THE CANADIAN COMMUNICATIONS SECTOR: AN ENVIRONMENTAL ASSESSMENT

ECONOMIC AND MARKETING ANALYSIS DIVISION
INDUSTRY AND ECONOMIC DEVELOPMENT BRANCH
TECHNOLOGY AND INDUSTRY SECTOR
DEPARTMENT OF COMMUNICATIONS

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Executive Summary

1.0 Background

The Environmental Assessment of the Communications Sector was initiated in June, 1983 following the issuance of a Regional Dimension Action Plan by the Deputy Minister. This plan was designed to bring the regional dimension into the DOC decision-making process.

The present report, a joint Headquarters/Regions effort, attempts:

- to identify the trends, opportunities, and problems of the communications sector in Canada;

- to determine the economic perspectives of each region in the medium term;

- to identify the main problems and objectives, as well as their regional and operational opportunities.

2.0 Findings

The report presents an evaluation of the economic outlook of Canada in the next couple of years and provides a detailed assessment of the communications sector in the short-to-medium term.

2.1 Economic Outlook

The economic recovery in Canada which started since the beginning of this year appears to gain strong momentum with an upsurge in personal consumption and residential housing activities. So far this recovery has not had any adverse impact on the rate of inflation, as measured by the Consumer Price Index, (CPI), which continues its steady fall and reached a 10-year low of 4.9% in October, 1983. The stabilization in energy prices has been seen as a key factor in the steady decline of the inflation rate. Although the unemployment rate in Canada is still high, and not expected to drop significantly in the near future, the Gross National Product is expected to grow by 3% - 5% in the next couple of years, thanks to a continued rise in business investment in response to steady improvements in sales and corporate profits. On the world scene, declining inflation and interest rates appear to have laid the foundation for a sustainable economic growth in industrial countries.

2.2 Sectoral Assessment

For the purpose of this study, the communications sector is divided into 5 sub-sectors: carriage/telecommunications, content/broadcasting, content/non-broadcasting, informatics, and space.

2.2.1 Carriage/Telecommunications

Carriage/telecommunications is defined to include the providers of telecommunications services including consulting and the telecommunications equipment manufacturers.

In 1982, net carriers' revenues for telecommunications services increased by 13.3% to $8.25 billion. This represents 58% of the communications sector (excluding content/non-broadcasting). Many carriers through firms and consortia such as ATE, MTX, ELINCA, and especially BCI have been very successful in exporting Canadian telecommunications expertise.

At the equipment manufacturing level, this industry is dominated by its vertically integrated suppliers Northern Telecom and AEL Microtel, the two largest firms. Manufacturers in Canada produced over $2 billion worth of equipment in 1982, over 20% of which was exported, resulting in a $317 million surplus in the balance of trade. The manufacturers, on the whole, appear to have felt very strongly the impact of the 1982 recession with a 6% contraction in the Canadian market. The telecommunications sub-sector is the industry with by far the largest intramural R & D expenditures in Canada.

Frequently-cited forecast growth rates of 8% to 9% through the eighties for the world telecommunications market appear somewhat optimistic, nevertheless the US$ 29 billion world market (excluding North America) offers a good prospect for Canadian manufacturers.

Differences in rates and services exist across Canada. They are largest with respect to intra-territorial long distance and local services, with rates generally low in the Prairies and high in the Atlantic region. Telecommunications manufacturing activities are largely concentrated in Ontario followed by activities in Quebec, British Columbia, and Saskatchewan.

The coexistence of competition and regulation elements in the telecommunications field constitutes the most pressing regulatory issue today in Canada.

2.2.2. Content/Broadcasting

The content/broadcasting sub-sector is defined at the service level as consisting of (i) the private commercial broadcasting sector, (ii) the CBC, and (iii) the CATV industry. In terms of equipment manufacturing, it includes broadcasting equipment and CATV equipment.

In 1982, the gross expenditure of the sub-sector was estimated at $3.04 billion, 9% of which consisted of investment. This represented an increase of 11% over 1981. All of the growth in this sub-sector came from the service part of the the industry (13.3%) while the manufacturing activity contracted over the period by 12.4%. This sub-sector represents 15.6% of the communications sector's expenditures (excluding content/non-broadcasting).

Program production, a source of employment for 17,700 persons, accounted for almost a third of the gross expenditures of the sub-sector in 1982. As measured by revenue (or proxy revenue for the CBC), the private broadcasting segment made up 44% of the industry, the CBC 39%, and CATV 17%. Growth in 1982 was highest in the CATV service industry and the CBC, followed by the private broadcasting segment. It was estimated that an average person watched television for 23 hours and listened to radio for 18 hours per week. Pay TV accounted for about 1% of all television viewing. It was estimated in May 1983 that 450,000 households had Pay TV and this figure is expected to increase to 600,000 by the end of the year. 60% of all Canadian households (4.86 million) are CATV subscribers.

It was estimated that 90% of the $89.5 million investment in equipment by the broadcasting industry was spent on imports. Even though some firms have been very successful at exporting their products, Canada has a very sizeable trade deficit in broadcasting equipment, especially with respect to the U.S.A. and Japan.

While the worldwide broadcasting equipment market is reaching saturation, with annual growth rates around 4%, the sale of radio and television sets is still booming, with growth rates of 24% to 42% respectively in developing countries.

In Canada, the broadcasting equipment manufacturing industry is concentrated in Ontario. In British Columbia, after a rapid growth in CATV equipment production, the industry may experience a contraction.

An early resolution of regulatory delays and jurisdictional disputes would provide a great spur to the broadcasting industry.

2.2.3 Content/Non-Broadcasting

This subsector consists of motion picture, audio and video production, distribution, and exhibition; videotex and teletext content; book, magazine, and newspaper publishing and distribution; and two components excluded from this study, the performing and visual arts.

The Canadian market for cultural products was found to grow steadily. The consumption of domestic products, however, is low compared to imports, except for newspapers and videotex. On the production side, domestic production is increasing except in records and tapes, videotex, and newspapers.

There is a high degree of foreign ownership and control in most component industries. Canadian-controlled film, book publishing and recording firms have difficulty competing or growing domestically and internationally. There is a high degree of corporate concentration in some components, especially newspapers. Cross-media ownership is prevalent in some areas. Geographically, there are high degrees of regional concentration, mainly in Ontario and Quebec. In the employment area, cultural talents are generally low paid and highly mobile, especially in "creative" areas such as writing and the performing arts.

2.2.4 Informatics

Informatics or computer/communications represents the combination of computing, telecommunications, information services, and related technologies. Market activities in informatics are subdivided into the supply of (i) equipment and (ii) services and intangible products like software packages or databases.

Equipment manufacturing is largely dominated by foreign (mainly U.S.) multinationals; however, there are Canadian subsidiaries with world product mandates. Canadian-owned firms generally focus on specialized product lines. On the other hand, the service-bureau and professional-service segments are dominated by Canadian-owned firms (80% of the revenues).

Total Canadian user expenditures on computer/communications products and services were estimated at $7.9 billion in 1982, accounting for 2.3% of the GNP. Projections are for $11.8 billion in 1985 and $19.5 billion in 1990.

Total revenues of commercial computer service suppliers were estimated at $1.65 billion in 1982. It is expected that this figure may increase to $3.06 billion in 1985. The most worrisome aspect of this industry is its contribution to a growing balance of payments deficit, including a short-fall of $1.7 billion in 1982 for the hardware component alone. If present trends continue, this deficit could reach $5 billion by 1985.

The development of a strong Canadian industry in the areas of systems integration and software development, both requiring intensive skilled labour, would be a positive factor not only for the balance of payments, but also for

employment creation.

On the equipment side, opportunities for Canadian-owned firms seem to be concentrated in niches such as the development of specialized or turnkey systems based on mini or micro-computers. On the service side, considerable opportunities exist in the development of computer assisted learning (CAL) software and on-line information retrieval and transactional services.

2.2.5 Space

The three major elements of the space sub-sector are: (i) the equipment manufacturing and supply industry, (ii) the satellite system operators and service providers, and (iii) government.

The space equipment manufacturing industry in Canada has the technical capability of providing almost all the products required for use in both the space and ground segments of Canada's space activities in communications, remote sensing, and scientific studies.

Satellite communications services are provided by Telesat Canada domestically and Teleglobe Canada internationally through its membership in international telecommunications bodies.

The federal government played a major role in the development of the first Canadian satellites and continues to provide crucial financial and technical support to the Canadian space industry.

In 1982, space-related sales by Canadian manufacturers were estimated at $180 million, about one-half of which were in the communications field. Total employment in the industry was estimated at 2,500. Also in 1982, Telesat Canada had operating revenues of $59 million, net earnings of $16.7 million, capital expenditures of $100 million, and employed 480 people. Teleglobe Canada had net revenues of $8.8 million from its space operations through INTELSAT.

Federal government expenditures on space-related activities were $136.9 million in 1982/83, one-half of which was spent on the activities carried out by the Department of Communications.

The Canadian space industry is concentrated in eastern and central Canada some significant activities are also found in the western provinces.

3.0 Communications Sector: A Synthesis

The communications sector is a very non-homogeneous group of industries. It displays, however, some unique characteristics. First of all, it is the industrial sector in which by far the highest concentration of high technology is found. It is a sector which has had high growth rates through the economic upheavals of the seventies and early eighties. At the same time, this sector, through the technology revolution of the information society, has gone and is still going through fundamental structural changes. Finally, the sector is playing an increasingly predominant role in virtually all economic activities.

The diversity of the sector is extensive. For example, some of its sub-sectors are regulated while others are not; telecommunications is an example of the former while informatics is an example of the latter. Furthermore, regulation can be uniform across the sub-sector, as is the case of broadcasting and CATV, or it can vary with the region, the province, and even the municipality, as is the case of telecommunications.

In terms of manufacturing, in telecommunications one Canadian multinational enterprise, Northern Telecom, is larger than the whole Canadian market while in informatics the leading firm, IBM Canada Ltd., is the subsidiary of an American multinational. The whole of the broadcasting and CATV manufacturing sub-sector is smaller than telecommunications equipment manufacturers such as AEL Microtel and Mitel, yet this group includes a great number of small firms. Some industries in the sector import the bulk of their equipment requirements while others mostly use domestically-produced equipment. In this context, telecommunications manufacturing is contributing to a large balance of trade surplus while informatics equipment contributes to a massive and rapidly increasing trade deficit. Vertical integration is the main characteristic of the telecommunications manufacturing industry: the largest two manufacturers, Northern Telecom and AEL Microtel, are subsidiaries respectively of Bell Canada and B.C. Tel.

With regard to government policies and programs, in some sub-sectors, the government plays an active role at the policy level, such as the case of broadcasting, or through programs and direct participation as in space. In others, the government role has been very limited; hence in informatics, it has generally been restricted to encouraging foreign multinationals to produce

equipment in Canada for which the Canadian subsidiary would have a world product mandate, or to participate in firms such as AES.

The forms of ownership vary significantly between sub-sectors. It is largely Canadian in content/broadcasting and in carriage/telecommunications, with an active government participation at the federal level (e.g. Telesat, Teleglobe, and CNCP), at the provincial level (e.g. Alberta Government Telephone), and at the municipal level (e.g. edmonton tel). It is almost exclusively foreign in informatics manufacturing. In most sub-sectors, there is less concentration at the manufacturing level than at the service level.

It is in the communications sector that the second largest privately owned Canadian firm, Bell Canada, is found. The largest high-tech manufacturer, Northern Telecom, the largest privately financed and owned research laboratory, Bell Northern Research (BNR), and the largest concentration of sectoral and privately financed R&D in Canada are all in this sector.

The overall annual growth rate of the sector is estimated to be in the 10-15% range, with an annual growth rate of 20-25% in informatics. As such this is one of the fastest growing areas of the Canadian economy.

The prospect of the sector throughout the eighties is excellent. While the sector as a whole is likely to remain as presently defined, many of the boundaries between the sub-sectors can be expected to become blurred and in some cases to disappear. This is already a reality in computer/communications with the merging of computer applications and telecommunications. It will be a reality in

broadcasting equipment which is already becoming digital.

At the manufacturing level a disproportionate fraction of the sector is found in the Québec-Windsor corridor, especially in Ontario. The high-tech nature of the industry is likely to increase that concentration with Vancouver and Saskatoon being the other regions to significantly benefit from the expected rapid growth of the communications equipment industry.

4.0 Applications

The Communications Sector Environmental Assessment can be used by the Department of Communictions staff for a number of tasks such as preparation of the Strategic Overview, policy development, and preparation of background documents. It can also be used to identify the issues which are of concern to the Department and which require in-depth study. Similarly, the present report may be of use to the Canadian Radio-television and Telecommunications Commission and provincial departments of communications.

5.0 Suggestions for Future Work

Given that the present report is a first attempt at a comprehensive analysis of the communications sector and that it was prepared under a tight schedule over the summer months of 1983, the data gathered here are unavoidably sketchy and the analysis of industries is not as deep as one wishes to see. These shortcomings can, however, be overcome in the future by dividing the work into two stages as follows:

Stage 1 : Semi-annual Update

In this stage the present report would be reviewed by DOC Regional Headquarters staff for the purpose of updating the main trends of the sector analyzed therein. It is suggested that a one-day workshop be held in April, 1984 for project participants to discuss their views and to revise the report where necessary.

Stage 2 : Annual Update

In this stage the report would be subject to a thorough review for the purpose of substituting all previously used data with new data wherever available and to revise the analysis accordingly. It is suggested that a three-day workshop be held in October, 1984 for project participants to carry out this update.

CANADIAN COMMUNICATIONS SECTOR: AN ENVIRONMENTAL ASSESSMENT

1.0 Introduction

1.1 Background

The Environmental Assessment of the Communications Sector was initiated following the issuance of the Regional Dimension Action Plan on May 31, 1983 by the Deputy Minister. This plan was put into action in order to strengthen the relations between Regional Offices and Headquarters by bringing the regional dimension more fully into the Department's decision process as it applies to policy development and program management activities. In this context, the present report culminates a joint effort made by staff of the former Communications Economics Branch and the Regional Program Development and Policy Analysis Divisions during the summer of 1983. Due to the limited amount of time allocated to it and the usual shortage of personnel during the summer months this report should not be considered as a state-of-the-art assessment of the communications sector in Canada. It should, however, be viewed as a first step toward a regular assessment of the sector which can serve as an input into the planning activities of the Department.

1.2 Objectives

The objectives of the Communications Sector Environmental Assessment are:

i - To identify the trends, opportunities, and problems of the communications sector in Canada;

ii - To determine the economic perspectives of each region in the medium term;

iii - To identify the main problems and objectives, as well as their regional and operational opportunities.

1.3 Organization of the Report

The report consists of 4 chapters: Introduction, Economic Outlook, Sectoral Assessment, and Conclusions. In addition, an assessment of provincial economic outlook prepared by the Conference Board of Canada is given in the Appendix. The regional analyses of the communications sector are available for consultation on request.

2.0 Economic Outlook

The Canadian economic situation in 1982 was characterized by substantial declines in demand, output, and employment and with unemployment reaching new record levels. However, this recession, bottomed out at the end of 1982, appears to have been replaced by a resurgence of business and consumer confidence. There has also been considerable progress in reducing inflationary pressures on both the price and wage fronts, with the increase in the Consumer Price Index (CPI) falling to 4.9% on a year-to-year basis in October, 1983. Interest rates are expected to remain high due to the pressure of substantial U.S. deficits on the world capital markets. High interest rates, however, will not adversely affect consumption especially in the residential housing and automobile sectors where demand is quite strong. Also, business investment is expected to continue to rise with improvements in sales and corporate profits.

The real Gross National Product has been forecast to rise by 2.0% - 3.0% this year, after a 4.8% decline in 1982, and growth rates in the 3% - 5% range are forecast for each of 1984 and 1985[1]. A vigorous upsurge in industrial activities is expected in the next two years, and despite some deterioration in Canadian manufacturers' competitive position, the volume of merchandise exports remains broadly unchanged while a record surplus was built up on both the foreign trade and current account balances in 1982.

In summary, the current economic recovery in Canada is seen to be firmly rooted and expected to last for the next few years.

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1. Based on Data Resources Inc. (DRI) and Conference Board of Canada forecasts.

On the world scene , prospects for 1983 and 1984 are for a modest but significant improvement in the international economic climate. Declining inflation and interest rates, an important positive feature of developments in 1982, appear to have laid the basis for a return of confidence and a more sustainable growth of output.

Evidence of economic recovery in the industrial world, weakest in Europe and strongest in North America, characterizes the present situation. The improvement in the short-term outlook is due in part to the recent drop in oil prices, which should have a generally beneficial impact on the world economy by reducing inflation and by creating more room for an expansion in demand. The pace of the expansion is likely to remain lower than during the earlier recovery periods.

An assessment of the provincial economic outlook is given in the Appendix.

3.0 Sectoral Assessment

3.1 Carriage/Telecommunications

3.1.1 Description

3.1.1.1 Introduction

For the purpose of this assessment, the carriage/telecommunications sector is defined as consisting of two separate elements: the providers of telecommunications services, including consulting services, and the telecommunications equipment manufacturers. The former corresponds closely to Statistics Canada SIC (1980) 4821, the latter to SIC (1980) 3351 and part of 3381.

3.1.1.2 Telecommunications Carriers

The leading providers of telecommunications services in Canada consist of two carrier groups, Telecom Canada (formerly TCTS) and CNCP Telecommunications to which one must add Teleglobe Canada which is reponsible for the overseas segment. Telesat Canada is included in the Space Subsector of this report (Section 3.5)

Telecom Canada is an unincorporated consortium formed by 10 members including Telesat and nine telephone companies: British Columbia Telephone (B.C. Tel), Alberta Government Telephone (AGT), Saskatchewan Telecommunications (Sask Tel), Manitoba Telephone System (MTS), Bell Canada, New Brunswick Telephone (NB Tel), Maritime Telephone and Telegraph (MTT), The

Island Telephone Company (Island Tel), and Newfoundland Telephone. Telecom Canada coordinates all interprovincial long distance service, whether basic or competitive, which crosses the territory of any one of its members (excluding Telesat) through a national network. It is also responsible for negotiating rates and revenue settlements with AT&T and with Teleglobe as well as among its members, even though its revenue settlement role with AT&T and Teleglobe has recently been challenged by the CRTC as far as Bell Canada and BC Tel are concerned. Telecom Canada has a unique structure with a Board of Management which specifies the service and operations to be handled on a system-wide basis while each of the 10 members has an equal vote in policy and operational matters through its representation on the Board.

