

State's Science And Technology Policy In Shift To Knowledge Based Economy

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Abstract: In new techno-economic development paradigm ,new managerial role, brought about by rapid technological change(information revolution), has been articulated as the only effective role left for national governments. The traditional role of central macro and micro-economic management of national economies has become obsolete. The role of government as facilitator and catalyst in technological development has assumed a more important role in today's global economy.In this context, I will examine how Canadian state has responded to increase competitiveness in high-tech industries after along period of stagnation, through its technological andinnovation capability from early 1970s until recently.
Introduction:By the mid-1960s the relationship between the science and the state became closer. Publicly funded research budget expanded rapidly in the wide spread belief that the same approach to scientific research would advance national interests. An extensive research infrastructure was built for the advancement of knowledge and protection of public interest. The concomitant price of very expensive, collaborative, mega-science proposals to government increased particularly since 1980s. New kinds of collaborations and institutes have been established. Throughout the 1980s high tech industries in North America, Europe, and Asia have developed because of government involvement the style of government involvement have varied, but government business and university interaction has played always a critical role. In a sense, then government has been instrumental in shifting the industrial profiles of countries away from low knowledge and in so doing have helped improve standards of living. Moreover, government's sponsorship of research, training and education has been a major boom to the development of new industries and jobs.

There are three important thrust that forced Canada to adopt high technology strategies. The first one was when President Nixon unveiled his program of devaluation and protectionism on August 15, 1971 Canadian leaders were shocked to discover that United States had unilaterally change the implicit rules that had governed Canadian - U.S. relationship. United States was declaring Canada to be independent. (Cohen: 1991, pp. 106) Nixon introduced tax legislation in 1971 that discouraged US investment abroad by providing 7 percent tax credit on foreign sales. These measures were combined with a 10 percent surcharge on imports to the United States, from which Canada eventually was exempted but which highlighted Canada's fragile economic position. Such U.S. policies increased Canadian determination to reduce reliance on American trade and investment flows. (Jenkins: 1992; pp.124) Unable to secure an exemption from the economic body of Nixonomics, through the government found itself forced to shift towards a more national approach in its accumulation strategy. A state finance holding company, the Canada Development Corporation was set up to channel national capital into indigenously owned enterprises and reduce the proportion of the economy controlled by the

foreign corporations. Supporting the same trend to increase national control of the economy, the government created foreign investment to reduce the cost and increase the benefits accruing from direct investment in Canada. (Cohen: 1991, pp.106)

The second one was related with the emergence of problems in Canada's resource based economy. Important problem with the resource based economic development is staple trap. The economic surplus earned in staples traded opened the number of potential alternative paths to development: industrial diversification to ISI, a switch to new resource export staple or a **“staple trap”** of continued reliance on a declining resource base. Canada's falling into staple trap predisposed the development of inefficient, non- innovative and backward industrial structures with a penchant for dependence on foreign capital. (Albo& Jenson: 1997, pp.220)

Whereas the earlier staple demanded commercial capital and investment infrastructure, staples of twentieth century, namely, mining forest products, pulp and paper, hydro, oil, gas but not wheat, had required enormous investment and fixed capital leading to massive importation of capital goods and foreign investment. In this manner Canada became addicted, to the economic steroids of mega projects for employment and foreign debt for capital Canada's long recognized reliance on exports had intensified existing problems of structural and regional imbalance. The major non-renewable staple industries are oil and gas. In the base metal mining industry known resources have been declining since the early 1980s. At the same time employment in the industry fell by 24 percent. While coal reserves are adequate, exports are plagued by high transport cost, poor quality and stagnant prices. Given the recent environmental concern with acid region the future world coal market does not appear very bright. And also Canada is becoming a high cost producer. In the case of energy exports (oil and gas) the long term prospect are equally dim. According to production of relatively cost, conventional crude oil, according to a National Energy Board forecast is to decline by around 70 percent by the end of the century. In the long term even with some increase in the utilization of hard wood forest reserves Canada will face a major challenge in sustaining and increasing her forest harvest. Already B.C sawmills have been forced to close because of scarcity of logs. Consequence of dependence on resource exports has been underdevelopment of capital goods sector in Canada, which is demonstrated by the reliance on high tech products and industrial machinery. Even in agricultural machinery, where Canada was an industrial leader imports exceeded exports by more than three to one in most recent three years period. Canada's deficit in service sectors have been escalating rapidly. Deficit is particularly large in payments related to technology and to management services. (Phillips: 1991; pp,232-233)

This basis of development is also be challenged at an increasing rate by technological substitutes (such as fiber optics for copper cable) and by lower priced competitors in commodity markets. (Britton: 1996; pp. 16)

From within the state sector the alarm was sounded by Science Council of Canada, which warned that Canada's branch plant model of development was causing technological entropy through truncated industries with a low technological capability becoming cumulatively dependent upon foreign industries.

