

Canadian Highly Qualified Personnel in Business R&D: a Quantitative Analysis

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Investing in research and development, in education and fostering the interest of young people in pursuit of careers in science and engineering are important components of Canada's Innovation Strategy (Knowledge Matters, Industry Canada, 2002). Engineers and scientists are key components of research and development activities. This paper reviews the employment structure and functions of researchers in Canadian business enterprise research and development. The primary source of information used in this paper is Statistics Canada, Research and Development in Canadian Industry database. This database provides the information that is contained in the Business Enterprise Research and Development (BERD) expenditures.

The paper begins with a brief overview of Canadian university educated personnel as a component of the highly qualified personnel in the labour force, followed by some international comparisons of the distributions of researchers to the employed. A historical perspective of the composition of the Canadian BERD personnel follows with the top ten employing industries over time showing industrial structural change as well as compositional changes in the categories of R&D personnel. Finally, the paper presents a quick historical overview of R&D personnel composition in foreign controlled and Canadian controlled firms for selected years.

The Census of Population found that there were about three-quarters of a million university-educated scientists and engineers working in Canada (1996, Census of Population custom tabulation). Since, the mid-1990s Canadian universities have graduated annually an average of 4,300 scientists and engineers (Statistics Canada (2001) Education in Canada, p.129 & p.133). According to the results from the R&D in Canadian Industry annual survey, in 1999, 56,250 (60,528 in 2000) full time equivalent (FTE) positions for university-educated engineers and scientists were in business enterprise R&D. This suggests that Canadian R&D by business enterprises employs around 7% of working engineers and scientists. The similar ratio for the United States of America in 1999 was about 13% or almost twice the Canadian proportion. The two ratios are the percentages of research graduates per year calculated on an annual basis.

This paper contrasts the steady Canadian spending per R&D researcher to that of the increasing American spending. It shows that proportionally fewer Canadian university-educated scientists and engineers are employed as researchers by business enterprises. The paper is premised on the idea that personnel and in particular researchers, are roots to innovation and creativity. As such, the growth of R&D personnel in business enterprises is important.

Most notable amidst the findings is the fact that the majority of "up-skilling" or 'professionalization' of Canadian R&D personnel has occurred in researchers with bachelor degrees, while the roles of doctorates have undergone extensive change, moving into highly administrative functions and responsibilities. A comparison with data drawn from other contexts, the United States and other OECD countries, allows for a better understanding of the changes that have occurred within Canadian R&D units. The paper concludes by advancing that these changes are reflective of a desire to market

Canadian competencies and to actively participate in multi-disciplinary research within partner networks. Overall, the educational quality of personnel working in business enterprise R&D in Canada has greatly improved over the past two decades. As such, the roots of innovation are growing and deepening and whether they are improving Canada's competitive position is a distinct question.

References

Human Resources and Development Canada (2002), Knowledge Matters, *Industry Canada*

Statistics Canada (2001) *Education in Canada*, p.129 & p.133