CNCP Telecommunications is a joint partnership between CN Communications and CP Telecommunications, respectively subsidiaries of Canadian National and Canadian Pacific.

The telecommunications service industry in Canada is a mix of government and privately owned companies. The federal government, through Canadian National, owns two telephone companies, Terra Nova Tel (serving parts of Newfoundland) and NorthwesTel (serving the Yukon and parts of the Northwest Territories and British Columbia). Teleglobe Canada is a federal crown corporation. The provincial governments of Manitoba, Saskatchewan, and Alberta each own the major telephone company within their province: MTS, Sask Tel, and AGT. The remaining companies are privately owned with the exception of the telephone companies owned by municipalities such as Edmonton

and Thunder Bay. Certain other firms, mainly large public utilities, such as Hydro Québec, own and manage telecommunications networks for their own use.

Bell Canada, aside from providing services directly to the major portions of Quebec, Ontario and part of the Northwest Territories, has equity ownership in a number of other telephone companies, especially in the Atlantic region: MT&T, NB Tel, Island Tel, Newfoundland Tel, and in Ontario, Northern Tel. It also controls 100% of Télébec's stock, a telephone subsidiary servicing parts of Quebec. Other companies such as Québec Téléphone and BC Tel are subsidiaries of a foreign multinational enterprise, General Telecommunications and Electronics (GTE).

3.1.1.3 Equipment Manufacturers

The most striking characteristic of the telecommunications equipment manufacturing industry in Canada is the vertical integration between the two leading carriers and the two leading manufacturers: Northern Telecom is a subsidiary of Bell Canada and AEL Microtel is a wholly owned subsidiary of B.C. Tel. Regarding the other manufacturers, while Mitel and Canada Cable (a subsidiary of Noranda) are Canadian-owned concerns, firms such as Canadian Marconi, Phillips Cable and Pirelli Cable are all subsidiaries of foreign companies.

Northern Telecom is by far the largest Canadian telecommunications equipment manufacturer, supplying over two thirds of the demand for

telecommunications equipment in Canada.

The rest of the telecommunications equipment manufacturing industry consists of manufacturers such as AEL Microtel, Mitel and Canadian Marconi which produce telecommunications equipment and Canada Cable, Phillips Cable and Pirelli Cable which are specialized in wire and cable. All of these firms are in direct competition with Northern Telecom which supplies a complete line of telecommunications equipment.

3.1.1.4 Research and Development (R&D)

In the private sector, Bell Canada, jointly with Northern Telecom, owns Bell Northern Research, the largest privately owned R&D organization in Canada, and BC Tel owns Microtel Pacific Research, Western Canada's largest R&D complex, through its ownership of AEL Microtel. Mitel and Canada Cable conduct R & D activities internally.

A substantial R&D effort is also carried out by the federal government through the Communications Research Center (CRC) of the Department of Communications.

3.1.2 Economic Indicators

3.1.2.1 Telecommunications Carriers

Operating revenues of telecommunications carriers amounted to $8.23 billion in 1982 or 2.4% of the GNE (Table 1).

Bell Canada accounts for approximately half of the economic activities in telecommunications services provided in Canada as measured by total operating revenues, while B.C. Tel and AGT together account for almost a third. The 16 largest companies (including CNCP Telecommunications and Teleglobe Canada) account for 99% of the total operating revenue of all telecommunications carriers.

Telecommunications carriers' revenues are derived mainly from two sources - local and long distance services. In 1982 local services contributed $3.4 billion to the operating revenue of this sector and toll services $4.2 billion. However, the recession had an uneven impact on the rate of growth of these two components since for the first time in years, long distance revenue did not increase as rapidly as local revenue. This is likely to be due to the high income elasticity of demand for most long distance calls, especially by residential subscribers. Considering the three major carriers, AGT, BC Tel and Bell Canada together, local and long distance revenues each increased by 13% in 1982, a rate of growth slightly higher than

that of other telecommunications carriers. The 13% average growth rate however, hides a wide diversity among those firms. It is expected, however, that the historical trend will resume as the economy recovers.

The total number of telephones in use decreased by 1% to 16.8 million in 1982 due mainly to the decrease in business phones from 5.20 million units to 5.04 million. In comparison, the number of main residential stations increased 0.8% from 8.20 to 8.27 million. It should be noted that, with terminal attachment now possible in most of Quebec, Ontario and British Columbia, and Manitoba and Alberta likely to move in this direction, one has to be careful in drawing conclusions from such traditional industry measures and one should rely increasingly on measures such as the number of main stations to describe the sector.

The 14 major telephone carriers in Canada employed 104,007 full-time employees in 1982, up 2.4% from 1981. While full time employment increased, the total employment of the 14 main carriers for 1982 decreased slightly to 109,386 employees due to a decrease of 40% in part-time and casual employment.

Gross investment, on the whole, did not change much between 1981 and 1982: $3.01 billion compared to the previous $2.97 billion. Teleglobe's gross

investment level rose from $42 million in 1981 to $108 million in 1982 and B.C. Tel, Manitoba Telephone System, and CN Communication also increased their investments in 1982. For all the others, there were reductions which were, at times, drastic. For example, both Québec Tél and Island Tel cut their construction programs by a fourth.

Canada, mostly through BCI (a Bell Canada subsidiary) but also through such firms as ATI, MTX, and ELINCA has also been very successful in selling its telecommunications expertise abroad. The greatest success is certainly BCI's Saudi Arabia contract worth $1 billion in its first five year phase and $1.6 billion in its second five year phase which started in the spring of 1983. To give an idea of the size of this project it suffices to note that, in the first 5 year phase, more than 2,000 Bell Canada staff had worked in Saudi Arabia, increasing the number of telephones and the switching capacity by a factor of six and international traffic by 230%. It is not primarily in developed countries that Canada will be able to significantly expand this activity. The markets of greatest potential, besides the United States, are in developing countries, and especially those industrializing most rapidly.

At the service level, R&D data exist only for the category Transportation and Other Utilities. The total expenditure is estimated at $72 million in 1983. While the share of the telecommunications industry is unknown, it is likely to be a substantial proportion.

3.1.2.2. Telecommunications Equipment Manufacturing

According to estimates derived from the Labour Force Survey conducted by Statistics Canada in June 1983, 54,000 employees worked in the manufacturing of communications equipment. The proportion of those actually employed in the manufacturing of telecommunications carriage equipment, while unknown, is believed to be high.

According to Statistics Canada, the value of shipments of communications equipment and components amounted to $3 billion in 1982. Such statistics are not easily reconciled with other sources, such as those provided by the firms through annual reports and other means. Nevertheless, independent data developed within the Department of Communications suggests that the value of the equipment produced stood at more than $2 billion in 1982, with close to 80% being for the domestic market.

Data are not available on annual investment by manufacturers although the level of investment is believed relatively small compared with that of the service providers. Northern Telecom, with worldwide revenues amounting to over $3 billion in 1982, had an annual investment of $266 million, an increase of 22% over 1981. Northern Telecom's Canadian revenue and investment shares are not known. AEL Microtel, with an operating revenue of $209 million, consolidated its investment figures with BC Tel's, to yield a total of $434 million in 1982. Mitel, with an operating revenue of $204 million had $133 million in investment in the year ending in February, 1982; however, this figure appears to be exceptionally high and can be attributed to Mitel's 100%

growth rate up to 1982, and its optimistic growth projections.

Telecommunications equipment is a market where Canadian industry has been very successful in recent years. For instance, in 1982 exports of telecommunications equipment reached $481 million and represented one third of all communications and components exports. When compared to imports valued at $164 million, this leaves a healthy trade surplus of $317 million. The largest market for this equipment is the U.S.A., the destination for half of our exports. In response to the steady growth of this market in the past few years, Northern Telecom and Mitel have expanded their production facilities in the U.S.A. As a result, Canadian export growth was only 7.7% in 1982. This is nevertheless still much higher than most estimates of the growth experienced in the Canadian market. As Canadian exports increase, their destination is shifting in relative importance from the developed countries to the Middle East, Latin America and the Far East.

Telecommunications is one of very few high technology industries where Canada is self sufficient in manufacturing, and technical and operational know-how. One reason for this self-sufficiency appears to be the high and increasing level of R&D expenditures by the major companies, which is generally attributed to the vertically integrated structure of the industry. For example, consolidated figures for Bell Canada show $197.3 million expenditures on R&D in 1980, $256.3 million in 1981 and $341 million in 1982. These figures include Northern Telecom which had a level of R&D expenditures

of $241.4 million in 1982 and has budgeted a 18% increase to $285 million in 1983. The Company plans to increase the proportion of its revenues devoted to R&D from the present 9% to 10% in coming years. In fact, one single Northern Telecom R&D program, OPEN WORLD, is expected to cost $1.2 billion between 1982 and 1987. It is estimated that roughly 80% of Northern Telecom's R&D activities are in Canada. In terms of manpower, in 1982, it was estimated that Bell Northern Research had 2,300 R&D employees in Canada and 500 in the U.S. B.C. Tel's R&D expenditures increased substantially between 1981 and 1982, going from $12.2 million to $20.4 million. In addition AGT also shows strong indications towards greater R&D expenditures in the future. Although not a part of AGT, Novatel interacts with AGT because of common interests. It is an R&D company for mobile related hardware and systems.

3.1.3 International Market

The world market for telecommunications equipment is currently experiencing a number of significant changes that in the long term cannot fail to affect the future of the Canadian telecommunications industry. On the world scene, where overall demand for this type of equipment is growing, some foreign manufacturers have increased their share of the market while Canadian manufacturers have seen their share decline. With forecast real growth rates for the world in the order of 8 to 9% per year for the period 1980-1990, the sales of telecommunications equipment are increasingly subject to strong competition. The competition among telecommunications equipment manufacturers is rarely of the classic type. These companies usually operate in a

compartmentalized marketplace under the protection of their respective governments. These "preserves" represent approximately seven-tenths of the world market, including the overwhelming majority of developed nations. The countries of the Middle East and Third World are discovering the need to create telephone communications infrastructures in order to further economic and social development. Some of these countries insist that technical expertise and manufacturing be transferred to them while others are seeking to increase the percentage of local production. Thus, telecommunications manufacturers are often forced to adopt new strategies. After Europe, where the major manufacturers are Siemens, Ericsson and CIT-Alcatel, Japan has emerged as a third dominant force in the telecommunications equipment manufacturing group.

Telephone and telegraph industry shipments are expected to increase at an average annual rate of 5% for the period 1982-1987. After a slowdown in the rate of increase in 1983, 1984 should see a growth rate of more than 6%, provided that interest rates will not rise again. Conversion of central offices and PBX's from electromechanical to digital electronic switching, attachment of local area networks (LAN) and data equipment terminals to the national network, and an expanding overseas market will together contribute to sustaining the industry's rate of growth. U.S. private housing starts, forecast to increase at an annual rate of 14% from 1982 to 1987, will also contribute to the industry's growth through increased demand for main stations and for the equipment required at the central office and subscriber locations.

Japan has replaced Canada as the leading country of origin for U.S. imports of telecommunications equipment and accounted for half of the total value. In fact, Japan emerged during 1981 as the leading exporter of telephone and telegraph equipment and parts in the world reaching a level of U.S. $911 million.

The market for telephone and telegraph equipment worldwide is expected to grow rapidly. Estimates for requirements outside North America are in the range of U.S. $29 billion for 1982 and growing at an annual rate of almost 9%, consistent with the 8% forecast by A.D. Little. As the evolution to the digital environment proceeds throughout the world and the trend toward more competition continues, greater market opportunities for all manufacturers of telephone and telegraph equipment will exist.

In 1982, major export markets did not grow as rapidly as expected due to the general downturn in the world economy. Also, U.S. and foreign firms are increasing their assistance to foreign manufacturers producing sophisticated electronic equipment which may render the 8 to 9% annual forecasted world-wide growth rate in international trade overly optimistic.

3.1.4 Regional Characteristics

It was indicated earlier that telephone services were unified nationally through both CNCP Telecommunications and Telecom Canada. The service offered

by Telecom Canada is generally uniform across the country since the standard and the network design are jointly agreed to by all its members. This uniformity, however, does not apply to rates. The rate discrepancies are largest with respect to intra-territorial long distance and local service, with rates generally lowest in the Prairies and highest in the Atlantic region.

Services offered are further affected by the regulators' attitudes toward such issues as interconnection. For example, the Alberta Utility Board took a position in favour of a greater degree of deregulation and the CRTC allowed terminal attachment and network interconnection between CNCP and the federally regulated telecommunications carriers. Most other regulators have ruled, however, against interconnection. Such a situation prevents the implementation of a national policy in general, and, in particular it prevents a firm like CNCP from offering nationally its competitive services under conditions comparable to Telecom Canada's.

Telecommunications equipment manufacturing activities appear to be largely concentrated in Ontario with extensive activities in Quebec, British Columbia, and Saskatchewan. It is almost completely absent in the Atlantic region, except for the activities of Northern Telecom.

3.1.5 Government Policies and Programs

Telecommunications carriers, with the exception of Teleglobe, are

regulated at the federal level (BC Tel, Bell Canada, CNCP, NorthwesTel and Terra Nova Tel) the provincial level, and the municipal level (edmonton tel and Thunder Bay Tel).

Manufacturers are not directly regulated even though the two major manufacturers, Northern Telecom and AEL Microtel, are vertically integrated with regulated carriers so that their earnings affect the tariffs offered by the parent company while the transfer prices to their parent company are open to the regulator's scrutiny.

The subsidiary's earning issue will probably arise again once the CRTC tackles the more general problems of the regulation of the reorganized Bell Canada. The latter problem is to a great extent the result of the increase in competition in a regulated environment. The coexistence and relative roles of competition and regulation together constitute the most pressing regulatory set of issues today in Canada.

In manufacturing, the government's involvement, both actual and potential, is mostly at three levels: (i) in setting standards, (ii) in transferring technology to private industry, and (iii) in assisting international marketing efforts, so as to ensure that Canadian manufacturers have a fair chance in international bids.

In terms of the broad policy goals of uniformity of service and of economic development, the problems are far more complex. First of all, there

are discrepancies both in the variety and quality of the service offered and in rates. For instance, while some carriers, most notably AGT, have almost done away with multi-party lines, the situation varies widely across the country. At the same time, rates and the firms' performances also vary across the country. Atlantic carriers have generally much higher local rates. Certain firms such as AGT and, especially Teleglobe, appear to have achieved very high growth in productivity.

Equally important is the inability to avoid a national patchwork situation in such issues as Trans Canada rates, network interconnection and terminal attachment. At present, rates from St. John's to Vancouver or from Halifax to Toronto differ depending on the direction of the call. Similarly, CNCP can only interconnect with the telephone carriers in the regions which are under federal regulation.

3.1.6 Prospects and Opportunities

The prospects of telecommunications services will depend greatly on changes in the institutional and regulatory framework. The existing regulatory structure can be expected to affect the introduction of new services, and, through it, to limit the domestic market for equipment, especially terminals. Other major issues which will have to be tackled include the discrepancy between business and residential telephone rates and universal measured service. It should be noted that Canada is one of the last industrialized countries to maintain the flat rate tariff system for

local service. It has been the stated intention of all major U.S. carriers since the mid-seventies to systematically introduce measured service at the local level. If such issues and others regarding enhanced services and competition with CATV are resolved so as to favour more competition, the prospect for rapid growth in the demand for telecommunication equipment is excellent. Evidently it must be recognized that such rapid growth is not the sole objective of the government.

Developing countries and in particular the non-oil producing ones, have been hit particularly hard by the recent international economic recession. Growth in the latter category barely reached 1.5% in 1982 and a modest growth rate of 2 to 2.5% is expected in 1983. Some sources predict that economic growth among non-oil producing countries may not reach above the current rate. This prediction together with lower growth rates in oil producing countries, may have the effect that the 8% to 9% growth rates forecast for world demand for telecommunications equipment may not be realized. It is expected that Canadian exports and the continued rapid growth of the Canadian manufacturing sector will be crucially dependent on a substantial world recovery.

The prospects for growth abroad are nevertheless still considered good, and a strong recovery should ensure continued growth. However, it is likely that the competitive environment will require that more and more manufacturing activities take place abroad so that the net effect on the balance of payments will be more in the form of royalties than in actual exports. While not being as favourable in terms of job creation and regional

development in Canada, such a situation is still highly beneficial in terms of the continued control of the know-how and of the accessibility to Canadian state-of-the-art equipment.

Probably just as promising is the export of our know-how in the form of consulting services; while BCI's contract with Saudi Arabia is an exception by its size, there are numerous smaller markets.

3.1.7 Summary

Carriage-Telecommunications is defined to include the providers of telecommunications services including consulting and the telecommunications equipment manufacturers.

In 1982, net carriers' revenues for telecommunications services increased 13.3% to $8.25 billion. This represents 58% of the communications sector (excluding content non-broadcasting). Many carriers through firms and consortia such as ATE, MTX, ELINCA and especially BCI have been very successful in exporting Canadian telecommunications expertise.

At the equipment manufacturing level, this industry is dominated by its vertically integrated suppliers Northern Telecom and AEL Microtel, the two largest firms. Manufacturers in Canada produced over $2 billion worth of equipment in 1982, over 20% of which was exported, resulting in a $317 million surplus in the balance of trade. The manufacturers, on the whole, appear to have felt very strongly the impact of the 1982 recession with a 6% contraction

in the Canadian market. The telecommunications sub-sector is the industry with by far the largest intramural R & D expenditures in Canada.

Forecast 8% to 9% growth rates through the eighties for the world market appear somewhat optimistic, nevertheless the US$ 29 billion world market (excluding North America) offers a good prospect for Canadian manufacturers.

Differences in rates and services exist across Canada. They are largest with respect to intra-territorial long distance and local services, with rates generally low in the Prairies and high in the Atlantic region. Telecommunications manufacturing activities are largely concentrated in Ontario followed by activities in Quebec, British Columbia, and Saskatchewan.