The recent and fundamental advances in science and technology during 1980s and 1990s have also weakened the long standing relationship between national economic prosperity and natural resources. Prosperity has become contingent on the basis of nation's knowledge and intellectual capability in science and technology. The basis of trade between nations and the regions and the wealth to be derived from it have also changed and increasingly reside in the quantity and richness of human skills and intellectual resources, which shows the shift towards knowledge based economy.(Britton&Gilmour&Smith&Steed:1996,pp.433)

Third important impetus is the impact globalization and information revolution brought by liberalization of trade and capital markets, removal of barriers to trade, internationalization of production and technology, dramatic declines in computer processing costs and transmission costs. In this new environment, knowledge has become very critical asset in the economy. Nations' economic prosperity now contingent on their ability to innovate continually and broaden their knowledge base. In the new growth theory knowledge is important to increase the productivity and crucial element of comparative advantage of the nations.. As Newton, Lee-Sing and Gera indicate in their paper: "Industrialized economies are being transformed by the increasing emphasis on cognitive skills , on the development of the ideas, the assimilation of technologies and participation in international networks for the exchange of products and knowledge. Knowledge-based activities, which include high-tech manufacturing along with finance, insurance and business services dramatically increased in industrialized countries."(Lee-Sing, Gera&Newton:1998,p.1) Thus in the last decade of the twentieth century, as Andrei Sulzenko argues, creation of wealth is increasingly dependent on the effective management of knowledge, that is the organisational capability to create, acquire, accumulate, disseminate and exploit information and knowledge.(Sulzenko:1998, p.286)

Following a change in federal administration in 1984 the S&T policy debate became much more attuned to economic imperatives and nation building objectives.(Dufour: 1994, p.26). Federal government through the Ministry of State for Science and Technology, began a concerted process along with other governments to develop national policy for science and technology. At the center of national of National Policy is the recognition that there is a necessity to take into account of federal and provincial and territorial priorities. Dufour and Gingras in their analysis of National S&T Policy they point out the partnership spelled out by the Council of S&T Ministers (Dufour&Gingras:1988, pp.16) The new government's first term saw the launch of free trade negotiations and the introduction of a deficit reduction program, the results of the Royal Commission on the Economic Union and Development Prospect for Canada (the MacDonald Commission) and considerable energy devoted to a national approach to S&T. In 1985, Ministers of Science and Technology (MOST) reported a working paper entitled Science Technology and Economic Development

In 1986 Science Council of Canada undertook the evaluation of effectiveness of public sector funding in Canada. Evaluation concluded that direct transfers from the government to the business sector, excluding tax incentives , had played a minimal role in increasing industrial R&D in Canada. On March 1987-, the Prime Minister delivered a major address on R&D at the

university of Waterloo. The address was an open challenge to the private sector to increase its R&D efforts and to redouble efforts to transfer technology out of university and government labs to industry.(Dufour:1994, p.26-28)

A National Science and Technology Policy was signed in Vancouver on 12 March 1987 by the federal, provincial and territorial ministers responsible for S&T. This policy, the first of its kind in Canadian history. (Dufour:1988, p,28) Dufour focuses upon the intensification of government activities on S&T. A new government strategy put forward \$1.5 billion in support of a federal microelectronics strategy, a new technology centers policy, for the management of key federal labs and external technology centers aimed at promoting technology diffusion, funding for the Networks of Excellence, a Canada Scholarship Program for undergraduate students, increased funds for IAP, and an increase to the matching policy funding for university research. Throughout this period , federal investment in S&T was strengthened in a number of ways, including support for the Canadian Institute for Advanced Research, establishment of funds to support international linkages, notably in Japan and Europe, support for specific federal-provincial S&T sub-agreements, especially with Quebec, British Columbia, and New Brunswick, the creation of Canadian Space Agency and the first long term of space program, including the approval of RADARSAT. Meanwhile, provincial governments continued considerable experimentation in support of industrial R&D and innovation. New policy structures were created., including new ministries responsible for technology and research as well as advisory structures for S&T. In 1989, all of the science advisory mechanisms within the federal and provincial governments came together under the National Forum of Science and Technology Advisory Councils (Dufour, pp.28-29).

