, remote sensing (including aerial photography), and geophysical surveying and mapping. Advances in information technology are rapidly forcing surveying and mapping firms to develop and provide services in systems design and management of spatial information management systems. These systems combine data sets from several different sources in digital form, providing greatly increased flexibility and vastly improved images for maps, charts and other geocoded information.

The application of information technology to this industry is creating a new "geomatics science" which integrates the traditional mapping disciplines of data collection and presentation with new computerized methods of data acquisition, manipulation, storage and retrieval.

The surveying and mapping industry in Canada includes approximately 1200 firms employing 9000 people. Revenues generated in 1986 were estimated at $521 million, based on preliminary figures, with the top 20 firms accounting for 70 percent. Exports in 1986 were estimated at $92 million.

The larger integrated surveying and mapping firms offer a full range of services while the more numerous smaller firms usually offer a specialized service in one or two of the disciplines outlined above. The trend in recent years has been for experts in the various fields to come together in integrated companies in order to offer a complete service.

Approximately 66 percent of industry revenue is derived from land development and resource-based engineering construction markets. The remaining 34 percent represents public procurement by federal, provincial and municipal governments. Fifty-eight percent of firms are located in Ontario and Quebec, while the Prairie provinces, British Columbia, the Atlantic region, Yukon and the Northwest Territories account for the remainder in descending order.

Eighty percent of firms have gross annual sales of less than $500 000; no more than 10 firms have gross annual sales of more than $3 million. Gross domestic sales by type of service include land surveying, 45 percent; engineering surveying, 11 percent; and hydrography, 10 percent. The remaining 34 percent is split more or less evenly among the other disciplines.

Ownership of surveying and mapping firms in Canada is 100 percent Canadian. Most firms are owned by individuals who have made a career of surveying and mapping, and only three or four of the larger firms have issued shares to the public. Those with gross annual sales of more than $500 000 are almost all set up as corporations, while most partnerships and sole proprietorships have gross annual sales of less than $500 000.

Canada

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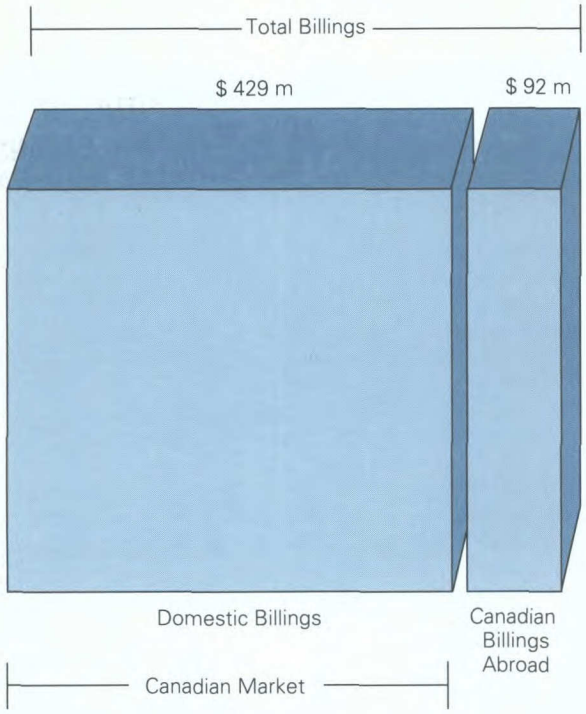


Domestic Billings and Canadian Billings in Foreign Countries, 1986

The industry remains heavily oriented to the domestic market, where there is virtually no direct foreign competition. However, Canadian billings in foreign countries accounted for approximately $92 million, or 18 percent of total sales in 1986, and there is scope for considerable expansion in sales abroad. Most of these sales are for aerial, hydrographic and geophysical surveying, mapping and remote sensing to developing country markets in Southeast Asia, Africa, South America and the Middle East. The United States has not been a major market, although American customers have bought some specialized services and the industry is optimistic about future opportunities. The main international competitors are France, the United Kingdom, the Netherlands, the Federal Republic of Germany, Japan, Australia, Norway, Sweden and the Republic of Korea.

The industry works closely with a number of other professional groups, including engineering consultants and contractors, urban and regional planners and geophysical exploration companies.

Performance

The performance of firms in the industry is strongly influenced by general economic conditions, and particularly, new investments related to major resource developments. During the latter part of the 1970s, the industry expanded rapidly, primarily as a result of the western-based energy boom. But the worldwide recession of the early 1980s and the deferral or cancellation of many major projects had a negative effect on employment, investment intentions and revenues. These factors not only have reduced sales volume significantly in recent years but also have caused operating losses and sharp cutbacks in employment among many firms in the industry — particularly those serving energy markets.