The coexistence of competition and regulation elements in the telecommunications field constitutes the most pressing regulatory issue today in Canada.

3.2 Content - Broadcasting

3.2.1. Description

The broadcasting sub-sector (at the service level) as defined by Statistics Canada (SIC (1980)481) consists of three components : the CBC, the private broadcasters, and CATV. It is defined here to also include Pay TV and non-commercial broadcasting operated by religious groups, educational institutions and provincial governments. Private broadcasting includes all commercial radio and television stations, the regional television networks, Global Communications Limited and the CTV national television networks. At the manufacturing level, this sub-sector consists of the production of studio equipment and transmitting equipment for radio and television broadcast, including antennaes, radio and television broadcast equipment, and radio and television insulated wire and cable. Program production is also one of the activities carried out by the broadcasters.

The CRTC reported a total of 3177 broadcasting stations and 625 licensed cable television undertakings in 1983. Out of these broadcasting stations, roughly 25% are originating stations, and the remaining ones are rebroadcasting stations. Among the originating stations, two thirds are private stations with no affiliation with the CBC while one fourth are either CBC-owned or private stations affiliated with the CBC. The other remaining originating stations include three provincially-owned systems (2 for Radio-Québec and one for TV ontario), 34 conventional network stations (which

include, in addition to networks such as TVA and CTV, such corporations as those distributing sporting and other special events) and 20 other networks, including Pay TV. Two thirds of the rebroadcasting stations are owned by or affiliated with the CBC while a fifth belong to the private system. The remaining stations are divided between licensed CANCOM stations (338) and provincially owned stations (57).

In addition the CBC provides the CBC Northern Service mainly to serve Canadians living north of the 60th parallel. The Northern Radio Service serves 97% of the population of the N.W.T. and 92% of the Yukon and includes programming in seven native languages. The Northern Television Service distributes its programming via Anik satellites and includes native language programming and dubbed network programming. Radio Canada International is a short wave service intended for audiences in other countries.

In the cable television industry, the 620 undertakings in 1982 were part of 441 operating systems (those which submit an annual return to the CRTC). Some Canadian Multi-System Operators (MSOs) control a great number of systems. MacLean Hunter Cable TV Ltd. for example, oversees 15 systems. Cable Communications Magazine, in its 1983 directory, lists 23 MSOs for a total of 102 systems and 3.5 million subscribers.

In manufacturing, the sub-sector has two components: broadcasting and CATV equipment. Even though there are many firms producing broadcasting equipment, this market is dominated by imports. It should be noted that it is

also a very small industry comprising such major actors as Canadian General Electric (transmitters), McCurdy Radio (audio-equipment) Ross Video (television switching equipment), Ward-Beck Systems (audio and video tables), Central Dynamics (video terminals), and Digital Video Systems (studio equipment). The Canadian CATV manufacturing sector is much larger. Six major firms in this domain had sales (including sales of non-CATV equipment) exceeding $10 million in 1981: Jerrold (the subsidiary of General Instrument a U.S. company), Viewstar, Electrohome, Digital Video Systems, Ampex Canada, and Andrew Antenna (two other U.S. subsidiaries). Altogether there were 12 Canadian manufacturers with annual sales of over $1 million in 1981.

There exists no easy way to quantify the broadcasting sub-sector. One can use the number of transmitters or the number of stations. Alternatively, one can describe national coverage, the proportion of the population which can receive radio and/or television programs. The CBC reports a national coverage at more than 99% of the population, with the exception of the coverage by FM programming (75%). 97% of the population has access to both the CBC AM radio and television English networks while 92% has access to the CBC French AM radio network and 85% to its French television network. The respective coverages of the Canadian population by the English and French CBC FM networks are 69% and 24%. One can also look at the availability of radio and/or television receivers: in 1982, 98% of all Canadian households owned an AM radio, 97% owned a television set, while 84% owned a colour television set. The markets for AM radio and television sets appear close to saturation, while the markets for cable TV connection and converters still have room to grow.

The market for AM stereo is too new to forecast. Finally, in terms of the audience, some CBC figures show that the average number of hours of television watched per person per week is 23 hours; radio is listened to an average of 18 hours per week. Pay TV in its first two months of operations accounted for only about 1% of all viewing.

The CATV sub-sector had 4.86 million household subscribers in 1981, or 60% of the 8.13 million Canadian households. However, it should be noted that only 6.81 million Canadian households are in localities served by CATV.

A study conducted by the CBC in May 1983 estimated the number of Canadian households with Pay TV at 450,000 or 5.5% of all households. It is expected that this figure may go up to 600,000 by the end of 1983.

3.2.2. Economic Indicators

3.2.2.1. Broadcasting

The gross expenditure incurred by this sub-sector, excluding the regulatory and policy functions, was $3.04 billion in 1982, 91% of which was funded by revenue (proxy revenue in the case of CBC).

According to Statistics Canada total program expenses amounted to $944 million in 1982, an increase of $100 million over 1981. Of the total, 50% was incurred by private broadcasters, 46% by the CBC and 4% by CATV operators. Program production was a source of employment for 17,700 persons, with a wage bill of $500 million in 1982. With the exception of music, almost all CBC radio programming is Canadian-produced. CBC Radio programming expenses in 1982 were $135 million (both languages). Television program production expenses incurred by the CBC in 1982 were $145 million, representing 90% of all CBC program expenses. The corresponding ratio is thought to be much lower in the private broadcasting segment even though no data are available to confirm it.

Revenue to private broadcastors was $1.22 billion in 1982, 11% higher than the 1981 figure, almost all from advertising. Private broadcasting revenue made up 44% of the broadcasting sector's total net revenue and the CBC proxy revenue made up another 39%. The remaining 17% is the share of the CATV component. CBC's proxy revenue increased by 16.5% to $1.08 billion in 1982. The growth in the CATV subsector brought its revenue to $472 million in the same year.

In private broadcasting, television contributed the largest share of revenue (59%), a share which is increasing over time.

CBC operating revenue, as reported on the income statement, increased by 16.1% to $167 million in 1982. However, given the public mandate of the

corporation this is not a particularly meangingful indicator of the activity of the Corporation. In the same period, total expenses increased by 10% to $771 million in 1982.

The operating revenue of CATV comes mostly and increasingly from direct subscription (86%). The rapid growth in expenses by CATV operators, 17.5% in 1981 and 21.2% in 1982, are due to: (i) the increase in the amount of community programming required by the CRTC, (ii) the upgrading of equipment to accomodate Pay TV, and (iii) the very high interest rates prevailing throughout this period.

3.2.2.2. Broadcasting Manufacturing

The major part of the broadcasting equipment purchased in Canada is either assembled in Canada by multinationals such as Canada Marconi Ltd., or imported. It is estimated that imports represent more than 90% of Canadian demand. If this is the case, imports would correspond, in 1981, to about $83 million out of a gross sectoral investment of $93 million and, in 1982, approximately $80 million out of a gross sectoral investment of $89.5 million. On the other hand, Canadian firms, while small, often tend to specialize and export a large portion of their production. An example of a particularly successful firm is Central Dynamics, a multi million dollar firm which exports as much as 90% of its sales, half of which went to the U.S.A.. In spite of such success stories, that Canada still has a sizeable trade deficit.

Nationally, the situation is better in CATV equipment manufacturing, which is, in any case a larger market. The largest firm in this market is Jerrold but such firms as Viewstar, Digital Video Systems, and Ampex Canada are also important. Many of these firms, such as Electrohome and Andrew Antenna, are active in other markets and their operating revenue does not properly reflect their actual importance in this market. It is estimated that around 70% of the domestic market is supplied by Canadian manufacturers. However, as the phenomenal growth observed in the U.S. is expected to subside, U.S. firms are likely to look more actively for new markets to maintain or expand their production. They may soon offer much increased competition to the Canadian firms.

As indicated by Statistics Canada's data, the total investment in equipment reached $112 million in 1982, including the labour used by the CATV operator to install the equipment. Such capitalized labour by the CATV operator accounted for $17 million in 1982. Net expenditure was estimated at $95 million in 1982. In addition, the manufacturers' labour input to install CATV equipment accounts for about 30% of the net expenditure. It is estimated that the expenditure on equipment amounted to $72 million in 1981 and $83 million in 1982.

The impact of Pay TV on CATV equipment manufacturing is expected to be short-lived because saturation is forecast by late 1984. The long term prospect for this industry will depend to a great extent on other enhanced services.

Consulting services are a new and growing source of revenue in the broadcasting sub-sector. For example, the CBC recently signed a $182 million contract with Algeria.

3.2.3 International Market

Broadcasting networks across the world are predominantly financed by one of three methods: direct government funding (as in the case of the CBC) license fees, and commercial advertising. According to a UNESCO report, there were 38 countries where at least one system is predominantly financed by government, 35 countries in which at least one system is primarily financed through license fees and 46 countries with at least one commercial system. Canadian manufacturers must be aware of such differences, since procurement practices will vary depending on whether the broadcasting systems is funded by government or advertising. A significant element which appears to act as a non-tariff barrier to exports is the lack of uniform world standards for broadcasting equipment.

Even though the latest existing revenue and expenditure figures for 1977/1979 are not converted into a common currency, UNESCO data indicate that with 63,000 radio and/or television broadcasting transmitters, the annual world growth rate for broadcasting since 1975 amounted to 4%. It appears that this market is reaching worldwide saturation.

The proportion of the world's 1.18 billion radios found in

industrialized nations was 81% in 1980, down from 88% in 1965. This market has been growing in Third World countries at an annual rate of 24% since 1965. The trend with respect to television sets is even more striking with developing countries representing 11% of the total in 1980 compared to 6% in 1965, the corresponding annual growth rate being 42% for the Third World.

3.2.4. Regional Characteristics

3.2.4.1. Atlantic

The Atlantic Region has no significant capability in broadcasting equipment manufacturing. There is, however, some growth potential, at least at the service level. For example, a limited channel capacity in CATV systems should spur a growth in demand for new equipment. Similarly, DBS and CANCOM represent growth potential even though 53 of the 71 CANCOM licensed stations have yet to become operational.

Most radio and CATV systems in the region are locally-owned. While NBBC provides CBC services in New Brunswick, CTV is provided by a subsidiary, ATV, and by Newfoundland Broadcasting. Finally, the Atlantic Satellite Network has been well received to date and is now being introduced in Newfoundland. At the same time, Pay TV networks, Star Channel in particular, are experiencing some financial difficulties.

3.2.4.2. Quebec

The content/broadcasting sub-sector in Quebec grew steadily during the 1978-1982 period. The growth of employment of the industries in this sub-sector was moderate and there was, to some extent, a fall in the rate of growth. In the case of radio broadcasting, the level of employment had actually dropped.

With regard to CATV, there was a decrease in employment between 1979 and 1980. In fact, Quebec saw a drop of 23% in CATV employment while the Canadian-wide average decrease was 3.04%. Despite this setback, CATV is still an industry with a lot of potential in the province.

3.2.4.3. Prairies

As for the rest of the country, the broadcasting industry in the three Prairie provinces has performed well but is now facing some problems. The industry is relatively small in Manitoba and Saskatchewan but somewhat larger in Alberta. For example, of the 6,841 radio and television broadcasting employees in Canada in 1981, 629 were found in Manitoba and Saskatchewan and 884 in Alberta.

Broadcast equipment production is not a significant industry in the Prairies. While most equipment used by broacasters in the region is imported, in Saskatchewan North American equipment is used in many non-content applications (the production equipment is largely of Japanese origin).

There are two significant opportunities for cable equipment production in the Prairies. i) Sask Tel is presently implementing a major fibre optics program throughout the province, and ii) it is anticipated that the Manitoba Telephone System will rebuild a major cable plant in the next few few years.

In the three provinces, the traditional TV and radio operators have maintained profits and shown some growth through the recession. However, it now appears that the increase in broadcast stations has fragmented listening and viewing audiences. Broadcasters contend that government is also slowing their potential for growth; they argue that government regulation is excessive, and that the regulatory decision making process is much too slow.

Of particular concern to broadcasters in Manitoba and Saskatchwan is the federal/provincial government disagreement over cable; this has seriously increased the risks faced by broadcasters and hampered their investment programs. The economic situation for cable companies in the three provinces is similar to that found in the rest of the country. Of particular concern to cable companies in Alberta is the increase in MATV installations. It should be noted that in Manitoba and Saskatchewan cable and much of the related hardware is owned by the telephone carriers.

3.2.4.4. British Columbia

TVRO's are selling well, so that it appears that with MATV systems they might soon begin to dent the CATV market. Otherwise, on the whole, there seems to be little action. Premier Cablesystems has just completed a major

modernization program which gives them one of the most advanced CATV networks in Canada and, given their predominant size, the provincial demand for CATV equipment has now been drastically reduced. Various additional factors responsible for this lack-luster performance by the broadcasting sector include the recession, federal-provincial jurisdictional disputes, long regulatory delays (especially as far as new non-broadcasting services are concerned) and, as in the case of CANCOM, cash flow problems. Finally, little employment creation is expected regionally from Pay TV.

3.2.4.5. Ontario

The general trends found in Canada for broadcasting are reflected in Ontario. This is to be expected because of Ontario's large share of the total market. For example, 27% of the TV stations, 25% of the AM radio stations, 35% of the FM radio stations, and 24% of the TV cable companies licenced by the CRTC are found in Ontario.

In the manufacturing of broadcasting equipment there is little activity, as also seems to be the case in the rest of the country. The advent of Pay TV may, however, open up a few opportunities.

The television broadcasting industry in Ontario has three principal components: the CBC, TV Ontario and the private commercial stations. In 1980 there were 2,736 employees in private television broadcasting in Ontario. Because of the large number of broadcasting undertakings in the provice, the traditional broadcasting systems are subject to increased competitiveness, fragmented audiences and decreased potential.

Although Ontario cable companies show significant potential and are estimated to serve 41% of the total Canadian subscribers, it appears that some problems persist in the industry. Generally profits have declined over the last few years. They appear to have been affected by the increase in MATV systems. Pay TV has had start up problems, low subscription levels, undercapitalization and large initial losses and consequently has not yielded the expected revenues.

3.2.5 Government Policies and Programs

1982-1983 was a period in which policy questions were at the forefront through the review by the CRTC of its radio policies and regulations and the publication, first, of the Applebaum - Hébert Committee and, later, of the Government's new national broadcasting strategy. The latter lists three fundamental goals:

i - To maintain the Canadian broadcasting system as an effective vehicle of social and cultural policy in light of a renewed commitment to the spirit of the broadcasting objectives set out in the 1968 Broadcasting Act.

ii - To make available to all Canadians a solid core of attractive

Canadian programming in all program categories, through the development of strong Canadian broadcast and program production industries.

iii - To provide a significantly increased choice of programming of all kinds in both official languages in all parts of Canada.

With these goals in mind, the following policies have been adopted by the government:

i - to expand programming choice

ii - to strengthen Canadian programming by making available a significant amount of Canadian programming in each program category. This will be centered on a special Canadian Broadcast Program Development Fund with a budget to reach $60 million per year.

iii- to issue directives to the CRTC on broad policy matters.

iv - to abolish satellite dish licensing requirements for individuals.

The government, in addition, proposes to take specific measures to: (a) review the role of the CBC in the Canadian broadcasting system, (b) encourage private broadcasting, (c) enhance and extend French language broadcasting and programming services, (d) establish a framework for the

international marketing of Canadian television programs, (e) attempt to equalize the level of broadcasting services throughout the country, and finally, (f) respond to the needs of native people.

In the past year, the CRTC has tackled or studied Pay TV tiering and universal Pay-TV, sex-role stereotyping, CANCOM, newspaper/broadcasting cross-ownership, and the CBC long range radio plan.

3.2.6 Prospects and Opportunities

The prospect with respect to consumer expenditures on entertainment services appear excellent, and the part of expenditures going to the broadcasting industry is expected to keep pace. The major competition to broadcasting service may come from the penetration in households of video-cassette recording equipment. However, the degree of impact remains unknown and may even be complementary in the long run. The prospect with respect to advertising revenues for this sector also appears promising even though some of it may be eroded by the proximity to the U.S. market and the facility of advertising on a North American scale from U.S. stations. The major unknown is the allocation of this revenue among specific service providers. Even though the total revenue for this sub-sector can be expected to grow at a substantial rate, the number of service providers, and the diversity of the technologies available, may be growing even more rapidly with the result that there may even be no winner because of the smaller revenue base for each firm.

Regarding manufacturing, technological changes may affect the structure of the industry. Digital methods and equipment constitute one of the major technological developments which will affect the broadcasting industry in the future. Certain types of digital equipment are now in use, and eventually a major changeover to this technology will occur. In fact the CBC has opened a digital laboratory in Montreal to facilitate its research and development work and to develop in-depth knowledge of the digital field. It is expected that over the coming years such technology will lead to fundamental shifts in manufacturing while some markets are taken over by other industries such as the informatics sector. The long-awaited CBC Toronto Centre is likely to accelerate this process of technological change; it may also provide some help to the Canadian manufacturing industry, especially if traditional broadcasters are able to hold onto and expand their markets, and hence benefit from the increased Canadian manufacturing capacity resulting from the construction of this center.

Market fragmentation may progressively erode the position of traditional broadcasters, while the markets for such segments as TVRO and MATV are likely to continue to expand rapidly for sometime. CATV is nevertheless seen as relatively healthy and, while MATV and TVRO may erode some of its market, they are not expected to substantially affect its long term growth. CANCOM appears to be shaky with many of the licensed stations still not operational; further delays may encourage communities to look for alternatives.

The fate of Canadian Pay TV is likely to be decided in the coming months. In the meantime it is of concern to note that AIM is not yet on

the air, Star and World View are experiencing difficulties, and C-Channel has already folded. Given the stated intention by the government to increase Canadian content, opportunities should develop. Success may be dependent on a review of content rules and their application for radio and TV and also for cable companies and Pay TV. If Pay TV realizes the original expectation of the industry, at least 40% of cable subscribers will receive it by 1986. This development is expected to yield an annual gross revenue of about $415 million.

Finally, an early resolution of regulatory delays and the jurisdictional dispute would provide a great spur to the sector by removing many of the uncertainties now impeding expansion into new markets.