This period marks the cooperation and partnership instead of diversity of interests.

Science and Technology Policy after 1993: The federal elections of 1993 marked the shift from the emphasis of importance of a broad approach to economic growth, innovation and development of an innovative society to emphasis on an enabling effect of information highway for Canadian S&T and an economic policy, focusing upon on development of a broad strategy for managing S&T resources. The Prime Minister entrusted Ministry of Industry with overall responsibility for S&T. The Government started an intense consultation process to put in place a federal S&T strategy.(Gerrard:1997, pp.254) A major thrust emphasized the need to narrow the gap between public and private activities. Here the principal mechanism is a series of partnerships between the two sectors. (Meisel: 1998, pp.159)

In 1993 Liberals published a Red Book for the new policy of S&T to cope with the problems spelled out in Auditor General's S&T Review. The jargon they used in the Red Book was "partnership". Small- medium sized enterprises were given special importance. It noted that Canada's research and development investment was low. It argued that Canada's failure in research and development and innovation was in its inability to move from the lab to marketplace. Mothe points out the fact that the emphasis for government strategy was shifted away from R&D driven growth and moved towards innovative, entrepreneurial behavior as a key to growth and job creation. And he thinks that the liberal party had conveyed to public a very strong sense of policy direction and leaders about its views on science, technology and economy

n an interview with Laird Roe of Industry Canada, an analyst of science and technology strategy and innovation policy in Industry Canada, coordination and networking were stressed.

“ During late 80s, combination of globalization and the realization that the government can not afford to do everything made the Liberals when they came to power in 1993 to take a more integrated approach across the government. Government started a horizontal policy. So the coordination have started between departments; ideas have been discussed and the cabinet have made decisions collectively. Before interdepartmental discussion of the science and technology policy , policies are discussed with the employees within government. In the early 90s government have started to act as a catalyst and facilitator by providing networks. Federal government’s and Industry Canada’s role is now to collect information and to bring people together. Government tries to make sure that all networks link well together.”

Major Initiatives since early 1990s:1994 marked the beginning of current shift in S&T policy. The linear approach has been replaced by non-linear and holistic approach. The federal government has shifted its role from prime mover to being a catalyst, facilitator and strategic investor (OECD:1998). Considerable importance was given to the creation of new institutions and mechanisms and several new initiatives have been taken to improve the Canada’s performance in S&T. Closer cooperation among related departments and agencies is coming into being, possibly as the result of impetus provided by review process. At any rate , there is some indication that government is beginning to place more value on research.(Meisel:1998, pp. 161)

The Advisory Council on S&T: It was established to advise Prime Minister and Cabinet on critical innovation issues. The strategy requires federal departments and agencies to report annually to Parliament on their S&T expenditures, activities and priorities. Each department and portfolio of department has developed an action plan to implement 7 principles set out in the strategy document. (Gerrard:1997, pp.266)

In an interview with Paul Dufour of Industry Canada, a senior advisor in Advisory Council On Science and Technology, we talked about Canadian performance in science and technology. According to Dufour:

“A creation of pool of skills requires the creation of new programs and incentives. For example Centers of Excellence serve for that end. He says that the government stopped to give money directly to industry and the university. Now the government act as a facilitator and creates partnership programs to help the industry and the university.

In order to have higher level of R&D in the country government provides tax credits and support collaborative programs. Although Canada is not keeping up with the R&D shares of other G 7 countries, Canadian R&D is increasing. In Provincial Research Organizations, their work tends to gravitate on applied research. Compared to federal government what they do is small but in some respects, they have big investments.