Demand for surveying and mapping services from all levels of government, although more stable, has also declined in recent years as a result of government restraint measures. However, land surveying has remained strong, particularly in central Canada with its high levels of residential, industrial and commercial construction.

Canada's presence in international markets has also declined. During the late 1970s and early 1980s, Canadian firms regularly captured a significant volume of new offshore business. Markets have weakened since then and industry sources indicate that Canada's share of new surveying and mapping projects abroad has declined relatively more.

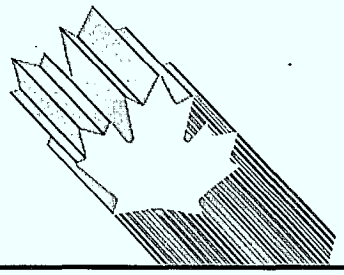
In general, firms in the surveying and mapping industry are caught in a financial squeeze between rapidly escalating costs and a fee structure that is constrained by competition. Consequently, profitability has also declined, hampering the industry's ability to finance equipment and generate funds for in-house research and development.

2. Strengths and Weaknesses

Structural Factors

Factors affecting Canada's competitiveness in this industry include a reputation of strength based on experience in the mapping of Canada's vast and diverse geography; a need to adjust to rapid changes in technology, which are replacing traditional methods; and industry fragmentation and inadequate profitability, which has restricted investment in new technology and led to a decline in offshore sales.

Canada's unique geography and diverse resource base have enabled the industry to develop a strong international reputation in surveying and mapping. The need to service a rapidly expanding resource-based economy in a large, topographically diverse land mass in a hostile northern environment and bordered by oceans on three sides, has led to a wide range of industry strengths. These include aerial photography, remote sensing, geodetic surveys, hydrographic surveys, charting and airborne geophysical surveys. Indeed, the Canadian capability to carry out projects at remote sites in hostile environments is probably unmatched anywhere else in the world.



While Canadian surveying and mapping firms have proven capabilities, their leadership role is currently being challenged by international competitors. The industry has been slow to adapt to rapid technological changes at a time when clients are increasingly demanding faster, more reliable service products based on advanced information technologies. These include satellite positioning systems and high-performance portable computers to integrate digital information systems for geographic, spatial or land-related purposes. The larger, more diversified Canadian firms are adjusting to these new requirements, but many smaller, under-financed firms may have to leave the industry unless they can consolidate or restructure their operations.

The relatively small size and fragmentation of the industry are also affecting its ability to retain its share of foreign markets where it faces larger, stronger foreign competitors who often bid as part of a consortium. The sharp decline in Canada's share of overseas markets is due largely to competition from larger firms in the industrialized countries such as Japan and France which have invested heavily in new technologies, in the knowledge that participation in surveying and mapping activities is often a forerunner of other important commercial opportunities.

Canadian firms also face stiff competition from foreign governments which designate their national participant and back it with attractive export financing, insurance and subsidies. A lack of sufficient funding to maintain foreign marketing efforts on a sustained basis puts Canadian firms at a severe disadvantage when they compete against firms from these industrialized countries.

The proliferation of small firms in the Canadian industry, each attempting to win a share of a shrinking domestic market, has also led to lower profitability and reduced incomes for new investments. This development will make it more difficult for industry to acquire sophisticated mapping, charting and positioning equipment, as well as significantly greater computing capacity. It will also make it more difficult to increase investment in research and development.

Trade-related Factors

Discriminatory taxation, the requirement to employ local nationals or to form a joint-venture arrangement with a local firm, currency restrictions and variations in bidding procedures — are factors which impede access to developing markets.

While the United States has not, to date, been a major market, Canadian surveying and mapping firms have successfully obtained contracts there because of generally superior technology and a competitive price structure. Moreover, future opportunities exist for targeted applications. Trade irritants have included immigration procedures which restrict the temporary entry of skilled professionals, difficulties in accreditation and in obtaining work permits, and the procurement practices of both U.S. federal and state government agencies which favour domestic firms.

An issue of current concern is the increasingly vigorous application of U.S. Department of Transportation rules which restrict the use of Canadian aircraft for specialized aerial survey operations if comparable U.S. aircraft are available for the purpose. American authorities point to similar restrictions in Canada and indicate that a solution to the problem must be based on full reciprocity.

The Canada-U.S. Free Trade agreement (FTA) sets out the principles which will apply to future laws and regulations governing the surveying and mapping industry. Under the national treatment principle, both governments have agreed not to discriminate against each other's industries in future regulations. Thus, the FTA enshrines the right of both the U.S. and Canadian industries to establish a commercial presence in each other's market and to make investments there for the provision of surveying and mapping services and any activity associated with them.