3.2.7 Summary

The content/broadcasting sub-sector is defined at the service level as consisting of (i) the private commercial broadcasting sector, (ii) the CBC, and (iii) the CATV industry. In terms of equipment manufacturing, it includes broadcasting equipment and CATV equipment.

In 1982, the gross expenditure of the sub-sector was estimated at $3.04 billion, 9% of which consisted of investment. This represents an increase of 11% over 1981. All of the growth in this sub-sector came from the service part of the industry (13.3%) while the manufacturing activity contracted over the period by 12.4%. This sub-sector represents 15.6% of the communications sector's expenditures (excluding content/non-broadcasting).

Program production, a source of employment for 17,700 persons, accounted for almost a third of the gross expenditures of the sub-sector in 1982. As measured by revenue (or proxy revenue for the CBC), the private broadcasting segment made up 44% of the industry, the CBC 39%, and CATV 17%. Growth in 1982 was highest in the CATV service industry and the CBC, followed by the private broadcasting segment. It was estimated that an average person watched television for 23 hours and listened to radio for 18 hours per week. Pay TV accounted for about 1% of all television viewing. It was estimated in May 1983 that 450,000 households had Pay TV and this figure is expected to increase to 600,000 by the end of the year. 60% of all Canadian households

(4.86 million) are CATV subscribers.

It was estimated that 90% of the $89.5 million investment in equipment by the broadcasting industry was spent on imports. Even though some firms have been very successful at exporting their products, Canada has a very sizeable trade deficit in broadcasting equipment, especially with respect to the U.S.A. and Japan.

While the worldwide broadcasting equipment market is reaching saturation, with annual growth rates around 4%, the sale of radio and television sets is still booming, with growth rates of 24% to 42% respectively in developing countries.

In Canada, the broadcasting equipment manufacturing industry is concentrated in Ontario. In British Columbia, after a rapid growth in CATV equipment production, the industry may experience a contraction.

An early resolution of regulatory delays and jurisdictional disputes would provide a great spur to the broadcasting industry.

3.3 Content/ Non-Broadcasting

3.3.1 Description

This subsector consists of motion picture, audio and video production, distribution, and exhibition; videotex and teletext content; book, magazine and newspaper publishing and distribution; and two components excluded from this review - the performing and visual arts.

The structures of the industries comprising this subsector vary significantly, although similarities between some industries exist. The inter-industry linkages also form very different patterns, both within the subsector and with other industries outside it.

In the film industry there is a strong working relationship among the three major elements of production, distribution, and exhibition. Film production involves the use of costly equipment, supporting costs, technical crews and production laboratories. The key to the success of a film in Canada is proper distribution and access to exhibitors; Canadian producers do not have adequate access to either the distribution networks or the theatres because of the predominance of foreign control. The TV market for film is of growing significance, especially with the growth of Pay TV services in both the U.S. and Canada.

Compared to film, audio production or sound recording on disc or tape is an inexpensive enterprise. In Canada the largest record companies are subsidiaries of foreign owned multinationals whose primary activity is the manufacturing of records and tapes from imported master tapes. The four

largest of these companies account for 80 percent of all record sales in Canada. The 100 or so small Canadian owned companies produce over half the records with Canadian content, and are responsible for the majority of capital expenditures in Canada. The largest record companies, mainly foreign controlled, benefit from an industrial structure that is highly integrated from recording to manufacturing, distribution, wholesaling, and retailing.

The publishing and graphic industries are very diverse, comprising, in rough order of economic importance, newspapers, magazines, and books. Videotex content and electronic publishing are perhaps of least economic significance at present despite their long term potentials which pose threats to some printed types of content. Many of these product groups, books for example, are of a heterogenerous nature and contain sub-groups distinguishable by language, entertainment value and cultural significance. The structure of the publishing and graphic industries is also diverse, ranging from no dependence on advertising revenue (books) to a very high dependence (newspapers); from heavy dependence on government support (scholarly journals) to almost no support (imported magazines); from a high degree of ownership concentration (daily newspapers) to a very low degree (newsletters).

3.3.2 Economic Indicators

Because of the breadth and diversity of this subsector it will only be possible to refer to a few key indicators in any particular component.

From a demand perspective the rough order of importance of the components and the relationships of demand to consumer income is displayed in

Figure 1. It shows the relationships between average family income and annual per capita expenditures. In 1978 per capita annual expenditure was highest on newspapers ($50) followed by records/tapes and books ($44 each), movies ($39), magazines ($25) and plays/concerts ($20).

On a per capita basis people go to the cinema about 3.5 times per year, in Canada, compared to 5.9 in the U.S., 2.0 in the U.K. and 3.3 in France. Total movie theatre admissions in Canada declined from 196 million in 1955 to 100 million in 1965 and have since been fairly stable. Many more foreign than Canadian movies are screened each year in Canada. Of the 561 new releases distributed in 1981 only 36 were Canadian produced. In Quebec the percentage of foreign films screened increased from 91% in 1974 to 95% in 1979; attendance at foreign movie shows rose from 91% to 97% of the total audience over the same period.

Pay TV networks, beginning service in February 1983, have not yet greatly stimulated the production of Canadian films.

A recent survey indicates that Canadians would prefer to see a large number of Canadian films exhibited in local cinemas; whether or not more Canadians would actually attend theatres more often if more Canadian movies were shown remains an open question.

There were 306 film production establishments in Canada in 1981, compared to 287 in 1977. Thirty-three had annual revenues exceeding $1 million. Nineteen English-language and six French-language feature films (75 minutes or longer) were produced in the private sector in 1981, two English

and five French in the government sector. Paid employees, excluding freelancers decreased from 1,483 in 1977 to 1,038 in 1981.

Printing, publishing and allied industry groups contributed $2.6 billion or 1.13% of GNP in 1978. Newspaper publishing contribution amounted to 0.41% of GNP followed by magazine publishing (0.16%) and book publishing (0.09%). In financial terms newspaper publishing is well over twice as important as magazine publishing, which in turn is almost twice as important as book publishing. The book publishing industry is most important to the economy when measured in terms of employment. In 1978 there were 5,536 person-years of employment in book publishing, 2,200 person-years in firms engaged in publishing plus exclusive agency sales, and 1,341 person-years in firms engaged only in sales for a total employment of 9,077 in book publishing and related activities.

Shipments of records and tapes by manufacturing companies showed rapid and steady growth in the 1970s: 44 million records and tapes were sold in 1970 and 94.1 million in 1978, a 113% increase over nine years. Revenue from shipments increased 293% over this period reaching a level of $258.5 million in 1978. By contrast sales declined between 1979 and 1982, a result of the recession, sales of illegally produced recordings, home taping, and the rise of video product sales as a competitor to sound recordings.

Foreign ownership and control of the recording industry accounted for 82.2% of total revenue in 1977 and 85.2% in 1980. The high percentages reflect privileged access to imported foreign master tapes which are then

copied and distributed in Canada.

Employment in record and disc manufacturing was 2,700 in 1979, up from 1,752 in 1971.

3.3.3 International Market

Canadian companies in the cultural industries have not yet succeeded in penetrating foreign markets to any great extent. Our competitors, by contrast, have been very successful exporters of non-broadcasting content to Canada.

Canadian exports of motion pictures were $0.90 million in all of 1982, and $0.89 million in the first six months of 1983. Exports of records and blanks were $13 million and $4.9 million in the same two periods. As in the case of film, royalty transfers are excluded from the export figures.

Newspaper, periodical and book exports amounted to $60.3 million, $58 million and $54.9 million, respectively, in 1982, and $31 million, $33 million and $81.4 million in the first six months of 1983. In all, Canada's exports of non-broadcasting content were $187 million in 1982 and $151 million for the first half of 1983. A graphic portrayal of the book market is given in Figure 2. It indicates the predominance of imports over exports, and the predominant role of the U.S. both as a market for our exports and a source of our imports. The same situation holds for periodicals, the second largest component of Canada's imports of non-broadcasting content. France is Canada's second

most important export market and source of imports since it is the world's most important consumer and producer of French language content.

The market for teletext/videotex is still small enough for all of the major players to participate in a joint trade show. The most recent event was Videotex '83, held on June 27-29 in New York. Canadian products and software were prominent in this show. No European country displayed equipment or services using the new North American Presentation Level Protocol Syntax (NAPLPS). The Japanese have adopted the Telidon protocol and are purchasing NAPLPS software from Canadian companies. They are developing NAPLPS products based on the home TV and the personal computers. Time, NBC and CBS now offer teletext services in the U.S. but Norpak is the only source for NAPLPS teletext decoders (Cdn. $4,080). Major services offered in the U.S. are Viewtron (Knight-Ridder), Grassroots (Videotex America, 50% of which is owned by Infomart) and Gateway (Times Mirror). Videotex service bureaus now exist which specialize in narrowtext magazines with banking applications (The Bank of Montreal is the only Canadian bank involved so far). At Videotex '83, Genesys, in cooperation with two U.S. companies, announced the establishment of a telebanking network in north eastern U.S. scheduled to begin in August 1983; Videotex America announced an Agribusiness videotex service to serve northern and central areas of U.S.; and AgriData Resources Inc. announced that their agribusiness service would be introduced into Canada in September '83 to compete with Grassroots. With videotex services just being introduced in the U.S., Canada appears to have a waiting market for system and applications software.

3.3.4 Regional Characteristics

Figure 3 portrays the regional distribution of employment in 1975 and 1982 in staged entertainment services and publishing and printing.

Ontario had by far the largest share of employment in publishing and printing, about 47% in both 1975 and 1982. Quebec and the Prairie regions had the second and third highest shares, respectively. Except for a small increase in the Prairies, the regional shares did not change much between 1975 and 1982. Only three subprovincial regions had 8,000 or more employees in content production and services industries: Toronto, Montreal and Vancouver in descending order (Figure 4). In each of these urban regions the number of persons employed increased significantly between 1975 and 1982.

Film

The film industry in Atlantic Canada is struggling economically. Cooperatives have been formed in some areas and the important Atlantic Film Festival is supported by small grants by the governments of Nova Scotia and New Brunswick. Atlantic filmmakers are having difficulty qualifying for available funding programs such as those of the Canadian Film Development Corporation (CFDC). Nova Scotia is in the process of launching a study to assess its film industry.

Most French-language film production activities are located in Montreal. Dubbing of English language films is an additional activity in the Province of Quebec.

Most English-language film production activities in Canada are located in Ontario. For instance, in 1980, there were 151 Ontario-based companies out of 292 nationally, accounting for over one half of total revenues, production revenues (mostly from TV programs and advertisements), expenditures, wages and benefits and freelance fees in Canada. Over one half of laboratory and production services are in Ontario. In 1980, the 59 Ontario-based distribution companies accounted for over three quarters of film and videotape sales and revenues, employees, and salaries and wages.

Vancouver is an important western centre for the film and recording industries.

Newspapers

The Atlantic region has a high percentage, in terms of their population, of Canadian dailies, due to its dispersed population. Several newspapers belong to the Thomson chain. L'Evangeline, the only French-language newspaper, has been closed.

The Ontario newspaper industry has generally been healthy. In 1978 Ontario-based daily newspapers represented 46.4% ($447 million) of total Canadian revenues. In 1980, the Thomson chain had 27.3% of circulation, Southam 22.2% and the Sun chain 10.6% in Ontario. Corporations based in Toronto accounted for 83% of Canada's English-language daily newspaper circulation.

Magazines

About 60% of the periodical publishing industry is located in Ontario. The production of trade magazines is, to a substantial degree, in the hands of two Toronto-based corporations, Southam and MacLean-Hunter.

Books

In 1981, in the Atlantic region, the 32 publishing houses published 101 book titles. Revenues from publishers' sales in 1980 were under 1% of the Canadian total in all provinces except Ontario and Quebec, where they were 83% and 15% of the total, respectively.

Ontario-based publishers accounted for 98% of sales of Canadian English-language books. Quebec-based publishers accounted for about the same percentage of sales of French-language books.

In Alberta, recent growth in the book publishing area has been good and is expected to continue as the economy improves. In Manitoba, book publishing has come to a crossroads. If publishers can obtain business and management training/expertise, significant growth should occur over the next five to ten years.

Recording Industry

There are a few recording studios in the Atlantic region and most are experiencing economic difficulties. An exception has been Smithsound Studios in Charlottetown, a company involved in commercial production and with a weekly syndicated radio show.

The heart of record production and manufacturing activity in English Canada continued to be centered in Ontario. In 1980, Ontario-based companies accounted for approximately 86% of single releases and 78% of album releases. In 1980, nine Ontario and one Quebec foreign-controlled companies recorded over three quarters of total Canadian revenues from sales of records, with most records made from imported master tapes.

In the Prairies the Manitoba and Saskatchewan recording industries are relatively small. In Alberta, growth has been experienced in the last few years and the economic problems the industry faces should be overcome with a general economic turnaround in the province.

The recording industry in Vancouver is of growing significance as evidenced by the large number of Juno Awards won by Vancouver performers this year.

Videotex

NBTel, in Saint John, N.B., has the only Telidon Database in the Atlantic Region. It launched Project Mercury with DOC funding in late 1979

and spent more than $1 million on the project ot establish a database and carry out a field trial. Other groups in the region such as Newfoundland Tel, NT&T (Halifax), Advisory Council on the Status of Women, and Tourism , New Brunswick, are storing some 2000 pages in this database.

Infomart of Toronto has been a major supplier of Telidon software and has created over 100,000 pages of Telidon content over the last three years. It has a $26.1 million investment in support of Telidon projects in the last three and half years, out of which $17.9 million has been counted as losses; current losses are $450,000/month on all five Telidon business ventures: Grassroots, Teleguide, Cantel, International Sales of Software, and Videotex America. As a result, Infomart has recently shifted its emphasis to business operations, reflecting concerns about consumer prospects.

Two new services in Toronto called MARKETFAX and FAXTEL make use of the CANSIM and other data bases in graphical forms suitable to business needs. Out of 218 organizations identified as active in Telidon development, 152 or almost 70% are based in Ontario. Seven main activity areas have emerged with consulting being predominant. Almost 50% of companies surveyed offer consulting services. Software development and page creation services are also significant areas of activity for 33% of the companies.

The Grassroots America service is expected to be provided initially out of Winnipeg starting in mid 1984 and will involve a scattering of some 1500 terminals across the country.

Genesis Research Inc.'s videotex service "Genesis Story Time" is

currently available to cable subscribers in Winnipeg. The service has been sold to the four largest cable operators in the U.S. (over 4 million subscribers) for distribution over SatCom A, a U.S. satellite. All page creation is done in Winnipeg.

Infomart's involvement in Grassroots in Winnipeg has served as a stimulus to a number of small page creation undertakings. This trend is expected to continue with the extension of Grassroots into Saskatchewan and Alberta.

3.3.5 Government Policies and Programs

Government support and leverage policies and programs exist in most components of the non-broadcasting content sub-sector. An overview of the degree of support during the Seventies is shown in Figure 5. It indicates that in terms of constant dollars per capita, government expenditures on films, the performing arts, libraries, literary arts and visual arts remained rather constant over the decade. Per capita expenditure in 1980/81 was about $1 for film and performing arts, 20¢ for the literary arts, and 10¢ for the visual arts.

A Canadian feature film industry has developed over the last ten years thanks mainly to the formation of the Canadian Film Development Corporation (CFDC) in 1968 and to the 1976 Capital Cost Allowance grant of 100% for Canadian films. DOC support and leverage measures are now being designed to overcome the distribution and exhibition problems faced by Canadian film producers.

In the publishing industry, policies are under review to strengthen the Canadian book and periodical industries. A comprehensive book publishing support strategy is currently under preparation in the Department of Communications due to be completed 1984. To date federal policies have been mainly directed at the supply, and partly because of these policies Canadian writing activities have flourished in the last ten years. The new initiatives will stimulate the demand for Canadian books, as well as their supply.

In the province of Ontario a "Halfback" magazine program has been initiated. Forty-six Ontario-based magazines have been selected for participation in the program. The program allows readers to redeem their non-winning Wintario tickets at 50¢ each towards new subscriptions, up to $15 whichever is less. Special marketing assistance grants totalling $200,000 were also awarded to 22 of the 46 magazines. Through the selection of magazines and the distribution of grants, Ontario's Ministry of Citizenship and Cultural Affairs has made clear its intention to give commercial viability priority over pure literary merit and to encourage publications to become financially self-sustaining rather than continuing to exist on the basis of government grants. The approach adopted in the Halfback program have been extended to other magazine support programs, and to cultural industries generally. At present, the Ontario government strongly supports the industry and is presently re-examining its support level.

With respect to postal rates the basic levels for Canadian magazines rose from 3.4¢ to 4.0¢ in April, 1982. The rate for foreign magazines printed and mailed in Canada rose from 3.8¢ to 5.0¢ while the rate for foreign

produced magazines rose from 15.2¢ to 30.4¢.

The recording industry has not received significant attention in government policies and programs, except those dealing with Canadian content in broadcasting.

In the videotex field, federal support for the commercialization of Telidon was announced for fiscal 1983-84 and 1984-85. The $23 million program will support the development of content, foreign marketing and technological research and development activities.

3.3.6 Prospects and Opportunities

There are a number of forces at work on both the supply and demand sides of the non-broadcasting content sub-sector. The rapid development of videotex technology and the slower but steady development of content, applications and services are expected to make inroads into the demand for newspapers and special interest magazines in the medium term.

The recent U.S. decision forbidding AT&T from entering electronic publishing for at least seven years appears to be favorable to Canadian videotex exporters.

U.S. exports of magazines to Canada are expected to remain strong during the next five years. Foreign sales of U.S. periodicals are expected to grow at an average annual rate of about 12 percent through 1987. This continued growth in U.S. magazine exports is related to the high quality of

U.S. magazines, and the relatively underdeveloped state of domestic magazine publishing in some areas of the world.

Book publishers have revised their operations in several ways in order to improve productivity. Warehouse and distribution centers have become highly automated, with computers monitoring book inventories and processing shipments to wholesalers and retailers. Some publishers and bookstores are considering tying the computerized distribution centers of publishers directly to the inventory systems of bookstores, thus speeding up book delivery and keeping tighter control of sales and inventory transactions.