Networks of Centers of Excellence: It provides enhanced support for research excellence and accelerated result by encouraging best researchers in Canada to work together. They link 48 universities, 37 hospitals, 76 government agencies, 63 research institutes and 406

firms. It accelerated knowledge exchange and technology transfer. There are also 14 networks such as tele-learning and robotics. (OECD:1998) Having clearly demonstrated the advantages of collaboration the program was made permanent in 1997. (Industry Canada:1997; pp.23)

Canadian Network for the Advancement of Research, Industry and Education (CANARIE): It is a non-profit industry led corporation with over 140 fee paying members. It helps develop innovative networking technology and application and expand the understanding and the use of information highway. CA*net II marks the first significant upgrade of internet services in the world. It was launched in 1997. It aims to facilitate a partnership between industry, carriers, and Regional Advanced Networks in order to accelerate the deployment of next generation commercial internet service by promoting the development of applications that can not run properly on today's internet. It also supports the real time multimedia applications demanded by the business, research, education, and health communities including the collaborative research, tele-education and tele-health. (CANARIE Inc., pamphlets) table. CA*netII Networks in figure 1.

Canadian Foundation for Industry Innovation: It is a private organization set by parliament in 1997 to support infrastructure in research institutes, university and hospitals. It was targeted towards KBE. Grants cover capital costs involved in modernizing infrastructure needed to do research in these areas such as acquiring state of art, art equipment, establishing computer networks, creating significant research database and also upgrading labs. (OECD:1998)

Strategis: It is the largest business website of Canada. Business users can make critical decisions about opportunities of growth, explore new markets, find partners add form alliances. (OECD:1998) It allows businesses to take advantage of the partnership. Since its launch March 26, 1996, there have been more than 2.9 million visits to Strategis, with about 8000 visits each business day. More than 30 million documents have been retrieved from Strategis. Most users rate highly educated with 78% of surveyed users having a college or university level education.(The Ottawa Citizen, Marlene Orton, Oct,6, 1998, p, G11)

Technology Partnership Canada (TCP): It was created in 1996. It represents a new funding approach to help Canadian firms compete in enabling technology, where market failures exists. (e.g., bio-technology), or where there is an unlevelled playing field (aerospace). The program invests in research and development. It also assess trends in the marketplace and ensure that the program continues to target opportunities which generates job and economic growth. Since 1996 innovation at the near market end of R&D spectrum has been supported by Technology Partnerships Canada. The program is a key element in government's S&T strategy. The new investment supported companies across Canada in developing new products and processes in environmental technologies and the aerospace industry. The program supports the private sector through investment rather than subsidy sharing both risks and rewards. TPC also has entered into a partnership with the Industrial Research Assistance Program (IAP) of the National Council of Canada. Through the partnership, IAP's industrial technology advisor will improve delivery of TPC assistance to innovative SMEs across Canada. During 1997-1998 TCP contracted 35 projects. These investments were made by companies across Canada.15 projects

in Ontario, 9 projects in Western Canada, 8 projects in Quebec and three projects in Atlantic Canada. (Industry Canada:1998)

Technology Partnerships International: This program, launched in October of 1996, is administered jointly by both Industry Canada and the Department of Foreign Affairs and International Trade. Its mandate is to attract new foreign investment into Canada, promote the expansion for and upgrading of existing and upgrading of existing foreign investments, and to facilitate investment partnerships between Canadian SMEs and foreign knowledge-based companies (Toronto Star: November 24, 1996,p. B 2)

Business Development Bank of Canada (BDC) has existed for decades. In 1995, the parliament passed a new BDC Act to permit greater technology .The Bank can provide Canadian SME's with such specialized funding as venture loans and venture capital in order to meet the unique financial requirements of knowledge based SME firms (Industry Canada: 1996,p.15 and 29).

A New Framework for Federal Provincial Corporation is a School Net Program which provides internet based educational service. (OECD:1998). As the author of The Ottawa Citizen points out it was designed to push technology in education. "It was initiated in 1993. It is a government supported program that brought together the education community, private industry, provincial representatives. Currently 85 % of schools across the country are connected to the Internet. Aboriginal schools are provided with satellite technology under Direct PC, which brings a fast internet service to remote communities through federal funding."(The Ottawa Citizen, Marlene Orton, October,6,1998, p.G19)

The Federal-Provincial Corporation also provides Community Access Program that ensures the opportunity for small and remote communities to obtain assistance in developing internet access. It aims to promote new business, development, job creation and economic growth, including student employment in rural communities.(OECD,1998)