Existing regulations remain in place, but can be amended provided they do not become more discriminatory towards firms of the other country. Provisions in the agreement for temporary access ensure that business persons trading in goods and services will benefit from improved and easier border crossing procedures. The FTA also has provisions to seek agreement through professional licensing bodies on mutually acceptable licensing standards.

Technological Factors

Canadians have a good record in applying and adapting new technologies. Canadian surveying and mapping firms have been world leaders in the early development of photogrammetric and image analysis, and in the application of satellite positioning and inertial surveying systems. Current developments in computer software for various surveying and mapping programs and for spatial information management systems are contributing to a widening of industry expertise and new markets. However, the Canadian industry is heavily dependent on foreign hardware technology. Many of the traditional optical instruments are manufactured in Europe, the United States and Japan. New instruments, such as inertial survey systems, satellite receivers, acoustic positioning systems and computers, are manufactured in the United States. This dependence on foreign hardware has contributed to a slower rate of transfer of new technology from equipment manufacturers to Canadian service firms.

The most significant recent development in mapping technology has been a number of systems that can integrate all types of geographically based data, including social and economic data. This geographic information systems (GIS) technology makes possible the integration of a wide variety of data sets, and allows for their manipulation and analysis with the aid of high-performance computers. The existence of well-established government laboratories, active in the surveying and mapping disciplines and using new technologies such as GIS, provides the opportunity to build on closer government-industry relationships in order to enhance research and development activities.

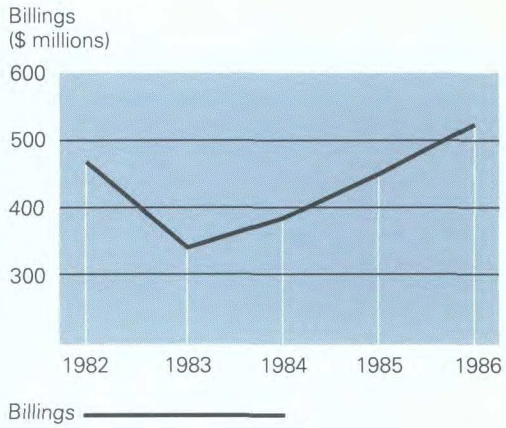
With the advent of spatial information management systems, the industry will need to increase its research activity to keep abreast of this fast-moving discipline. This effort should include systems development, as well as research on the acquisition, processing, storage and distribution of data. The major obstacle to early transfer of new technology is the high capital cost associated with technological innovation in such areas as sensor development, rapid data capture, and the integration with an aerial platform and a precision navigational system. It is also difficult, and at times impractical, to transfer innovations developed in public sector facilities without the accompanying knowledge and training package. Mechanisms to facilitate the diffusion of technology currently being considered by the industry include formal training sessions and business-government employee interchanges.

While new computer-based technologies offer scope to broaden service and expand markets, their implementation will require large new capital outlays by the industry. There will be pressure on Canadian firms to compensate for their relatively weak capital structure by combining or merging with others in order to achieve economies of scale to finance costly new equipment, and continue to match the capabilities of their larger foreign competitors.

Other Factors

Industry development is influenced by the procurement policies of federal, provincial and municipal governments. Fully 34 percent of gross sales are to the public sector, which historically has provided a more stable demand pattern than the private sector. Federal departments such as Energy, Mines and Resources and Fisheries and Oceans maintain state-of-the-art technical capability, but have contracting-out policies for both R&D and surveying services which make a significant contribution to the development of private-sector capability and export potential.

The financing facilities provided by the Export Development Corporation (EDC) and the Canadian International Development Agency (CIDA) are usually key elements in the sale of surveying and mapping services to third-world countries.



Total Billings

3. Evolving Environment

The surveying and mapping industry is in transition. Firms today must adapt their operations to the new technologies and the expectations of clients. In addition, as land development activities slow down in developed countries, demand for basic land survey services will decline and give way to new approaches, such as the development and management of spatial information systems. This will offer clients the capability to capture more information in a much quicker and more efficient way. Technological developments of this kind are changing the industry from labour intensive into capital intensive. In addition, they are leading to dramatic changes in the education requirements of surveyors and mappers.

Not only have the methods for gathering, storing and presenting information changed, these tasks can also be performed much faster. The lapse of time between the gathering and presentation of information has been drastically reduced. Topographical maps, which used to take a year or two to produce, can be produced in a few hours through remote sensing. In addition, environmental concerns are focusing industry attention on the need for more and improved information on the physical environment.