Dramatic improvements in book production, including the use of web-offset presses, photocompositions, and in-line binding machines, have significantly reduced the manufacturing cost component of the entire cost of publishing.

In the film industry, many theater owners are concerned about the short time between the release of films to exhibitors and their sale to pay and commercial television. Many films are sold to television broadcasters because this arrangement holds the promise of greater income return to producers than rentals to theaters. The exhibitors' concern is increased by the rapid pace with which cable franchises in the U.S. are being awarded and the increasing attractiveness of available programming.

Another concern expressed by theater operators is that home video products, such as video cassette records and video games, offer tremendous recreational potential and may keep people away from the theater. It will

take some time to determine if such a trend does indeed develop and to ascertain the severity of its effects on motion picture theater attendance.

Competition from the U.S. is expected to remain strong while Canadian production costs keep rising. Between 1970 and 1980, remittals to the U.S. from U.S. film rentals abroad ranged from 40 to 52 percent of the total film production costs. Canadian producers are unlikely to achieve this degree of remittals in the near future. The upward trend in remittals from U.S. operations abroad is expected to continue in the foreseeable future.

In the videotex area, the U.S. market is expected to provide the largest opportunities due to the large population base, the lack of regulatory restrictions on cable companies, the availability of risk capital, and a more pioneering attitude towards new technologies.

3.3.7 Summary

This sub-sector consists of motion picture, audio and video production, distribution, and exhibition; videotex and videotex content; book, magazine, and newspaper publishing and distribution; and two components excluded from this study, the performing and visual arts.

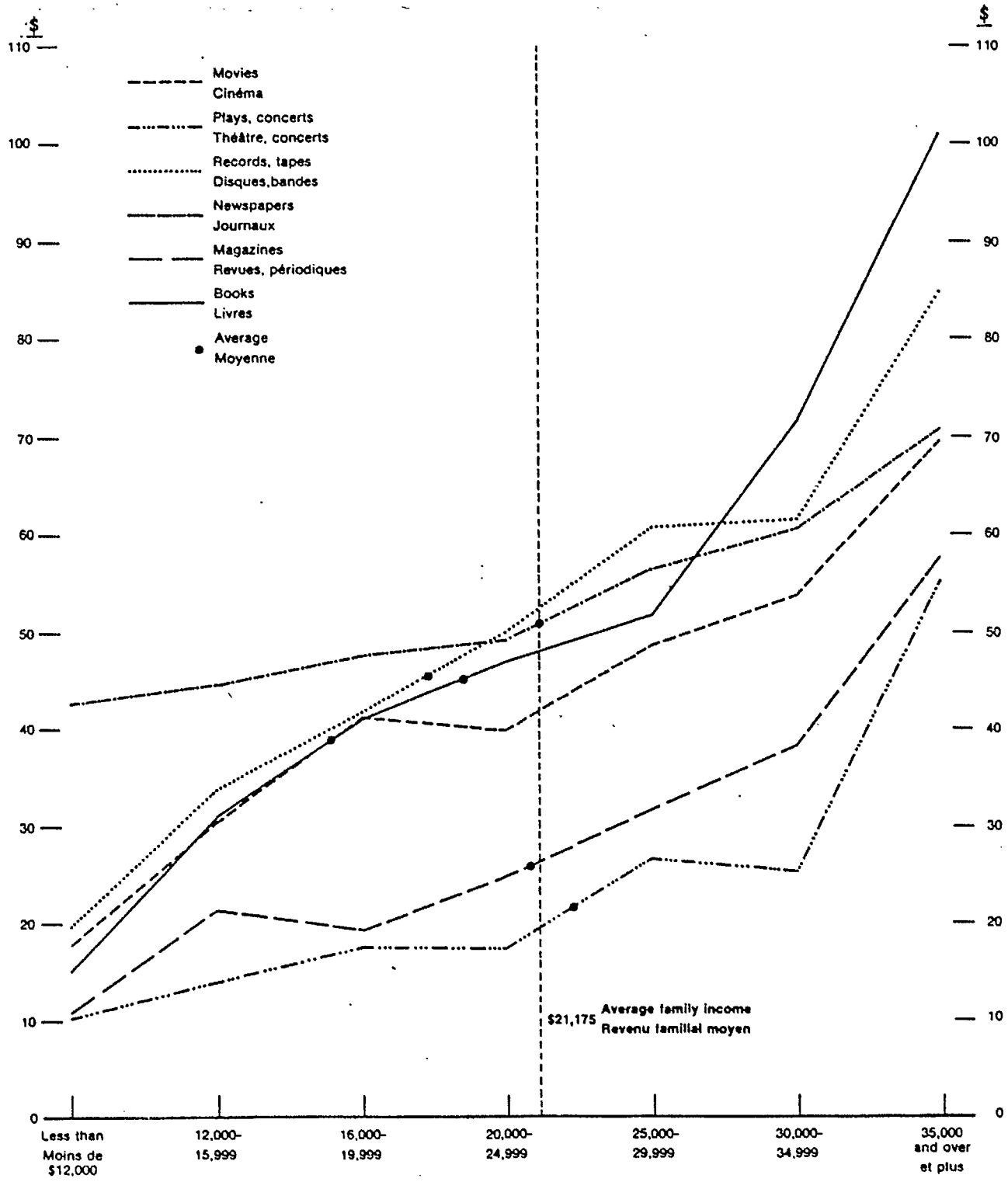
It was found that the Canadian market for cultural products is steadily growing. The consumption of domestic products, however, is low compared to imports, except for newspapers and videotex. On the production side, domestic production is increasing except in records and tapes, videotex, and newspapers.

There is a high degree of foreign ownership and control in most component industries. Canadian-controlled film, book publishing and recording firms have difficulty competing or growing domestically and internationally. There is a high degree of corporate concentration in some components, especially newspapers. Cross-media ownership is prevalent in some areas. Geographically, there are high degrees of regional concentration, mainly in Ontario and Quebec. In the employment area, cultural talents are generally low paid and highly mobile, especially in "creative" areas such as writing and the performing arts.

Figure I

Average Yearly Family Expenditures on Selected Leisure Activities by Family Income, 1978

Dépenses moyennes des familles au titre de certaines activités de loisir selon le revenu familial, 1978



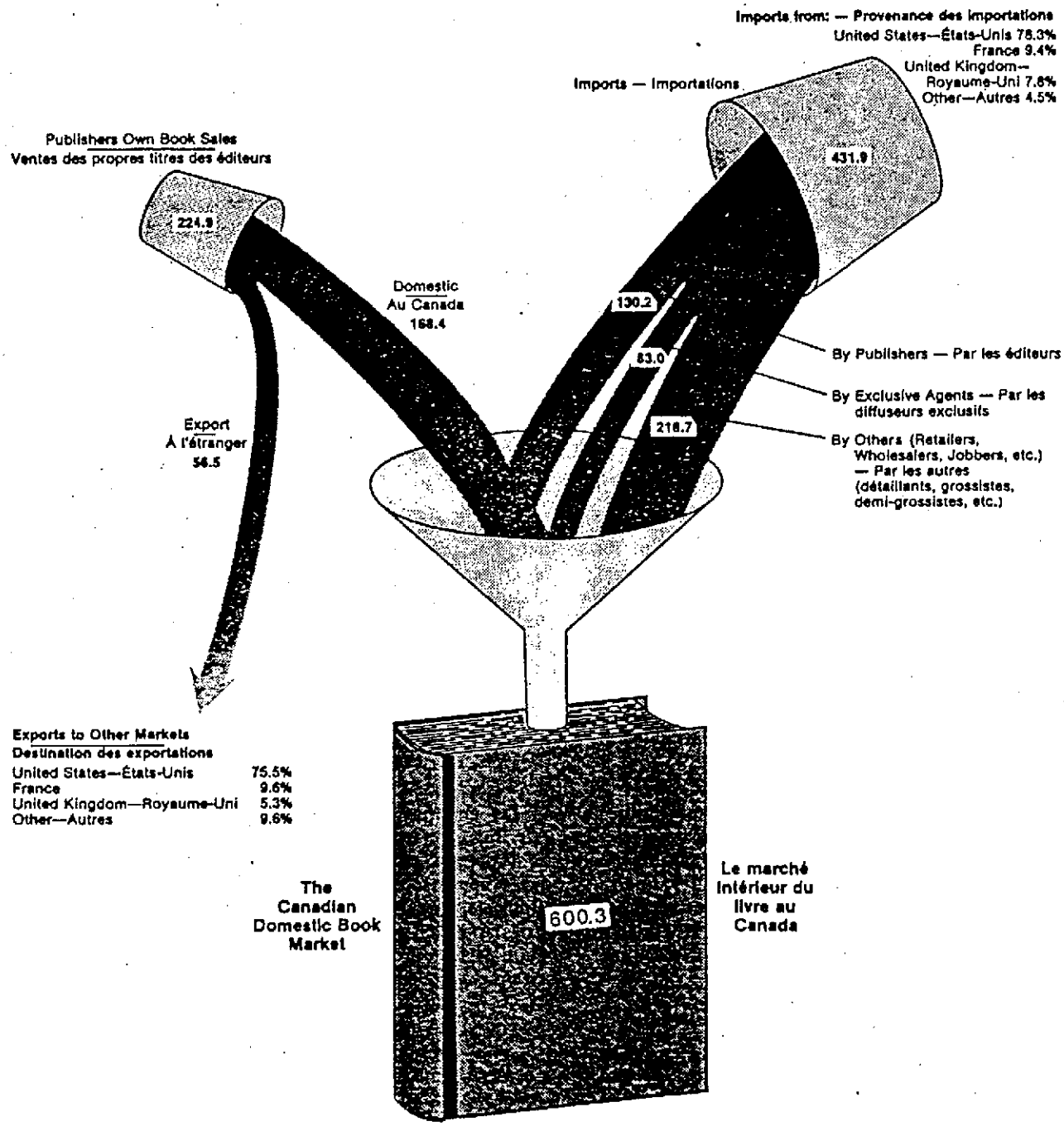
Source: Statistics Canada Catalogue No. 87-625, 1980.

Figure . 2

Estimates of the Canadian Book Publishing Situation, 1977

Estimations de la situation de l'édition du livre au Canada, 1977

(In millions of dollars — En millions de dollars)



Source: Statistics Canada Cat. No. 87-601, 1977.

Figure 3

PERCENTAGE DISTRIBUTION OF THE EMPLOYED BY COMMUNICATIONS INDUSTRY AND REGION, 1975 AND 1982

THEATRICAL AND OTHER STAGED ENTERTAINMENT SERVICES

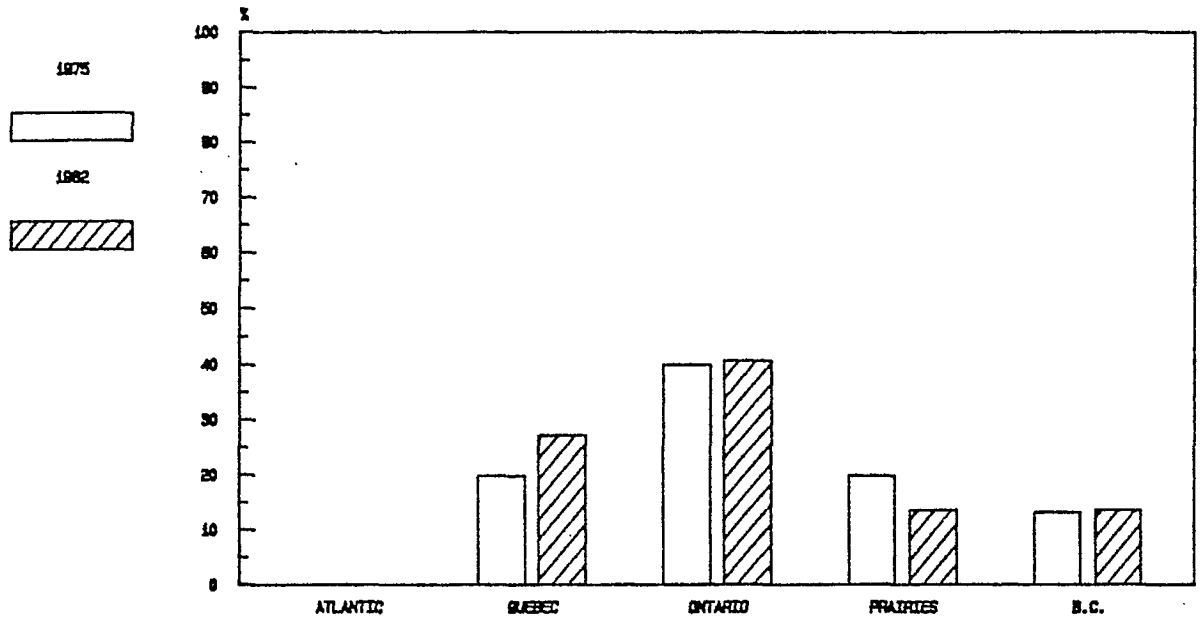
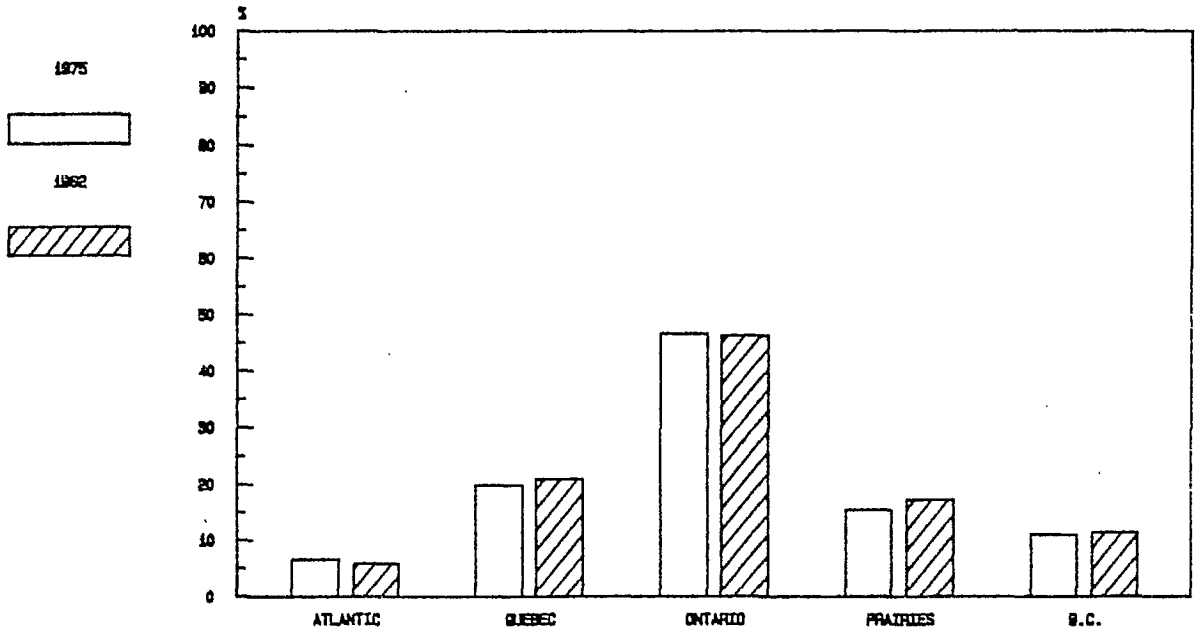