The Canadian Innovation Center in Waterloo(CIIC): It was founded in 1981 as an independent not for profit organization. It was dedicated to assisting entrepreneurial innovators and innovative companies with continued funding support from Industry Canada until September 1998. The innovation center has assisted over 60 000 Canadian inventors and entrepreneurs and has evaluated over 11 500 new product ideas (Canadian Industrial Innovation Centre,1998)

The Public Policy Process: Industry Canada versus The Finance Department of Canada

Many government programs, designed to improve Canada's technological competitiveness, emerged as a result of a public policy debate between Canada's finance Department and Industry Canada. During the late 1980's and 1990's the neo-liberal economic model had defined the parameters of debate regarding appropriate government intervention into the economy. The regulation of capital controls in the 1970's and 1980's allowed a state's domestic banks, corporations and investors with the opportunity to gain access to foreign

financial systems. This increased then potential for capital flight. It is the threat of capital flight that allows capital traders the power to indirectly influence public policy debates within national governments that can lead to the convergence of domestic and international strategies of government intervention in the economy. In this new integrated globalized financial market, the worth of a nation's currency can now be determined by a collective international consensus, through computerized trading, according to their perception of that nation's status or prospects.(Toronto Star, June 18, 1995 and Toronto Star, October 7, 1995) The emergence , growth and power of the international financial markets has provided a domestic policymakers with an economic environment conducive for the advocacy and adoption of monetarist economic as a strategy for economic growth. Consequently, the only appropriate role for government intervention in the economy are measures designed to ensure a stable and predictable supply of money. monetarist strategy is designed to restore capital accumulation by allowing market forces to operate free of government . Moreover, they oppose any artificial government intervention into the market economy, designed to address such problems, because it could result in an adverse inflationary effect upon market prices (McBride:1992,p.65).

This neo-liberal economic model, aided by the progressive integration of the world's financial markets, has allowed certain components of government bureaucracy- notably finance departments- to acquire a predominant voice within the economic public policy process of national governments. Consequently, such state departments as those associated with industry, unemployment and welfare have tended to lose their influence in the public policy-making process. With the deregulation of financial capital, a state's monetary and fiscal policies are now predominantly influenced by the power and mobility of international capital markets. This has allowed Canadian Finance Minister, Paul Martin, the opportunity to assume control over Canada's industrial policy by implementing a macro-economic agenda according to the dictates of international financial markets.

Paul Martin's and the Finance Departments's ability to manage the government's high-tech industry strategy, according to the dictates of the neo-liberal economic model, was reflected in the Chretien government's 1995 federal budget. In October of 1994, Paul Martin informed the House of Commons Standing Committee on Finance that the total government debt in Canada had reached approximately 100 percent of GDP. As a result, the federal government had to pay \$39billion in interest payments on that debt. He then warned the Committee that if the federal government were to continue such deficit financing then Canada's debt would increase to approximately \$800 billion with interest payments of \$64 billion (Department of Finance: 1994). Accordingly, Martin's 1995 budget attempted to address this deficit spending problem by cutting \$25.3billion in spending cuts over the next three fiscal years. In particular, the 1995 budget reduced Industry Canada's program of business grants. In all these budget cuts had cost Industry Canada 43 per cent of its operating budget.(Toronto Star: March 1,1995, p.A19).

The severity of the cuts in the 1995 federal budget reflected the Finance Department's concerns over how the international markets would view Canada's ability to manage its debt problem. For example, in January of 1995 Moody's Investor Services, a credit rating agency

based in New York, had announced that it was reviewing Canada's debt status. That same month international investors had sent the Chretien government a warning by dumping Canadian dollars on foreign exchange markets. (Toronto Star:January 13,1995,p.A15).

In order to gain control over Canada's high-tech industry policy, Industry Canada, under the leadership of John Manley, had to develop a creative micro-economic policy if the Chretien government hoped to implement a pro-active industrial policy that would allow Industry Canada to play a more interventionist role in the economy than that being allowed by the Finance Department. Because of the 1995 federal budget Industry Canada had to terminate, or was unable to renew, over 40 programs. This retrenchment represented nearly 80 per cent of its program portfolio (Industry Canada: 1996, p.2). This forced Industry Canada to restructure and prioritize its efforts in order to allow it to offer an effective program of services to the Canadian business community in this new era of fiscal restraint.

