

B. Diffusion of New Knowledge and Technology

Technology diffusion is the spread of technology from its source—the inventor or innovator—to its users. The sources of innovation are concentrated in a few industries, while use is much less concentrated. For example, Seguin-Dulude³¹ (1982) finds that in Canada, four industries (machinery, electrical products, chemicals and "other" manufacturing) were the industry of manufacture in 80 percent of the patents issued in 1978. The four largest users (machinery, transportation equipment, electrical products and chemicals) accounted for 49 percent of use.

Empirical studies show that only a small fraction of industrial R&D is oriented toward improving products that will serve solely as consumer goods. Innovations in one industry spread to other industries and improve related products and production processes. Resources can be wasted in the premature adoption of new technologies just as easily as they can be wasted in putting it off for too long. Nor does early adoption necessarily imply its earlier diffusion domestically. Indeed, Nasbeth and Ray³² and Swann³³ have noted domestic diffusion rates are generally faster in the countries that adopt late.

In Canada, Globerman found that in numerically controlled machine tools in the tool and die industry³⁴, and computers in hospitals³⁵, the adoption of new technologies has proceeded more slowly in Canada than in the United States. There is also evidence that the intra-industry diffusion process in Canada³⁶ is facilitated by larger firm size, R&D

³¹ L. Seguin-Dulude, "Les flux technologiques interindustriels: une analyse exploratoire du potentiel canadien". *L'Actualite Economique*, 58, 1982: 259-81.

³² L. Nasbeth and G. Ray, eds., *The Diffusion of New Industrial Processes*. London: Cambridge University Press, 1974.

³³ P.L. Swan, "The International Diffusion of an Innovation." *Journal of Industrial Economics* 22, 1974: 61-69.

³⁴ S. Globerman, "Technological Diffusion in the Canadian Tool and Die Industry", *Review of Economics and Statistics* 57, November 1975: 428-34.

³⁵ S. Globerman, "The Adoption of Computer Technology in Selected Canadian Service Industries." A study prepared for the Economic Council of Canada. Ottawa: Minister of Supply and Services Canada, 1981.

³⁶ Donald G. McFetridge and Ronald J. Corvari, "Technology Diffusion: A Survey of Canadian Evidence and Public Policy Issues". In *Technological Change in Canadian Industry*, volume 3 of the research studies prepared for the Royal Commission on the Economic Union and Development Prospects for Canada. Toronto: University of Toronto Press, 1985.