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CANADA

Report of the
National Advisory Board
on Science and Technology

INNOVACTION COMMITTEE

Presented to the
Prime Minister of Canada

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Government Committee Report on InnovAction

February 1988

The views expressed in this paper are those of the authors and do not necessarily correspond to the views or policies of the Government of Canada.

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1.0 INNOVACTION

1.1 Introduction

The committee focused its efforts on examining the InnovAction strategy and some tentative proposals for increased funding to support this strategy. The committee also reviewed the conclusions and recommendations of several relevant studies, task forces and conferences - for example: the Wright Task Force (July, 1984); the National Technology Policy Forum (June, 1986); and selected findings of the Nielsen Task Force - building on the large amount of good work already undertaken.

1.2 Overview

The committee formed some conclusions about the government's role in S&T generally, and InnovAction in particular. These conclusions are discussed below.

1.2.1 Objective

The basic objective of S&T policy should be to apply S&T to the improvement of economic competitiveness and the general well-being of Canadians. This objective should not be confused with related goals such as improved education, job creation or regional development. Education may be a *means* and job creation and regional development may be *consequences* of S&T policy, but neither is the central objective.

1.2.2 The InnovAction Strategy

The InnovAction strategy is defined by five themes:

a) fostering innovation and technology diffusion;

b) developing capacity in certain strategic technologies;

c) increasing the effectiveness of the federal government's S&T effort;

d) building human resources; and

e) promoting an S&T 'culture' in Canada.

The committee finds these themes appropriate and comprehensive. The emphasis is right. But they do not, by themselves, constitute a *strategy*. A strategy must begin with a good understanding about how the innovation process actually works in Canada.

In fairness, a complete understanding of the innovation process will never be achieved. So practical people must continue doing sensible things using imperfect knowledge. We suggest, nevertheless, that more time be spent gaining an understanding of the processes by which technology and innovation become

imbedded in the economy. In particular, greater effort should be made to *evaluate* the effectiveness of S&T policies and programs.

The committee also noted that the InnovAction strategy has very little to say about which policy *instruments* might be most effective. For example, there is no analysis of the use of tax incentives, trade policy or regulatory policy. The apparent focus of InnovAction is on direct spending - whereas other means may be more effective in many situations.

The committee offers the following observations on S&T policy generally and on InnovAction specifically.

1.3 Basic Principles

1.3.1 Build on Strengths

Canada cannot hope to make a major commitment to every S&T field. We must choose areas where we have comparative advantages (e.g., a strong base in communications) or unusually compelling national needs (e.g., environmental protection).

1.3.2 Focus on Resources

This is a corollary to building on strengths. We must be prepared to concentrate adequate resources to support excellence. Financial assistance becomes completely ineffective if spread too broadly. Assistance must exceed a certain threshold (depending on the circumstances) or it risks being wasted. Canada cannot afford 'universality' in its S&T budget.

1.3.3 Evaluate Policies and Programs

The committee has been uncomfortable about advising on additional funding for existing programs (as tentatively proposed under InnovAction) without a better understanding of the effectiveness of these programs. Although it is not practical for members of NABST to delve into the detail of every program, we would benefit from executive summaries of objective program evaluations. More significantly, the government needs a systematic way to learn from its successes and failures.

1.3.4 Keep S&T Issues at the Centre of Government Decision-making

The creation of NABST is a significant step. This should be followed up with the appropriate machinery *inside* government. If we are serious about the critical importance of S&T for Canada's economic future, the message must be brought home credibly and forcefully to the public service, Parliament and the media. A prominent place for S&T in the day-to-day activity of government and a corresponding spending commitment are required. There must be a significant increase in the relative allocation of resources to S&T, assuming worthwhile initiatives can be brought forward. This means a shift of existing spending from other areas, not simply a re-juggling of priorities within the S&T 'envelope',

though this will probably be needed too. Without a shift in spending, a claim that S&T is now a top government priority will not be believed.

1.3.5 Find New Ways to Reach Consensus

The committee is aware of the difficulty, in political terms, of making the tough choices required to:

a) reallocate resources;

b) focus on some areas and not on others; and

c) concentrate financial help on relatively few initiatives.