During its restructuring efforts, Industry Canada's officials were able to develop an innovative program of services designed to help small and medium-sized Canadian enterprises to grow and become competitive in the global market economy. In order to convince the Canadian government its new programs of services was critical for the growth of Canada's high-tech sector, Industry Canada had to acquire a more predominant policy making voice within the federal public policy process. Industry Canada was able to achieve this by introducing a new issue to the public policy debate concerning the proper role of the government in the market place. This new issue defined the critical relationship between technology and economic performance. Industry Canada officials embarked upon an issue management programme designed to impress upon federal government economic policy makers the idea that if the government wanted to increase productivity and growth, in the Canadian economy, then it would have to invest in Canada's future high-tech economic development by adopting a pro-active policy program designed to implement new innovative technological ideas. This implicit message was articulated in two reports of produced for Industry Canada. The first, by Jeffrey Bernstein of Carleton University, examined how high levels of R&D spending by such Canadian companies as Nortel, Newbridge Networks, and Mitel, not only benefited those corporations, but also had positive effects throughout the whole Canadian manufacturing sector (Toronto Star: 1996, p.B 2). The second report by Frank lee and Handan Has, two Industry Canada analysts, illustrated how high knowledge sector industries performed out both medium and low knowledge sector companies in terms of output and economic growth. Their conclusion was that traditional fiscal and monetary policies can not, by themselves, solve Canada's economic problems. Continued economic growth, they concluded could only be secured by a package of micro-economic policies designed to stimulate such growth. Both analysts argued that "nation's ability to compete successfully in a globalized economy is becoming increasingly dependent on its capacity to generate new ideas and innovation."(Toronto Star:1996, p.B 2) Through the articulation of such ideas, Mr. Manley and his officials were able to engage in a programme of "issue management" designed to persuade the Chretien cabinet that the Finance Department's deficit reduction programme was insufficient, by itself, to foster the appropriate level of economic growth. An innovative programme of government measures, designed to enhance Canada's technological competitiveness and growth would also be needed. With the Finance

Department controlling the macro approach to economic development in Canada, with its deficit reduction programme, Industry Canada would develop a pro-active micro-approach to aid Canada's emerging high-tech industry. It was this new activist programme that redefined the government's role in the economy that enable Industry Canada to become a predominant player in the development and implementation of a high tech industrial programme.

Industry Canada's attempt to acquire a predominant voice in the development of micro-economic approach to industrial development in Canada has seemed to have had a decided impact upon government policy after the 1995 budget. In November of 1995, Finance Minister Paul Martin admitted that his department's focus on creating a healthy fiscal environment was insufficient, by itself, to create jobs in Canada. Consequently, he supported a micro-economic approach to economic development, which would allow for greater government support for R&D and other measures that were instituted in order to help Canadian industry develop new technologies and expand into new growth markets (Toronto Star:November 13,1996, p.C6). Moreover International Monetary Fund Meeting in Washington, on September 30, 1996, Mr.Martin argued that although the past years of deficit cutting and trade liberalization had succeeded in creating sustained growth without inflation, governments would nevertheless, have to promote new programs in order to maintain the creation of high quality jobs and the maintenance of a social safety net (Ottawa Citizen: September 30, 1996, p.A2). It was, however, the 1996 federal budget which seems to illustrate the Finance Department's acceptance of an increased interventionist role for the government in the economy. The 1995 budget had terminated the Defense Industry Productivity Programme (D.I.P.P). This programme helped fund R&D projects by providing companies with grants covering between 30-40 per cent of their total R&D costs (Toronto Star:July 23, 1995, p. D1&D2). After the termination of D.I.P.P programme, Industry Canada lobbied officials hard for some kind of technology growth fund to replace it. Such a fund was needed in order to assist Canadian knowledge -based or high-tech industries (Toronto Star:July 23, 1995, p.D1). While Paul Martin's February 1996 budget continued with the Finance Department's deficit reduction programme, by calling for an additional \$1.9 billion in government's spending cuts in 1998 -1999, it did provide additional funding for Industry Canada's micro- agenda for the development of Canada's high-tech industrial policy (Department of Finance, 1996, p.7,9, 10). These funds were obtained through a reallocation of \$220 million from budget savings and were targeted towards a series of investment and ^{innovation} programmes which I mentioned above (For example , Technology Partnership Canada, Technology Partnerships International, Business Development Bank, e.t.c .)