Figure 4

PUBLISHING AND PRINTING

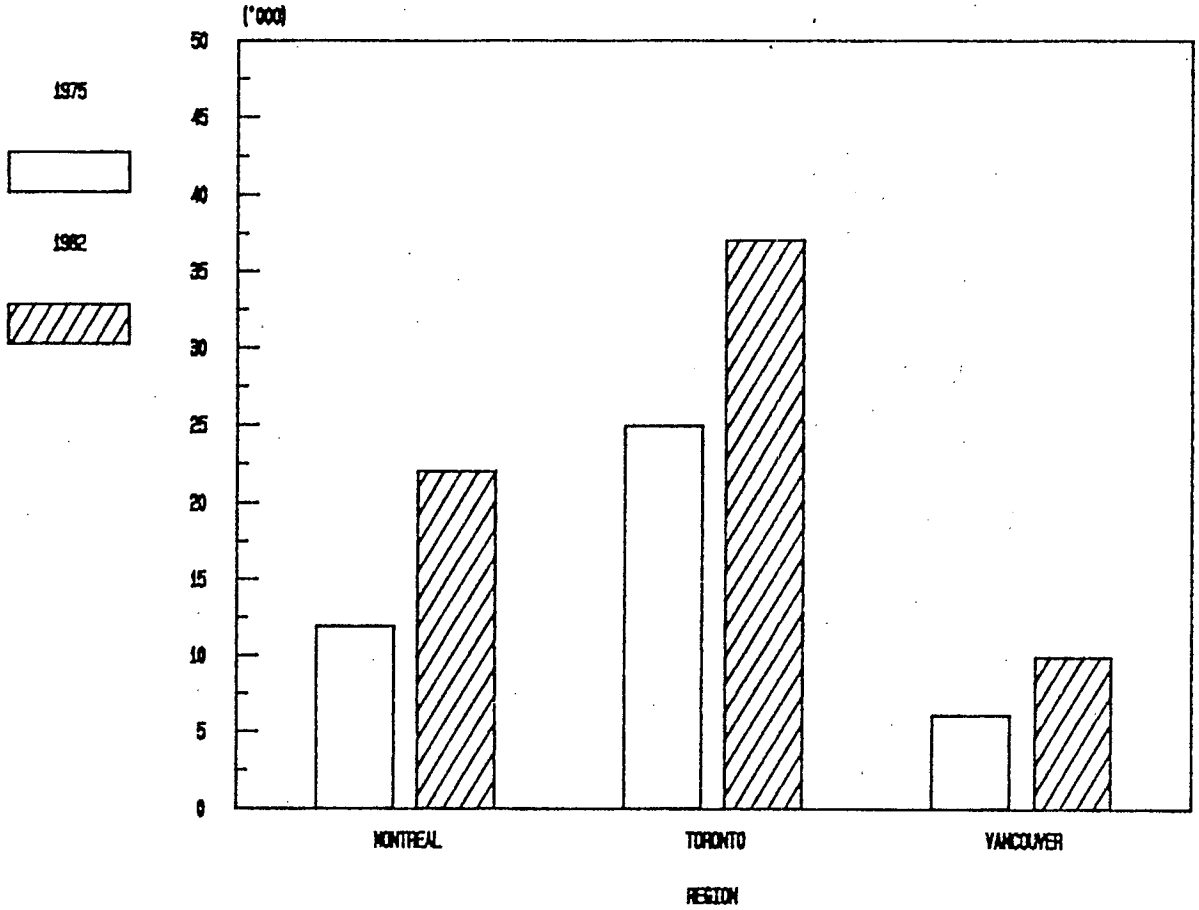


SOURCE: Statistics Canada, Labour Force Survey, Special Request

Figure 4

SUBPROVINCIAL REGIONS WITH 8,000 OR MORE EMPLOYED IN COMMUNICATIONS INDUSTRY GROUPS, 1975 AND 1982

COMMUNICATIONS CONTENT PRODUCTION AND SERVICES

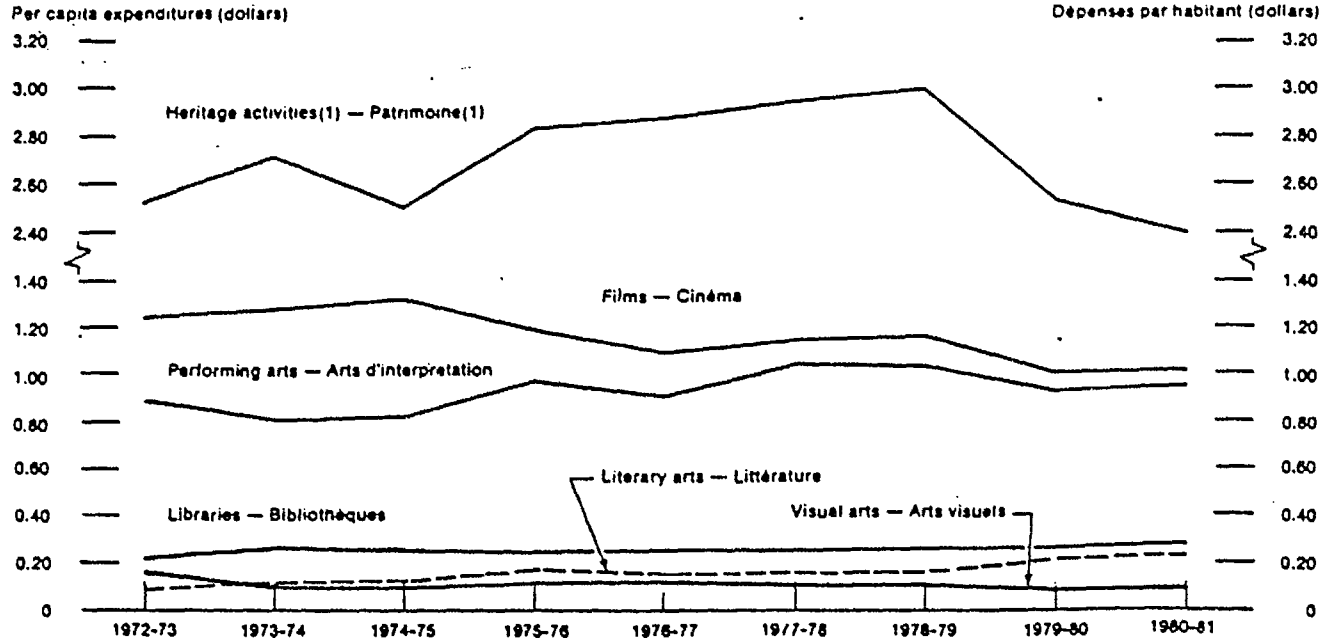


SOURCE: Statistics Canada, Labour Force Survey, Special Request

Figure 5

Per Capita Federal Government Expenditures on Selected Cultural Activities in Constant (1971) Dollars, Fiscal Years 1972-73 to 1980-81

Dépenses par habitant de l'administration fédérale au titre de certaines activités culturelles en dollars constants (1971), années financières 1972-73 à 1980-81



(1) Includes historic parks and sites, public archives and museums.
(1) Comprend les parcs et lieux historiques, les archives publiques et les musées.

Source: Statistics Canada Cat. No. 87-680, 1979-80 and 1980-81.

3.4 Informatics

3.4.1 Description

Informatics or computer/communications is a term relating to the combination of computing, telecommunications, information services and related technologies. Informatics activities cover products and services related to the creation, storage, processing, retrieval, and distribution of information in machine readable (usually electronic) form.

The demand for information products and services is currently generated largely by businesses and institutions, although the personal computer has brought about rapid growth in the mass consumer segment. It can be met either by in-house supply, using purchased hardware and in-house personnel, or by commercial supply. In-house supply constitutes an economic but non-market activity, while commercial supply constitutes a market activity. In either case, the supply of such services and products creates a derived demand for informatics equipment. Commercial or market informatics activities can therefore be sub-divided into two broad categories: supply of equipment and supply of services and intangible products like software packages or databases.

The informatics equipment industry covers the production and distribution (sale, leasing and rental) of computer/communications devices designed primarily for the creation, storage, processing and retrieval of information; this includes computers, peripherals and auxiliary storage units, input-output units, data communications equipment, terminals and multi-functional

workstations, as well as systems software which is included with the hardware and not sold separately. The production activities are grouped into a wider category called the Office and Store Machinery Industry (SIC 318, 1970). It would be more consistent with existing statistical practices to treat distribution as a separate industry, if adequate data were available. This may become increasingly important with the retailing of informatics equipment, especially micro computers.

The informatics services industry produces services and intangible products which can be broken down into three main categories:

i) Processing services, which include input preparation and data entry, processing and information retrieval services;

ii) Professional or consulting services, which include computer consulting, systems development, custom programming, systems engineering including hardware and software maintenance, education, training and research services;

iii) Software Products, which include the sale, leasing and rental of systems and applications software packages.

Service bureaus are defined as firms which provide machine-based data processing and/or information retrieval services as their principal or major activity, but such firms usually provide other categories of professional services as well. Firms whose principal or major activity is the provision of professional services are usually referred to as EDP consultants, software houses, or software service firms. It is particularly important to note that few companies operate in only one of these three areas, and that some hardware

manufacturers can and do provide informatics services. Unless statistics are collected (or reported) for each separate activity or area, however, companies are often classified according to their prime area of involvement, and all revenues are attributed to that area.

The Canadian informatics equipment industry is, to a large extent, dominated by foreign (mainly U.S.) multinationals. Forty-five of the top 60 hardware suppliers in Canada in 1982 were foreign-owned and, in fact, only one (AES Data Inc.) of the top ten was Canadian-owned. A number of the Canadian subsidiaries, however, have product mandates and export their goods from Canada to either regional or world markets; examples include IBM Canada Ltd. and Control Data Canada Ltd. Canadian-owned companies have generally focussed on specialized products lines, and have often concentrated in perceived high growth areas, supplying products to meet the needs of a particular market niche. GEAC and Gandalf are examples of this strategy.

The service bureau and professional services segments of the informatics services industry are dominated by Canadian-owned firms, who have accounted for over 80% of the revenues since 1979. The situation is very different in the software products area; the bulk of the systems and applications software packages used in Canada are produced by foreign (mainly U.S.) suppliers.

3.4.2 Economic Indicators

Total Canadian user expenditures on computer/communications products and services (including personnel, equipment, services, data transmission and overhead costs) were estimated by an internal DOC source at $7.9 billion in

1982, accounting for some 2.3% of the GNP. These costs were projected by the same source to increase to some $11.8 billion in 1985 and $19.5 billion in 1990. All the above estimates are in current dollars. In-house supply still accounts for the bulk of user costs, but purchased commercial products and services are increasing their share.

For the 141 top computer firms in Canada having EDP revenues greater than $1 million in 1982, Evans Research Corporation (ERC) reported total revenues (including exports) of $5.5 billion. Of this total, $4.5 billion (80.7%) was accounted for by the 60 firms classified as hardware suppliers, $684 million by the 35 top service bureaus and $141 million by the 16 leading software and EDP consulting companies.

A. Informatics Equipment

Market Size, Revenues and Trade

In 1981, according to statistics compiled by the U.S. Bureau of Industrial Economics, the worldwide production of computer hardware (excluding Eastern Bloc countries) was U.S. $51 billion, while the total value of both exports and imports was U.S. $18.5 billion (Table 1). The seven leading OECD supplier nations (U.S., Japan, France, W. Germany, U.K., Canada and Italy) accounted for most of the world activities in this field.

The U.S. clearly dominated the industry. For 1983, U.S. exports and imports are projected by the Bureau at U.S. $10.65 billion and $2.89 billion respectively, for a surplus of $7.76 billion.

The Canadian picture is sharply different and is characterized by a rapidly increasing balance of payments deficit.[1] In 1982, for the Office and Store Machinery Industry, Statistics Canada reported imports of $2.9 billion and exports of $1.2 billion, resulting in a balance of payments deficit of $1.7 billion.

It was reported by Evans Research Corporation (ERC) that the Canadian informatics equipment industry had total revenues (including exports), to companies with annual sales in excess of $1 million, of $4.5 billion in 1982. The dominant firm is IBM Canada Ltd., which in 1982 has total Canadian revenues of $2.2 billion.

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(1) Statistics Canada does not publish data precisely corresponding to the informatics equipment industry as defined above. It is therefore necessary to use the data for the Office & Store Machinery Industry (SIC 318) as a proxy, while realizing that certain items of this group should be excluded from the definition, and other items of informatics equipment may not be included.

Employment

For 1982, Statistics Canada reported a total employment figure of 10,829 for the Canadian Office and Store Machinery Industry . The 1982 figure represented a significant drop from the 16,161 reported for 1981. Production related employment provided by Canadian equipment manufacturers has remained relatively flat for almost 10 years, fluctuating between 4,000 and 6,500, while the nominal value of the equipment produced has increased almost 4.5 times, from $262 million in 1972 to $1,170 million in 1982. Unlike most other sectors of the economy, the increase in the real value of the output of the informatics industry is, of course, much greater, since the price/performance of computer hardware has increased dramatically over the last decade.

It should be clearly understood, however, that these figures considerably understate the total number of people working in the firms which are classified as equipment manufacturers, since they do not cover activities related to the distribution of equipment and provision of services. Thus IBM Canada Ltd., the largest of the equipment manufacturers, employed 11,580 people in 1982; 3801 of these worked in manufacturing, research and development, but the majority worked in marketing and customer support functions in 25 branch locations, as well as various corporate functions.

According to the Bureau of Industrial Economics, total employment in the U.S. computer industry rose about 5% during 1982 to 351,000 workers. This increase fell well below the 15% annual growth rate of total employment between 1977 and 1981 and reflected the softening demand in both the U.S. and major foreign markets.

Research and Development

The total 1981 research and development (R&D) expenditures of a sample of 26 U.S. computer equipment manufacturers rose 15.3% above the previous year's level.

This rate of increase was slightly higher than the 15.1% increase for all manufacturing reported in Business Week's annual survey of corporate R&D expenditures but below the composite gains for the aerospace, electronics, semiconductor and telecommunications industries.

For the Canadian Office and Store Machinery Industry, Statistics Canada estimated R&D expenditures of $79 million in 1982 which constituted 6.7% of shipments but only 1.8% of total sales. It was estimated that IBM Canada Ltd. spent 35 million in 1982 in the operation of its research laboratory in Toronto, concentrating mainly on the development of software products. This figure is less than 2% of IBM Canada's estimated EDP revenues, and is relatively small compared with IBM's estimated total R&D expenditures of U.S. $2 billion. R&D continues to consume a high proportion (up to 10%) of the revenues of small manufacturing firms and new entrants.

B. Informatics Services and Products

For 1981, Statistics Canada reported 1392 establishments engaged primarily in providing computer services, with total operating revenues of $1.1 billion,

exports of $58.7 million and 20,495 employees. Other sources estimate somewhat higher total revenues. No reliable estimates of service imports are available, but there is a widespread perception that there is a rapidly increasing balance of trade deficit.

For the commercial computer service suppliers, including equipment manufacturers, ERC estimated somewhat higher total revenues (including exports) of $1.65 billion in 1982 and forecast revenues at $3.06 billion for 1985.

The most important development of 1982, attributable directly to the recessionary economic environment, was the slowdown in revenue growth for the computer services industry as a whole, and the service bureau segment in particular; the latter is estimated by ERC to have fallen below 10%. Although definitive overall industry figures from Statistics Canada will not be available for some time, ERC estimates indicate that industry revenue growth for 1982 was in the 10-15% range, down sharply from the 25% compound annual growth during the period 1974-81.

The key medium-term economic question for the industry is whether, as the Canadian and U.S. economies improve, the service bureaus can resume their "customary" 20% per annum growth rate, and the software services firms resume their even higher growth rate, and whether they can sustain these rates for the rest of the 1980's.

3.4.3 International Market

It must be appreciated that Canadian equipment and service suppliers operate in a competitive North American and world market. This is particularly true of computer hardware, packaged software, and some types of information retrieval services, where the demand of Canadian users is similiar to that of U.S. users. The informatics industry is both a dynamic and essentially unregulated industry, at least in North America. Factors such as equipment cost differentials, access to venture capital, the tax treatment of software development and related activities tend to affect the competitiveness of Canadian firms in the North American market. This, in turn, affects their opportunities for profitable growth and job creation.

The U.S. market for informatics equipment, services and products constitutes 50% of the total world market, and it is more than 15 times larger than the Canadian market. Because of the small size of the domestic Canadian market, any Canadian firm which wishes to grow into an international class supplier must attempt to expand into the U.S. market. However, because of economies of scale, it is considerably easier for an established U.S. firm to expand into the Canadian market than for a Canadian firm to expand into the U.S, if the products and services sold in both markets are essentially similar. There are also many more large, established U.S. firms than Canadian ones. Internationally successful Canadian firms like I.P. Sharp and Quasar Systems have usually followed a niche-filling strategy.

3.4.4 Regional Characteristics

The bulk of the Canadian demand for informatics equipment, services and products is concentrated in the so-called "Golden Triangle" (Montreal-Ottawa-Metro Toronto and Southwestern Ontario). Therefore, the suppliers are also concentrated in this geographical area. Of the 50 top companies in the Canadian computer industry listed by ERC, 42 have headquarters in Ontario and five in Quebec. The majority of these companies, however, operate on a national scale and many have branch offices in the major cities to handle the marketing, customer support and other service functions, since these require a local presence. In general, production of equipment and certain services can be centralized, but distribution of equipment and delivery of services requires a local presence.

Table 2 illustrates the heavy concentration of computer and office equipment manufacturing in Ontario and Quebec and the very weak share in the other regions. In 1981, Ontario accounted for 69.8% of total shipments, 64.2% of production related employment and 63.0% of total employment; the corresponding figures for Quebec were 28.7% for shipments, 30.9% for production related employment and 25.9% for total employment.

The computer service industry is somewhat more evenly distributed across the five regions (Table 3) than the equipment manufacturing industry. According to Statistics Canada, in 1981 the regional distribution was as follows:

	Total Operating Revenues	Revenues Generated Outside Canada	Employment
Atlantic	1.9%	0.3%	2.1%
Quebec	16.8	11.2	19.0
Ontario	58.4	74.8	55.3
Prairies	15.4	8.7	14.5
B.C.	7.5	5.0	9.1
Total	100.0%	100.0%	100.0%

It is worth mentioning that among the Prairie provinces Alberta dominates the scene while Nova Scotia is the leader in the Atlantic region.

The regional dispersion of the computer service industry is more apparent than real. B.C. Systems Corp., Saskcomp, Manitoba Data Services and Newfoundland and Labrador Computer Services Ltd, which are the chosen instruments for providing the computer services required by the government agencies of their respective provinces, accounted for 16% of the revenues of the top 35 service bureaus in 1982. In the other provinces, such computer services belong to the "in-house" category of activities and is therefore excluded from the commercial market services figure.

Considering the supply of "in-house" computer services, there is some evidence that the Atlantic and Western regions encounter a loss of EDP activities to the firms with headquarters in Ontario and Quebec. In cases where such activities are centralized one could conclude that the more a region like the Atlantic uses computer technology, the more it introduces equipment and services from outside and the more it tends to become dependent on central Canada (and the U.S.). Therefore the arguments that are brought forward about Canada losing revenues and jobs to the U.S. also apply regionally within Canada, particularly to the Atlantic region. Against such potential losses, however, one must offset the benefits to local businesses and the regional economy created by the use of informatics services.

3.4.5 Government Policies and Programs

The federal government is both the single largest producer of information and user of informatics services in Canada. The federal, provincial and municipal levels of government jointly account for 20% of the institutional demand for informatics services. The two senior levels of government, by their policies and programs, are in a position to influence both the demand for and supply of informatics services, products and equipment in Canada. Most current policies and programs, however, are designed to assist equipment manufacturers, rather than software developers or service providers.

The Department of Regional and Industrial Expansion (DRIE) has had some success in promoting a policy of world product mandates for the Canadian subsidiaries of the major multinational equipment manufacturers. Several federal programs designed to encourage the development of "high-tech"

industries can be applied to Canadian equipment manufacturers; these include IRDP (Industrial and Regional Development Program), IRAP (Industrial Research Assistance Program), and PEMD (Program for Export Market Development). Provincial government programs such as Ontario's BILD (Board of Industrial Leadership and Development) have also targeted smaller Canadian firms.

Software developers can benefit from the Small Business Loans Program and, in principle, from the IRDP and PEMD, but the results of direct support to such firms have not been encouraging. The main requirement of such firms, however, is the creation of favourable environmental conditions, through taxation and related measures, which will encourage Canadian venture capital to invest in this area. The situation may be considerably improved if certain proposals before the Department of Finance are incorporated into tax legislation. Coordinated procurement policies by all levels of government can play an important role in stimulating the service bureaux, information retrieval service providers and software developers. Such policies could include not only the contracting out of data processing requirements, whenever possible, but also the development of software modules, systems and packages which could then be turned over to the developers for third-party and general use.

Governments can also stimulate the development of information retrieval services by making unique information available to industry in electronic format; the CANSIM database serves as a good model in this area. This could be combined with the subsidized use, by educational, government and other non-profit organizations, of such service offerings provided by Canadian-owned service vendors.