It is unrealistic to expect any government to stick its neck out very far in the absence of consensus within the community of affected interests. Unfortunately, past attempts to build consensus on many of the tough issues in S&T policy have not gotten past the stage of platitudes. The committee concluded that new consensus-building ways must be found to arrive at *acceptable choices* leading to a coherent S&T strategy for Canada. (One important element of the Japanese success has been their ability to forge national consensus behind particular goals and projects. Sweden appears to have developed, through different methods, a similar national capacity to make choices.) This does not happen automatically. Canada will have to work hard to create the right institutions of consultation to overcome the deeply rooted 'zero-sum' mentality of interest groups.

1.4 Observations on InnovAction

1.4.1 Matching Funds for Technology Centres

It was suggested that up to $205 million of new funds be allocated over the next five years as a federal contribution, on a matching basis, to joint projects between industry and federal labs. The committee is concerned that this program would be biased toward large companies because of the matching funds requirement. We would want to have confidence that scientists in federal labs would support, and be comfortable with, an emphasis on commercial objectives. (Some strong incentives to this end will have to be designed.) The committee is reluctant to endorse the very large additional expenditure proposed for the Technology Centres Policy without a clearer understanding of:

a) who will benefit; and

b) the likelihood that the program will be able to respond to the needs of industry.

The committee believes building a more effective linkage between government labs and industry is an extremely important goal and merits consideration in depth by NABST.

1.4.2 Decentralized Delivery of Government Programs

Experience in Canada and in other industrialized countries indicates the importance of bringing the delivery of government programs close to the ultimate users. This is essential when delivering assistance to small- and medium-sized enterprises. The Industrial Research Assistance Program (IRAP) was extremely well received, perhaps largely because program officers have been close to clients and have been able to develop a keen appreciation of proposals that really merit support. From the information we have seen, the committee would favour increasing funds available to IRAP to support smaller firms and urge continuing efforts to delegate greater program authority to field offices. We were also impressed by SSC's Unsolicited Proposals Program and, in principle, would endorse increased funding on the assumption that there is considerable potential to take up greater resources.

1.4.3 Intelligence Gathering

The committee believes that Canada lags well behind many other developed countries in gathering information on foreign technologies. This is an increasingly important shortcoming that must be corrected. The government's trade offices and embassies should be given greater resources to gather and report intelligence. A more effective dissemination of results is needed. For example, can External Affairs' internal communications on foreign technological developments be declassified?

New funds have been proposed to support greater Canadian participation in international collaboration. Although this is commendable, it is more important to have something to bring to the table. We must ensure that the information flow is not one way. For example, the Japanese have been aggressive in canvassing Canadian activities, but few Canadians have delved beneath the surface in Japan. Language is an obvious barrier. This suggests that greater efforts are needed to promote Japanese language training in Canada.

1.4.4 Strategic Technologies

InnovAction proposes action plans in three strategic areas - biotechnology, advanced industrial materials and artificial intelligence. A microelectronics program is already launched. Undeniably, Canada must contribute to, and keep abreast of, these areas. All other industrialized countries have also targeted the same fields. The issue is to:

a) narrow our focus in Canada to sub-fields where we can make important contributions; and

b) foster the diffusion of work being done elsewhere.

The government must act because Canada's existing base in the emerging strategic technologies is weak. Furthermore, we have not yet established effective ways to conduct the longer term pre-competitive applied research that will be necessary to build commercial strength in these new fields.

We suggest that each of these strategic technologies be analysed for opportunities particularly important to Canada, for example:

a) applications to our resource industries;

b) environmental protection;

c) problems peculiar to cold regions;

d) transportation and communication over vast distances;

e) oceans and fresh water;

f) bilingualism; and

g) significant parts of our existing industrial base.

In short, the strategic technologies thrust of InnovAction needs a greater definition of focus and goals than the committee has seen.

1.4.5 Communications and Information Technology

It has been tentatively proposed to allocate $125 million of new funds over five years to augment the R&D program of the Department of Communications. On the surface, the committee has serious reservations about whether the work is best carried out in government laboratories. This could be an opportunity for contracting out and industry leadership.

1.4.6 Granting Councils

The committee believes that the granting councils are effective and deserve strong support. The new matching funds policy effectively encourages the private sector to take greater responsibility to support basic research and foster collaboration between universities and industry. There was some concern that the matching funds program would fail to provide sufficient incentive to universities to seek out joint projects with industry. But we believe that the NSERC policy of returning a bonus to the university (which in three years' time will have risen to 30 per cent of the government's matching funds) will prove to be a strong incentive for collaboration.