Through "issue management" the department was able to acquire a predominant voice within the public policy formation process by convincing both the cabinet and the Finance Department of the vital link between technology and economic growth. This "two-track" approach to economic growth in Canada allowed the Chretien government to move beyond the restrictions placed upon government intervention into the economy by the neo-liberal economic development.

Conclusion: Canada has implemented innovative programs especially since early 1990s designed to enhance Canada's technological ability in order to stimulate a higher rate of development, adoption and modification of technologies to keep with recent transformations with shift to knowledge based economy despite the current weaknesses in Canada's industrial and technological development. Institutional transformations has had a considerable role in bringing this success.

Bibliography

Books:

Albo, Greg & Jenson, Jane; "A Contested Concept: The Relative Autonomy of the State" In Wallace Clement and Glen Williams eds., 'The New Canadian Political Economy', McGill-Queens University Press, 1989

Atkinson, Michael & Coleman, William; "The State, Business and Industrial Change in Canada" University of Toronto Press, 1989

Britton, Gilmour & Smith, Steed; "Technological Change and Innovation: Policy Issues" In Brittoneds., "Canada and the Global Economy" 1996

Chorney, Harold, The Deficit: Hysteria and the Current Economic Crisis, Ottawa: Canadian Centre for Policy Alternatives, 1989

Clement, Wallace;&Williams, Glen; "Resources and Manufacturing in Canada's Political Economy" In Wallace Clement eds. Understanding Canada; McGill, Queens University Press, 1997

Drache, Daniel& Gertler, Meric; "The World Economy and the Nationstate The New International Order" In Daniel Drache and Meric Gertler eds., 'The New Era of Global Competition: State Policy and Market Power' McGill, Queens University Press, 1991

Gera,S & Clifton, Lee-Sing & Newton, Keith; "The Emerging Global Based Economy" Unpublished Paper presented at CIRANO/Industry Canada Conference, Doing Business in the Knowledge Based Economy; Mont Tremblant, Sept.20-21; 1998

Hellenier, Eric; "States and the Reemergence of Global Finance: From Bretton Woods to the 1990s". Cornell University Press ,

McBride, Stephen, "Not Working: State Employment and Neo-Conservatism in Canada, Toronto: University of Toronto Press, 1992

Meisel, John, "Caesar and the Savants: Some Socio-political Context of S&T in Canada" In A. Hertzberg and I.Krupka eds., 'Statistics, Science and Public Policy', Queens, 1998

Phillips, Paul; " New Staples and Mega Projects: Reaching the Limits to Sustainable Development" In Daniel Drache and Meric Gertler, 'The New Era of Global Competition: State Policy and Market Power' McGill, Queens University Press, 1991

Journals

Science and Public Policy, "Industry, Technology and the Political Agenda in Canada: The Case of Government Support for R&D" William Leiss, Vol.15. No 1, February, 1988

Technology in Society, "Science and Technology in Government: Canada" Jon Gerrard, Vol.19; (1997)

OECD Reports And Government Documents:

Department of Finance, "A New Framework for Economic Policy", A Presentation by the Honourable Paul Martin, The Minister of Finance, Ottawa, October 17, 1994

Industry Canada, "Industry Canada Annual Report, 1996-1997", Ottawa, 1996

Industry Canada; "Minding Our Future" Report on Federal Science and Technology, 1997 pkde@xlrj.ac.in

Industry Canada, Communication Research Center,1998-1999 Business Plan

Industry Canada; "The Canadian Electronic Commerce Strategy" 1998

OECD "Technology and Innovation Policy for the Knowledge Based Economy: The Changing View in Canada" Andrei Suzenko, 1998

Wilson, Andrew; "*Governments and Innovation*" Background Study for the Science Council of Canada, 1973

Interviews:

*Laird Roe, Industry Canada, Analyst of Science and Technology Strategy and Innovation Policy, December, 1998

*Paul Dufour; Advisory Council on Science and Technology, Senior Advisor, 19 February, 1999