

Toward the end of the decade, however, total expenditures remained almost constant, accompanied by a lack of growth in the professional and supporting personnel.

The federal government is well aware of the need for a strong research and development effort in Canada and has inaugurated several programs of direct financial assistance. The Department of Industry, Trade and Commerce administers the Defence Industry Productivity Program and the Program for the Advancement of Industrial Technology (see Section 9.2.6). The Industrial Research and Development Incentives Act authorizes the Department to make substantial grants to firms expanding their research and development effort. The National Research Council has its Industrial Research Assistance Program (see Section 9.2.1) and the Defence Research Board makes grants in support of Defence Industrial Research.

The newly established Industrial Science and Technology Division of the Policy Branch at the Ministry of State for Science and Technology has the purpose of ensuring comprehensive, well-planned and integrated policies in this area. Its objective is to assure that Canada develops and maintains a strong scientific and technological capability within the industrial sector and a favourable environment for the optimum application of this capability.

In recent years the total direct federal support for industrial research and development has increased from \$75.5 million in 1965-66 to \$149.7 million in 1971-72 and is expected to reach \$160.3 million in 1972-73.

The level of employment of scientists and engineers in the various areas of industrial research and development gives a measure of the corresponding activity. The ranking of the ten leading industries in 1971 is shown in Table 9.1.

The ten industries listed absorb some 78% of the scientists and engineers employed in research and development. The first four industries alone (electrical products, other chemical products, aircraft and parts, and non-ferrous metals) employ about 53% of R&D personnel in Canada, and account for over 53% of all current intramural expenditures on R&D.

One possible method of identifying research-intensive industries is to compare the number of scientists and engineers involved in R&D with the total number of persons employed by the industry. The ranking of the ten leading industries for 1971 based on this criterion is given in Table 9.2.

9.5.1 The Pulp and Paper Research Institute

The Pulp and Paper Research Institute of Canada is a centre of research concerned with virtually every aspect of the production and use of pulp and paper products. It was established in 1913 as a branch of the Dominion Forest Products Laboratories and in 1927 was reorganized under the joint sponsorship of the Canadian Pulp and Paper Association, the federal government and McGill University. The Institute staff carries out fundamental research and some applied research in the fields of logging operations and pulp and paper mill operations. In addition, in co-operation with McGill University, it trains postgraduate students who are working toward master's and doctorate degrees in physical chemistry, wood chemistry, or chemical and mechanical engineering, and whose theses subjects lie in fields of interest to the pulp and paper industry.

The Institute's head office and main laboratories are located in Pointe Claire on the western outskirts of Montreal in a building constructed by the Government of Canada. Space provided by the University is also occupied on the campus of McGill University by Institute staff and students involved in the graduate education program. The Institute's facilities include: organic and physical chemistry, physics and engineering laboratories; pilot plants for chemical pulping, pulp and chip refining and waste liquor pyrolysis; facilities for logging research; an extensive library; shops and special facilities for pulp and paper testing and for photographic and microscopic (both light and electron) studies of wood, pulp and paper. It has a staff of about 200.

The Institute's research activities comprise a basic program in pulp and paper research and in logging research, contract research and technical services. The basic pulp and paper research program is supported by assessments from the maintaining membership (48 companies, representing more than 100 mills and about 95% of the total production of the Canadian industry). The logging research program is currently supported by a financial contribution from the Canadian Forestry Service of the federal government. Both programs comprise research of interest to the industry as a whole as distinct from that which is the concern of only a single company.