3.4.6 Prospects and Opportunities

As societies evolve from an industrial to an information-based economy, informatics becomes a key economic activity, spanning across almost all the traditional industrial sectors. It has been predicted that much of the economic growth in the 1980's and 1990's will be dominated by informatics, with office systems, CAD/CAM and robotics, and transactional services being the leading growth areas. There are indications that, at least in the OECD Countries, informatics will become the largest single economic activity by the year 2001.

It must be recognized that Canada has a large and rapidly growing deficit in informatics hardware, and service areas involving software packages and applications. If present trends continue, this deficit could reach $5 billion by 1985. Estimates made by the Office Communications Systems (OCS) Program of the Department of Communications indicate that by 1990 the Canadian office automation market could reach $15-20 billion, with a worldwide market 20-25 times as large. Since systems integration and software development are labour intensive and skill-requiring activities, import substitution and exports in both of these areas would not only lead to employment creation, but would be a positive factor for the balance of trade.

On the equipment side, opportunities for Canadian owned firms seem to be concentrated in niches like the development of specialized or turnkey systems using minicomputers and microcomputers in such applications as office communication systems, financial and library systems, control and monitoring systems, dispatch and enquiry systems for taxis, police, etc., graphic systems,

computer communications switching and network devices. Canadian industry has a good track record in many of these potentially high growth areas. Canada has no comparative advantage in the manufacture of general purpose computer hardware; it is unlikely that major Canadian growth can occur in that area, since it is dominated by large U.S. and Japanese firms.

On the services side, considerable opportunities exist in software development and on-line information retrieval and transactional services. Promising areas include the development of applications packages, especially for minicomputers and microcomputers, creation of courseware for computer assisted learning (CAL), and the production of databases using information created by government agencies and research institutions. All these activities are fairly labour intensive.

The prospects for a more equitable distribution of the Canadian informatics industry among the five regions are not very bright in most areas, but some opportunities do exist. For instance, specific policies could influence the location of some processing service vendors and software product development.

3.4.7 Summary

Informatics or computer/communications is a term relating to the combination of computing, telecommunications, information services and related technologies. Market activities in informatics are subdivided here into the supply of (i) equipment and of (ii) services and intangible products like software packages or databases.

Equipment manufacturing is largely dominated by foreign (mainly U.S.) multinationals; however, some of the Canadian subsidiaries have world product mandates. Canadian-owned firms generally focus on specialized product lines. On the other hand, the service bureau and professional services segments are dominated by Canadian-owned firms (80% of the revenues).

Total Canadian user expenditures on computer/communications products and services were estimated at $7.9 billion in 1982, accounting for 2.3% of the GNP. Projections are for $11.8 billion in 1985 and $19.5 billion in 1990.

Total revenues of commercial computer service suppliers were estimated at $1.65 billion in 1982. It is expected that this figure may increase to $3.06 billion in 1985. The most worrisome aspect of this industry is its contribution to a growing balance of payments deficit amounting to $1.7 billion in 1982 for the hardware component alone. If present trends continue, this deficit could reach $5 billion by 1985.

The development of a strong Canadian industry in the areas of systems integration and software development, both requiring intensive skilled labour,

would be a positive factor not only for the balance of payments, but also for employment creation.

On the equipment side, opportunities for Canadian-owned firms seem to be concentrated in niches such as the development of specialized or turnkey systems based on mini or micro-computers. On the service side, considerable opportunities exist in software development and on-line information retrieval and transactional services.

TABLE 1: Computer Production and Trade of Seven Leading

OECD Supplier Nations (Millions of U.S. Dollars)

Country	Production (1)		Exports		Imports		1981	1981	1981
	1981 Value $M	Compound Growth (%) 1978-81	1981 Value $M	Compound Growth (%) 1978-81	1981 Value $M	Compound Growth (%) 1978-81	A.D.M. (1) $M	Trade Balance $M	Imports A.D.M. (%)
United States	29,525 (57.7)	23.2	8,493 (45.7)	26.5	1,647 (8.8)	29.7	22,679 (44.2)	6,846	7.3
Japan (2)	6,703 (13.1)	17.5	1,204 (6.5)	36.4	948 (5.0)	23.5	6,447 (12.6)	256	14.7
France	4,876 (9.5)	18.1	1,693 (9.1)	20.8	2,079 (11.1)	29.1	5,262 (10.2)	- 386	39.5
West Germany	3,500 (6.8)	13.3	2,326 (12.5)	23.0	2,681 (14.3)	23.1	3,855 (7.5)	- 355	69.5
United Kingdom	2,332 (4.5)	12.2	1,947 (10.5)	15.1	2,231 (11.9)	10.0	2,616 (5.1)	- 284	85.6
Italy	1,188 (2.3)	30.4	887 (4.8)	42.1	1,284 (6.9)	38.4	1,585 (3.1)	- 397	81.0
Sub-total	48,124 (94.0)	20.6	16,550 (89.0)	25.0	10,870 (58.0)	23.1	42,444 (82.7)		
Canada (3)	957 (1.9)	22.9	927 (5.0)	23.5	2,154 (11.5)	28.9	2,184 (4.3)	-1,295	98.6
Est. World Total (4)	51,196 (100.0)		18,595 (100.0)		18,740 (100.0)		51,341 (100.0)		
Est. Share of World Total (%)	(95.9)		(94.0)		(69.5)		(87.0)		

Sources:
1. U.S. Bureau of Industrial Economics: 1983 U.S. Industrial Outlook.
2. Department of Industry, Trade and Commerce: Electrical and Electronics Industries Statistical Summary, 1982

Notes:
1. Apparent Domestic Market (ADM)= Production (=Shipments) + Imports - Exports.
2. Does not include parts.
3. Canadian figures converted to U.S. dollars assuming $1 Canadian = .0834 U.S.
4. Does not include Eastern Bloc countries.
5. Figures in brackets are percentage shares.

TABLE 2: Office and Store Machinery Manufacturers (SEC 318)

Principal Statistics, By Region, 1981

Item	B.C., Yukon, N.W.T.	Central Region	Ontario	Quebec	Atlantic Region	Canada
Number of Establishments	6	3 (1)	46	16	-	71
% Total	(8.5)	(4.2)	(64.8)	(22.5)		(100.0)
Manufacturing Activity						
Number of Employees	X	X	4,214	2,029	-	6,568
% Total			(64.2)	(30.9)		(100.0)
Wages ($000s)	X	X	81,665	27,642	-	114,890
% Total			(71.1)	(24.1)		(100.0)
Value of Shipments ($000s)	X	X	799,856	329,525	-	1,146,511
% Total			(69.8)	(28.7)		(100.0)
Total Activity						
Number of Employees	X	X	10,176	4,186	308 (2)	16,161
% Total			(63.0)	(25.9)	(1.9)	(100.0)
Salaries and Wages ($000s)	X	X	219,527	76,361	6,990 (2)	333,800
% Total			(65.8)	(22.9)	(2.1)	(100.0)

Source: Statistics Canada Catalogue 42-216
Office and Store Machinery Manufacturers, 1981

Notes:
1. No establishments are reported in Alberta.
2. There are no establishments in P.E.I. Data for Newfoundland is considered confidential.

X = Not reported; - = none.

TABLE 3: Computer Services Industry

Summary Statistics, By Region, 1981

Item	B.C.,Yukon, N.W.T.	Central Region	Ontario	Quebec	Atlantic Region	Canada
Number of Establishments	201	242	630	273	46	1,392
% Total	(14.4)	(17.4)	(45.3)	(19.6)	(3.3)	(100.0)
Total Operating Revenues ($000s)	82,400	170,320	643,598	185,320	20,605	1,102,243
% Total	(7.5)	(15.4)	(58.4)	(16.8)	(1.9)	(100.0)
Revenues Generated Abroad ($000s)	2,946	5,140(1)	43,763	6,600	X	58,764
% Total	(5.0)	(8.7)	(74.5)	(11.2)		(100.0)
Number of Paid Employees	1,868	2,981	11,326	3,894	426	20,495
% Total	(9.1)	(14.5)	(55.3)	(19.0)	(2.1)	(100.0)
Employee Expenses ($000s) (2)	38,995	65,316	252,549	85,666	8,988	451,314
% Total	(8.6)	(14.5)	(56.0)	(19.0)	(2.0)	(100.0)
All Other Expenses ($000s)	34,980	79,544	300,317	78,298	9,040	502,179
% Total	(7.0)	(15.8)	(59.8)	(15.6)	(1.8)	(100.0)
Total Operating Expenses ($000s)	73,975	144,860	552,866	163,764	18,028	953,493
% Total	(7.8)	(15.2)	(58.0)	(17.2)	(1.9)	(100.0)

Source: Statistics Canada Catalogue 63-222
Computer Services Industry, 1981

Notes:
1. Export revenue for Alberta only. Data for Manitoba and Saskatchewan are confidential
2. Employee Expenses = Salaries and Wages + Employee Benefits

3.5 Space

3.5.1 Description

The Interdepartmental Committee on Space defines space activities as "research or other operations conducted above 50 km altitude by means of rockets, balloons, satellites, manned space vehicles, or other devices, and including any associated ground-based activity".

The key parts of the space sub-sector in Canada are the equipment manufacturing and supply industry, satellite system operators and service providers, and government.

The Canadian equipment manufacturing industry has the technical capability of providing almost all the products required for use in both the space and ground segments of satellite communications, remote sensing receiving and interpretation, and scientific studies related to upper atmosphere studies. The leading company in this category is SPAR Aerospace which acted as prime contractor for the ANIK-D series of satellites and has won a number of major international contracts, including a prime contract for the Brazilian domestic satellite system. Other Canadian companies have provided some 200 major earth stations in nine countries. The satellite service providers are Telesat Canada for domestic services and Teleglobe Canada for international services. The federal government owns 50% of Telesat and the carriers own the other 50% of the company.

Teleglobe Canada provides international telecommunications services to Canadian users via terrestrial, submarine cable, and satellite links. Teleglobe Canada is the Canadian signatory to the International Telecommunications Satellite Organization (INTELSAT) which operates a global public telecommunications satellite system and is also the signatory to the International Maritime Satellite Organization (INMARSAT), established in 1979 to provide maritime satellite communications services.

In Canada the federal government plays a major role in space activities. The early satellites were developed and built in government laboratories. As technology transfer to industry took place, and as the industry matured, direct government technical involvement lessened. The government's involvement at the present time is concentrated in such areas as: (i) the conduct of concept and feasibility studies for new satellite systems; (ii) the provision, on a cost-recovery basis, of satellite integration and testing facilities at the David Florida Lab; (iii) the provision of financial incentives to Telesat Canada to increase the Canadian content of its satellites; and (iv) international marketing support.

A number of Canadian universities conduct research in areas applicable to space. These activities include work in the three major areas of Canada's overall space program - scientific research, remote sensing, and communications. As would be expected from university programs, the emphasis of university space work is more on research than on immediate practical applications in the fields of remote sensing and communications. Research work covers a wide range of disciplines but tends to be concentrated in physics.

In the context of this environmental assessment, the space sub-sector is, in fact, composed of distinct elements of the telecommunications carriage and the broadcasting sub-sectors. It is treated separately because the space equipment manufacturers and service suppliers are a recognizable sub-group, the space telecommunications carriage and broadcasting elements share a common industrial base, and the space sub-sector provides distinct market opportunities and problems.

3.5.2 Economic Indicators

The total value of space-related sales by Canadian manufacturers reporting to the Canadian Space Information Bank was $180 million in 1982. About 80% of the sales are considered Canadian value added. These sales were 40% domestic and 60% export although in any year this can vary from 30/70 to 50/50 depending on the influence of large contracts. Space segment sales accounted for 60% of sales and the ground segment for 40%. These statistics do not reflect the recently developing market for privately owned satellite television receive only terminals (TVRO'S). This market is providing an opportunity for small business development in the area of retail sales, system assembly, and installation. A significant percentage of the electronic components to serve this market is imported.

Telesat Canada's operating revenues in 1982 were $59 million, up by $7.8 million from 1981. Net earnings rose from $15 million to $16.7 million. Capital expenditures in 1982 were $99.5 million compared to $80.9 million in 1981. Of the 1982 capital expenditures, $72.4 million were related to the space segment and $27.1 million were for the earth segment. 1982 represents the peak year for capital expenditures in the current cycle of bringing on

stream the new ANIK-C and ANIK-D satellites. Capital expenditures for 1983 are forecast at $50 million.

Teleglobe Canada had operating revenues in the year ending on 31 March 1983 of $174 million, including $8.8 million net revenue from space operations through Intelsat. Net income in 1982-83 was $54.6 million.

In the past decade, expenditures by the federal government on space-related activities have grown from $24.2 million in 1971-72 to $136.9 million in 1982-83. This represents a nominal growth of 460%, or 125% in real terms. Federal involvement is spread over several departments. The Department of Communications was responsible for the largest share of expenditures in 1982-83 (50%), with Energy, Mines and Resources (31%), and the National Research Council (NRC) (16%) being the other two groups incurring major proportions of the government's space-related expenditures.

The total space-related employment in the Canadian equipment manufacturing industry was about 2,500 in 1982. Approximately one-half of the total employment was in space communications equipment, one-third in remote sensing and the remainder in space-sciences applications. Telesat Canada employed 482 people at the end of 1982, and Teleglobe Canada had 1,391 employees as of 31 March, 1983.

3.5.3 International Market

Civil space activities worldwide can be divided between domestic systems and international systems.

In telecommunications, INTELSAT and INMARSAT are the two major international organizations which own and operate satellite systems providing the international links in telecommunications systems outside the Soviet bloc.

INTELSAT operates an intercontinental satellite system for voice and data transmission, and television signals while INMARSAT provides maritime satellite communications. About 1700 vessels, including drilling rigs and ships currently use INMARSAT service. Spar Aerospace has been awarded sub-contracts for the INTELSAT VI series of satellites and Canadian ground stations are built by Canadian suppliers.

A number of countries have domestic space programs. Countries such as Indonesia and Brazil presently, or soon will, own and operate domestic communications satellite systems purchased internationally. These systems often include satellites, associated ground terminals, training, and other related aspects. Several other countries such as Nigeria, Columbia and South Korea are at various stages in the process of obtaining domestic or regional systems.

Other countries have domestic industrial space sectors which can supply some or all of the space-segment and ground-segment equipment necessary to meet the needs of space service suppliers. They generally favour domestic suppliers. The U.S.A. and several European countries are in this category and Canadian space segment opportunities are restricted to sub-contracts.

The European Space Agency (ESA) is an organization of eleven European countries with full membership and three other nations (including Canada) with varying degrees of association. Canada also has a share in the L-SAT program to develop and build the solar panels.

3.5.4 Regional Characteristics

Over half of Canada's space industry is located in Ontario. Thirty of the 50 companies reporting to the Canadian Space Industry are based in that province and accounted for 53% of the Canadian total value of sales in 1982.

With the major proportion of Spar Aerospace's satellite production activity located in Quebec, an increasing proportion of space-related activities are occurring in that province. The total value of Quebec's share of national space-related sales rose from 21% to 31% between 1981 and 1982.

Space-related industrial activity in the Atlantic provinces is negligible and is restricted to TVRO retail sales.

The western provinces account for approximately 15% of the total sales in the industry with 70% of this originating from B.C., largely through MacDonald Dettwiler and Associates Ltd. A new opportunity now emerging is the "Spacetel" product being marketed by AEL Microtel of Burnaby. With the potential of a significant international market developing over the next few years it is likely that space industry activity will become an increasingly important feature in the B.C. economy.

The ground segment for privately owned TVRO's has been a growing area of activity over the past couple of years. There is considerable small business involvement in the construction of satellite antennae, assembly of TV earth station receiving systems, and sales and servicing. The recent authorization of TVRO's for private use and the steady fall in prices have stimulated the market, particularly in the North and in isolated areas.

Research activities in the space sub-sector tend to be concentrated in Ontario. The location of DOC's Communications Research Centre in the province acts as a stimulus and catalyst for research initiatives by provincially based institutions. Microtel Pacific Research in B.C. conducts some work in the space communications field and the Saskatchewan Research Council has been actively engaged in space research, including data platform research.

3.5.5 Government Policies and Programs

Government support policies have been a major factor in permitting the Canadian space industry to mature to the point where Canadian firms are able to successfully compete in international markets for large earth stations, satellite components, complete satellite systems, and specialized technology such as the Remote Manipulator Arm (CANADARM) used in the U.S. Space Shuttle Program.

The original policy of developing new technologies in government laboratories has given way to a contracting out policy permitting the industry to be more knowledgeable about new technologies through direct experience.

In 1972, the David Florida Laboratory was established at the Communications Research Centre. This facility is capable of final assembly and integration and environmental (thermal and vacuum) testing of large satellites.

The Telesat Canada Act requires the company to "utilize to the extent practicable and consistent with its commercial nature, Canadian research, design and industrial personnel, technology and facilities in research and development connected with its satellite communication systems and in the design and construction of the systems". To some extent, the high levels of Canadian content in the ANIK-C and -D satellites have been achieved through the payment by the Government of Canada of premiums to Telesat based on the achievement of Canadian content goals. Telesat Canada is subject to regulation by the Canadian Radio and Television and Telecommunications Commission (CRTC).

The government also provides international marketing support of a political nature, and assists in the financing of export sales.

3.5.6 Prospects and Opportunities

The space segment of the industry is internationally competitive in terms of technology, expertise, and production capabilities. However, purchasing decisions in the international market place are subject to political interests thereby making the future export market unpredictable over the longer term. Substantial government marketing support, both political and through the provision of financing will continue to be required, raising the question as to whether in an increasingly competitive international environment, significant net economic benefits will accrue to Canada from the space industry.

Although space is a growing industry now, it is not widely anticipated that the future TVRO ground segment market will provide much opportunity for Canadian manufacturers due to increased international competition. It is predicted that the electronic parts of satellite antennas will largely be supplied by Japanese companies. DBS is not anticipated to become a reality until the end of the decade at the earliest.

Communications satellites are already fully integrated into the domestic and international telecommunications systems and will remain so for the foreseeable future. Future growth will be dependent on cost competitiveness with terrestrial modes, both existing and future, such as fibre optics.

