

expenditures, foreign ownership, and various measures of organizational receptivity to change.

The flow of technology can either be in the form of ideas and suggestions, or R&D can be embodied in the goods and services purchased by one industry from another. For Canada, De Melto et al.³⁷ used the flow of ideas and suggestions approach to study 283 innovations. In 96 cases, the technology came from outside the innovating firm. In 55 percent of these cases, the parent firm was the source of technology; the source was a supplier or customer in 19 percent of the cases; a consultant in 11 percent; and unaffiliated joint venture partners in 9 percent of the cases. Similar findings are confirmed by R&D intensity (R&D as a proportion of gross output) as a measure of inter-industry technology flows.

Although intra- or inter-industry technology diffusion must be measured for individual industries, the following generalizations for Canada can be made. The industries providing the greatest fraction of their own technological requirements are electrical products, machinery, chemicals and miscellaneous manufacturing. The industries providing the least are construction, agriculture, forestry and fishing, and, in manufacturing, leather, food and beverages, and textiles.

● *International Transmission of R&D*

Since knowledge generated from innovation is internationally available, countries benefit from all innovation, regardless of where it originates. In general, the gains from innovations are nonetheless greater in the innovating country than in countries that import the technology because of the increased jobs and higher wages associated with high-technology industries. In addition, the innovating country benefits from earnings on the sale or lease of new technology to other countries. If process improvements to an initial innovation are made in the innovating country, the benefits of the initial innovation are even greater over time for that country because of increases in productivity.

International diffusion of technology is primarily determined by factors such as market size (openness to trade), market structure, capital flows (openness to foreign investment), and information (information gathering and dissemination, including education). Empirical studies indicate that the United States appears to be the major source of technology transfer to Canada.³⁸

³⁷ D.P. De Melto, K. McMullen, and R. Willis, "Innovation and Technological Change in Five Canadian Industries". Discussion Paper 176. Ottawa: Economic Council of Canada, 1980.

³⁸ D.P. De Melto, K. McMullen, and R. Willis, 1980, *op. cit.*