The structural relationship between the various sub-sectors of the industry is also changing. Increasingly, there is a breakdown in the distinction between the disciplines of land surveying, geodetic surveying, photogrammetry and hydrography. This trend is leading to a multi-disciplinary approach to the training and education of professional surveyors and to a requirement for a broader understanding of the principles of new technologies such as satellite positioning, inertial surveying, automated cartography and database management.

Surveying and mapping firms are working to re-establish their domestic business on a basis which will provide higher margins and improved cash flow, so they can make the investments needed to compete effectively both in domestic and foreign markets. Economies of scale achieved through further rationalization and consolidation could thus contribute to the strengthening of the industry both financially and technically.

To penetrate export markets, Canadian firms are pursuing the formation of export consortia, both in order to present one united Canadian voice and to compete more effectively against foreign firms which are often the chosen instruments of their home governments.

The FTA is not expected to have a major impact on the surveying and mapping industry. Except for the restrictions that have been noted, trade in surveying and mapping services with the United States is relatively free now. The elements of the agreement which could provide further liberalization through increased mobility and safeguards against new trade-inhibiting regulations or other measures, should be a positive development. It is not expected that the FTA will require the industry to make major adjustments.

4. Competitiveness Assessment

The surveying and mapping (geomatics) industry in Canada is both competent and well managed, with a world reputation for the development of innovative mapping programs. Although it has switched to digital mapping techniques quickly, it has been slow to adopt geographic information systems technology. In addition, a number of structural characteristics, particularly the existence of many small firms, have resulted in considerable fragmentation, and are a hinderance to competitiveness.

In the absence of major domestic resource developments, the industry continues to be faced with slower growth in sales, which yield slim margins, and difficulties in funding adequate marketing and research activities, as well as in acquiring new capital equipment. While it continues to enjoy success in export markets and can look forward to significant new foreign market opportunities, it is finding that export campaigns against heavily financed competition from larger firms in the major industrialized countries are becoming increasingly difficult to mount successfully.

Given that trade in surveying and mapping services with the United States is largely free now, the FTA is not expected to have a major impact. The further liberalization provided under the agreement will be beneficial.

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

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PRINCIPAL STATISTICS — SIC(s) COVERED: 7759, 4513 (1980)

	1982[1]	1983[2]	1984	1985	1986
Establishments	1 023	1 200	N/A	N/A	N/A
Employment	8 790	9 000	N/A	N/A	N/A
Total Billings ($ millions)	476*	340	392[e]	452[e]	521[p]

TRADE STATISTICS

	1982	1983	1984	1985	1986
Canadian billings in foreign countries ($ millions)	N/A	60	69[e]	80[e]	92[e]
Domestic billings ($ millions)	N/A	280	323[e]	372[e]	429[p]
Foreign billings in Canada ($ millions)	———	———	negligible	———	———
Canadian market ($ millions)	N/A	280	323[e]	372[e]	429[e]
Canadian billings in foreign countries as % of total billings	N/A	18	18	18	18

REGIONAL DISTRIBUTION — Average over the last 3 years

	Atlantic	Quebec	Ontario	Prairies	B.C.
Establishments – % of total	9	26	32	17	16
Employment – % of total	6	17	33	24	20

(continued)

MAJOR FIRMS

Name	Ownership	Location of Major Plants
The McElhanney Group Ltd.	Canadian	Vancouver, British Columbia
Marshall Macklin Monaghan Ltd.	Canadian	Toronto, Ontario
J.D. Barnes Ltd.	Canadian	Toronto, Ontario
Terra Survey Ltd.	Canadian	Ottawa, Ontario
Stewart Weir Group Ltd.	Canadian	Edmonton, Alberta
Kenting Earth Sciences International Ltd.	Canadian	Ottawa, Ontario
Eastcan Group Ltd.	Canadian	Halifax, Nova Scotia
Northway Map Technology Ltd.	Canadian	Toronto, Ontario
The Orthoshop	Canadian	Calgary, Alberta
Photosur-Geomat Inc.	Canadian	Montréal, Quebec

Notes:

1 Statistics Canada. Architectural, engineering and scientific services, 1982, Catalogue 63-537 Occasional.

2 *Report of the Task Force on the Surveying and Mapping Industry in Canada*, sponsored by the Department of Regional Industrial Expansion, February 1985.

* A portion of these revenues is attributed to non-surveying services provided by firms offering both surveying and unrelated services.

e ISTC estimate

p Preliminary

N/A Not available

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