Domestically, three major satellite programs are in the early study stages -- Direct Broadcast Satellites (DBS), Mobile Communications Satellites (MSAT), and Remote Sensing Satellites (RADARSAT). Because communications satellites (except Mobile Satellites) represent a mature technology in a competitive environment, a DBS system would go ahead if the commercial market was sufficiently large to support it, with government as one possible client to achieve social policies related to equity in the availability of broadcasting services to all Canadians, and in improving telecommunications services to remote areas in support of economic, social and sovereignty goals.

MSAT and RADARSAT are proposed as experimental and demonstration systems, but if the first satellites are launched and prove successful, subsequent satellites of either type would likely be required to operate on a commercial basis.

Canada has signed a cooperative agreement with the European Space Agency (ESA). This has led to a contract being awarded to SPAR Aerospace to develop and build the solar panels for the L-SAT satellite bus. Future sales of solar panels are directly dependent on sales of L-SAT by the ESA.

A.E.L. Microtel of B.C. has recently begun to market its "Spacetel" remote telephone link via satellite. This product has bright prospects both domestically and internationally.

Annual sales growth rates for the next few years are forecast by the industry to average about 30% leading to total annual sales of some $400 million by 1985.

The federal government's space plan calls for expenditures of $136 million in each of the fiscal years 1982/83 and 1983/84, and $106 milion in 1984/85 in a wide range of activities in the communications, remote sensing, and space science fields.

3.5.7 Summary

The space component of the communications sector should properly be considered as part of the telecommunications carriage and the broadcasting sub-sectors. It is treated separately in this report because of its unique characteristics and the relative ease of defining the space industry, separately from other aspects of telecommunications.

The three major elements of the space sub-sector in Canada are: (i) the equipment manufacturing and supply industry, (ii) the satellite system operators and service providers, and (iii) government.

The space equipment manufacturing industry in Canada has the technical capability of providing almost all the products required for use in both the space and ground segments of Canada's space activities in communications, remote sensing, and scientific studies.

Satellite communications services are provided by Telesat Canada domestically and Teleglobe Canada internationally through its membership in international telecommunications bodies.

The federal government played a major role in the development of the first Canadian satellites and continues to provide crucial financial and

technical support to the Canadian space industry.

In 1982, space-related sales by Canadian manufacturers were estimated at $180 million, about one-half of which were in the communications field. Total employment in the industry was estimated at 2500. Also in 1982, Telesat Canada had operating revenues of $59 million, net earnings of $16.7 million, capital expenditures of $100 million, and employed 480 people. Teleglobe Canada had net revenues of $8.8 million from its space operations through INTELSAT.

Federal government expenditures on space-related activities were $136.9 million in 1982/83, one-half of which was spent on the activities carried out by the Department of Communications.

The Canadian space industry is concentrated in eastern and central Canada and with significant activity in the western provinces.

4.0 Conclusions

For the purpose of this report the communications sector includes: (i) the provision of telephone services and the manufacturing of telecommunications equipment for those services; (ii) the provision of radio, television broadcasting, and CATV services and the manufacturing of the required equipment; (iii) the motion picture industry, the audio and video production, distribution, and exhibition industry, videotex and teletext content, and book, magazine and newspaper publishing and distribution; (iv) informatics services and manufacturing; and (v) satellite communications and other space-related activities.

It is apparent that this sector is very much varied at all levels. Nevertheless, it has some unique characteristics. First of all it is the industrial sector in which by far the highest concentration of high technology is found. Then, it is a sector which has had high growth rates through the economic upheavals of the seventies and early eighties. At the same time this sector, through the technology revolution of the information society, has gone and is still going through fundamental structural changes. Finally, the sector is playing an increasingly predominant role in virtually all economic activities. At the industry level, telecommunications are ever present as the nerve of our economy and informatics is also penetrating every sector where it plays an increasingly important role. The same holds at the consumer level, not only through book, magazine, and newspaper publishing activities which penetrate almost every home but also through radio and television. The CBC reports the average Canadian spends 18 hours a week listening to radio and 23 hours watching television.

To illustrate the diversity of the sector, one can indicate that some of its sub-sectors are regulated while others are not; telecommunications is an example of the former while informatics is an example of the latter. Furthermore, regulation can be uniform across the sub-sector, as is the case of broadcasting and CATV or it can vary with the region, the province, and even the municipality, as is the case of telecommunications. In terms of manufacturing, in telecommunications one Canadian multinational enterprise, Northern Telecom, is larger than the whole Canadian market while in informatics the leading firm, IBM Canada Ltd., is the subsidiary of an American multinational. The whole of the broadcasting and CATV manufacturing sub-sector is smaller than telecommunications equipment manufacturers such as AEL Microtel and Mitel, yet this group includes a great number of small firms. Some industries in the sector import the bulk of their equipment requirements while others mostly use domestically produced equipment. In this context, telecommunications manufacturing is contributing to a large balance of trade surplus while informatics equipment contributes to a massive and rapidly increasing trade deficit. Vertical integration is the main characteristic of the telecommunications manufacturing industry: the two largest manufacturers, Northern Telecom and AEL Microtel, are subsidiaries respectively of Bell Canada and B.C. Tel. In informatics, the market activity as observed through operating revenues grossly underestimates the actual economic activity. On the other hand, the two are closely matched in the telecommunications sub-sector. In some sub-sectors, the government plays an active role at the policy level, such as the case of broadcasting, or through programs and direct participation as in space. In others, the government role has been very limited; hence in informatics, it has generally been restricted to encouraging foreign multinationals to produce equipment in Canada for which the Canadian

subsidiary would have a world product mandate, or to participate in firms such as AES.

The forms of ownership vary significantly between sub-sectors. It is largely Canadian in the content/broadcasting service sub-sector, two-fifths of which is accounted for by the CBC. Canadian ownership is predominant in carriage/telecommunications, with an active government participation at the federal level (Teleglobe and CNCP), at the provincial level (Alberta Government Telephone), and at the municipal level (Edmonton Tel). It is almost exclusively foreign in informatics equipment manufacturing. In most sub-sectors, there is less concentration at the manufacturing level than at the service level.

It is in the communications sector that the second largest privately owned Canadian firm, Bell Canada, is found. The largest high-tech manufacturer, Northern Telecom, the largest privately financed and owned research laboratory, Bell Research (BNR), and the largest concentration of sectoral and privately financed R&D in Canada are all in this sector.

The overall annual growth rate of the sector is estimated to be in the 10-15% range, with an annual growth rate of 20-25% in informatics. As such this is one of the fastest growing areas of the Canadian economy. The prospect of the sector throughout the eighties is excellent. While the sector as a whole is likely to remain as presently defined, many of the boundaries between the sub-sectors can be expected to become blurred and in some cases to disappear. This is already a reality in computer/communications with the merging of computer applications and telecommunications. It will be a reality

in broadcasting equipment which is already becoming digital.

At the service level, the regional distribution is generally even. Thus, in spite of some differences in rates and in the quality of service, telephone services are of a very high quality throughout the country, including the Yukon and the North West Territories. Much of the observed differences appear to be due more to greater urbanization of certain regions such as the Québec-Windsor corridor and Vancouver. At the manufacturing level a disproportionate fraction of the sector is found in the Québec-Windsor corridor, especially in Ontario. The high-tech nature of the industry is likely to increase that concentration with Vancouver and Saskatoon being the other regions to significantly benefit from the expected rapid growth of the communications equipment industry.

APPENDIX A

PROVINCIAL ECONOMIC OUTLOOK

APPENDIX

PROVINCIAL ECONOMIC OUTLOOK[1]

1.0 Introduction

The economic recovery forecast for Canada in 1984 is expected to affect the provinces unevenly. While Saskatchewan and Nova Scotia, relatively insulated from the 1982 recession, are expected to continue to exhibit strongest economic growth, the other provinces except for Alberta will likely fare well in the recovery. The levelling-off of energy prices, while contributing to the recovery elsewhere in Canada, has had adverse effects on Alberta. The following gives a province-by-province assessment of the economic outlook in the next couple of years.

2.0 Provincial Economic Outlook

2.1 Newfoundland

Newfoundland felt the effect of the worldwide decline in industrial activity directly and dramatically in the form of vastly reduced demand for its iron ore. Steel production sagged badly in the United States, Europe and Japan, the largest markets for Newfoundland's dominant mineral export.

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1. This appendix is an assessment of the economic outlook of the provinces of Canada prepared by the Conference Board of Canada in October, 1983. It is attached to the present report as a reference only. As such, it does not represent the official view of the Department of Communications nor that of the Government of Canada. This document will be replaced by the Medium Track paper being prepared by the Ministry of State for Economic and Regional Development when it becomes ready in 1984.

Provincial mining output fell by 40 per cent last year and is not expected to recover in 1983. Overall production of goods and services will increase this year however, as residential construction and consumer buying respond to government incentives, lower interest rates and moderating inflation. Fishing and fish processing play a depressing role on Newfoundland's economy this year. Markets for fish products are weak, inventories are high and the larger fishing companies have suffered disrupted operations due to financial problems and delays in reorganization plans.

Newfoundland's prospects improve markedly in 1984, whan a 4.1 per cent growth rate is forecast. Offshore drilling activity is predicted to revive, giving the mining sector its first year of notable advance since 1979. A restructured deep sea fishing industry will enable Newfoundland to capitalize more fuly on its other source of offshore wealth. On land, forestry will experience a delayed recovery from some of its 1981-82 losses.

2.2 Prince Edward Island

For most provincial economies, last year's drop in production represented an abrupt and shocking change in direction. For Prince Edward Island, the drop was merely a severe manifestation of a trend which began in 1980 -- a trend of decreasing output. The 1983 forecast indicates a break in this trend, with production forecast to rise by more than 2 per cent. High potato prices and the promise of an abundant harvest will boost farm income, while a stunning 35 per cent increase in the lobster catch will swell fishermen's earnings. Islanders are showing no reluctance in spending these

extra dollars. Wholesale and retail trade activity is consequently forecast to increase by more than 8 per cent in real terms this year, as many of the purchases postponed during 1980, 1981, and 1982 are made in 1983. Growth is forecast to subside somewhat in 1984 with the abatement of this year's powerful impetus from rapidly increasing farm and fishing incomes.

2.3 Nova Scotia

In the midst of the national economic decline last year, construction activity in Nova Scotia continued to expand and offshore drilling propelled the province's mining sector forward. These forces allowed Nova Scotia to escape the worst of the recession, a fact that was readily apparent to those living both in the province and outside. In the first six months of 1983, migration to Nova Scotia from other provinces has increased, while the numbers leaving Nova Scotia for other parts of the country has fallen. For the first time since 1976, Nova Scotia gained population through interprovincial migration during the first half of this year. This additional population, and the optimism generated by the accelerating pace of offshore exploration, has stimulated most sectors of Nova Scotia's economy -- particularly construction and service industries. Overall growth is expected to reach 3.5 per cent in 1983, the fastest in the nation. This year's momentum will carry over into 1984, when a further 3.1 per cent advance in expected.

2.4 New Brunswick

Two restraining factors on New Brunswick's output growth in 1981 and 1982 -- the forestry and manufacturing sectors -- have both turned the corner

this year and are begininning the long climb back towards production levels achieved prior to the recession. Related service industries, such as transportation and wholesale trade are responding favourably as well. Offsetting these strengths to some extent, are the mining sector, where no output gains are expected, and non-residential construction, where a number of larger projects were completed in 1982, leaving a hole in this year's construction calendar. On balance though, New Brunswick is forecast to expand real output this year by 2.3 per cent, exceeding the national increase. Next year the province will again exceed the Canadian average advance with 3.4 per cent growth predicted. The mining sector will be a major contributing factor. New Brunswick's first potash mine will provide a full year's production in 1984 and improving copper prices should justify re-opening the province's second largest metal mine.

2.5 Quebec

Quebec has certainly provided the greatest surprise of any provincial economy this year. Many impediments to economic recovery stood in Quebec's way at the beginning of 1983. Its concentration on iron ore and asbestos mining placed it at a disadvantage since these two minerals have not shared in the general recovery in demand for resource products. Household income also suffered as a result of the public sector wage rollbacks in the first three months of the year. Nevertheless Quebec appears to have led the way in the early stages of the recovery. For the year as a whole, the province's economy is forecast to grow by 3.0 per cent, second only to Nova Scotia. Quebec's manufacturing sector, battered so hard by the recession, rebounded sharply in

the early months of 1983. After this initial catch up burst wears off, slower but steady improvement will continue, giving the province's manufacturing industry a 7.5 per cent advance in 1983, fastest in the nation. Fears of consumer retrenchment in the face of wage rollbacks have proven unjustified. Retail sales increased faster in Quebec than in the country as a whole in the first quarter of 1983, indicating that savings rather than spending bore the brunt of the adjustment to lower incomes.

After passing through the perilous conditions of early 1983 with its economy performing well, Quebec should enjoy smooth sailing for the rest of this year and next. Even though this forecast has not incorporated the effect of the recently announced helicopter plant investment, Quebec's production is still forecast to grow by more than 3 per cent in 1984.

2.6 Ontario

In three recent recessions -- 1975, 1980 and 1982 -- Ontario has seen its real output slip below the previous year's level. The most recent recession however, was much more severe than the others. Output fell in 1982 by over 4 per cent, as compared with less than one half per cent in 1975 and 1980. The depth of Ontario's 1982 recession is emphasized by the fact that two years of reasonably healthy growth -- 2.7 per cent in 1983 and 3.0 per cent in 1984 -- will be required to bring provincial production above its pre-recession level. This growth will come principally from the goods-producing industries in 1983 -- notably from forestry and mining which fell badly last year. Manufacturing industries will also make a large contribution to the recovery, as will the wholesale and retail sector.

Business oriented service industries (finance, consulting, advertising, computer service bureaus) will pick up strength in 1984. This service sector acceleration will offset the slower output growth forecast for forestry and mining. Manufacturing industries will continue to expand production approximately at their 1983 rate again next year. Consumer spending in Ontario, however, has already enjoyed the best of its recovery and the trade sector is consequently expected to grow at a considerably slower rate next year.

2.7 Manitoba

While Manitoba escaped the worst of the national recession last year, it is not expected to enjoy the full benefit of Canada's recovery in 1983. The countercyclical performance of the province's farm sector is a crucial element in the explanation of Manitoba's subdued version of the national economic swings. In 1982, when most industries cut production, farm output in Manitoba grew by nearly 9 per cent, to a new record level. This year, agricultural production is expected to dip slightly, thereby dampening overall growth. But agriculture is by no means the only restraining influence. Manufacturing industries in Manitoba are forecast to experience a second year of declining activity in 1983, while in other provinces with important manufacturing sectors (Quebec, Ontario, British Columbia) a strong resurgence in manufacturing is predicted. In 1984, both manufacturing and agriculture are forecast to post advances, and service industries will echo this strength. The overall increase in production forecast for Manitoba next year, 2.9 per cent, is limited by a drop in construction activity associated with reduced residential building.

2.8 Saskatchewan

The claim that the country had a recession but Saskatchewan decided not to participate is borne out in large measure by Conference Board estimates of provincial real domestic product in 1982. Production in Saskatchewan fell by only 1.1 per cent as compared with the 4.6 per cent national decline. A closer examination of the figures reveals that certain industrial sectors hit hardest at the national level (forestry and manufacturing for example) had comparable problems in Saskatchewan. However, the damage these industries inflicted on Saskatchewan was limited by their small share in overall provincial activity. Agriculture, on the other hand, which showed output gains at both the national and provincial levels last year, plays a much larger role in Saskatchewan's economic fortunes than it does in Canada.

Saskatchewan is forecast to exceed the national growth rate again in 1983 and 1984. The comparative provincial strength in these years, unlike in 1982, rests on superior performance of certain industrial sectors in Saskatchewan and not merely on its mix of industries. Demand for heavy oil has improved dramatically in 1983 and is forecast to remain strong next year. Potash production is also forecast to recover from the depressed levels observed earlier this year. Construction industry gains in 1983 have been impressive, particularly against the background of a flat national performance. This pattern of construction activity more robust than the national rate is predicted for Saskatchewan once more in 1984.

2.9 Alberta

The soaring energy prices of the 1970's served as the principal driving force behind Alberta's extraordinary economic expansion. In 1982 and early 1983 world oil prices fell, and it now appears that projections of price increases well in excess of the general rate of inflation will not be realized. Alberta's economy is thus faced with the problem of adjusting to a very different and unfavourable economic environment. In 1982, this adjustment took the form of a massive retrenchment in consumer spending and a major cut in construction activity for the first time in over a decade. Manufacturing industries in Alberta rely heavily on the province's consumers and building contractors as customers, and when these customers stopped buying, manufacturers were forced to curtail production by nearly 18 per cent. Expansion of public services continued, however, and the overall drop in production was restricted to 4.4 per cent, less than the national average. The construction, trade and manufacturing sectors will continue to adjust their levels of activity downward this year, but the rate of descent will be much slower than in 1982. As a result, Alberta's production losses will be considerably milder, at less than one per cent. By 1984, construction, trade and manufacturing will begin to grow once more. Construction in particular provides an example of the nature of adjustment required. Building of "mini" mega-projects, provide a basis for modest gains, but they do not return the province to the heady days of the 1970's, when double digit real growth rates in construction activity were the rule.

2.10 British Columbia

Goods-producing industries in British Columbia are forecast to advance by 5.5. per cent in 1983, but the province's service sector is predicted to experience a second year of declining output. As a result, overall growth will reach only 1.2 per cent this year. Goods-producing industries are all projected to surpass their 1982 output levels, with the greatest gains evident in forestry and wood-products manufacturing. But the service industries will be held back by a decline in tourism and public sector restraint measures. In 1984, British Columbia's growth will pick up sharply, to a 4.1 per cent gain. Both goods-producing and service industries will expand, the former by over 4 per cent. Instrumental in the turnaround forecast for services that are province's consumers, who will finally provide an impetus to overall growth. The wholesale and retail trade sector is forecast to expand by 6.6 per cent in 1984, playing the role of a growth leader. In 1981, 1982, and 1983, a sluggish trade sector held back overall growth. Next year's strong expansion in consumer spending arises from British Columbians finally making purchases postponed for several years while they awaited better economic times.