There is a concern - well-founded we believe - that the matching funds program will concentrate resources in areas of immediate commercial interest and leave other areas of research dependent on a fixed-base budget. This base funding is being eroded by inflation and by a real growth in demand. The committee therefore believes that ways must be explored to increase base funding. But before fully endorsing the proposals made under InnovAction, we want to examine the issues more closely and meet with officials of the granting councils.

1.4.7 Promoting an S&T Culture

The committee believes that fostering a greater awareness and appreciation of S&T is a critical element of the InnovAction strategy, but one that can only be achieved gradually. We also believe that the essential role of S&T in achieving national goals of economic prosperity and general well-being must be stressed. This message will not reach all Canadians if S&T is promoted primarily for its intellectual value.

The committee is concerned that the program ideas suggested in the documents it has seen fall short of the mark. More than a public relations campaign is needed, though this is a valid part of a larger strategy. The message will not reach a wider audience unless it is conveyed by the mass media - for example, the CBC, private networks, magazines, newspapers, the NFB - and through the widest array of channels - schools, chambers of commerce, service clubs, etc.

1.5 Further Observations

1.5.1 Government Procurement

The importance of government procurement in fostering the commercialization of new technologies cannot be overestimated. Using government purchasing power is probably the most effective way to incubate a new and risky high technology product to the point where it can meet world competition. The U.S. has been able to use defence procurement in this way and has invoked national security concerns to justify the implicit non-tariff barrier. Although Canada can make limited use of defence-related procurement, there are other areas of massive public spending - for example, health, education and the environment - that provide large potential markets. It is very important that a trade pact with the U.S. not prevent Canada from using government procurement to foster high technology industry.

1.5.2 Involvement of Women

The committee emphasizes the need to involve more women in scientific and technical careers. Women already make up half of our university population, yet they are grossly under-represented in most scientific and technical programs. This reflects a deep-seated attitude that S&T is a masculine domain. One consequence of the attitude is that a disproportionate number of female students fail to study mathematics in high school. A die is cast at an early stage that limits the number of women who can pursue careers in S&T fields. Given the dominance of these fields in our economic future, the under-representation of women threatens to be a new source of economic disparity between the sexes.

The committee believes that this issue should be faced squarely by the federal and provincial governments and that steps must be taken to ensure that today's young women preserve the option to pursue careers in scientific and technical fields.

1.6 Recommendations

Based on these considerations, the committee is prepared to endorse some of the specific funding proposals that have been advanced under the rubric of InnovAction. We emphasize that this selection does not imply that other proposals - part of a group that would total roughly $1 billion of new spending over five years - are undeserving. The committee has not yet had time to be satisfied about these proposals - they need more study.

Meanwhile, we believe it is important that the government not delay making commitments where NABST already has a high degree of confidence that the money will be well spent. We are prepared to recommend new expenditures in the following program areas. The amounts are to be disbursed over five years (certain programs may justify the increase over a shorter period) and total $110 million (see Table 1).

Table 1

Item	Comments	Five-Year Total ($ millions)
Unsolicited Proposals Program	■ enables federal departments to respond to private sector proposals that support departmental missions ■ highly regarded by clients and by Nielsen Task Force ■ particularly successful in fostering advanced technology manufacturing	$ 30
Industrial Research Assistance Program (IRAP) (assistance to small firms)	■ need to develop a new component of IRAP to assist in negotiating acquisition of foreign technology ■ need to augment existing IRAP programs that aid small firms to develop marketable technologies	$ 35
Technology Inflow Program (TIP)	■ uses External Affairs' network to facilitate contacts in aid of acquisition of technologies by Canadians ■ demand for program service exceeds funds ■ complements the new IRAP activity endorsed above	$ 17
Microelectronics (NSERC)	■ funds for an important element of the announced microelectronics strategy ■ need to enhance capacity of selected universities to develop computer-aided design and engineering tools	$ 7

Item	Comments	Five-Year Total ($ millions)
Granting Councils	■ need to increase matching funds ceiling for FY 1987-88 to avoid a decline in the councils' total budgets from 1986-87 level ■ key to maintaining credibility of the matching funds policy	$ 11
Promoting S&T Culture	■ specific program elements have not been sharply defined ■ recommendation reflects committee's view that priority must be given to developing much greater awareness of S&T, particularly among young people	$ 10
Total		**$ 110**