MODEL SURVEYS OF SERVICE INDUSTRIES: THE NEED TO MEASURE INNOVATION

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Abstract:

A measurement of innovation is proposed as an addition to model surveys of service industries. Measuring the introduction of new or improved products and processes provides an additional and important characteristic of the firm as well as a better understanding of the change over time of revenues from the set of products produced.

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1. INTRODUCTION

New ideas that improve products and processes make firms more competitive. Depending on the particular innovation, firms can sell the same products more cheaply, or gain the advantage of bringing a new product to market. The propensity to innovate is an important characteristic of a firm, of an industry or at a higher level of abstraction, an economy.

The measurement of innovation, especially technological innovation, has developed over the years for manufacturing industries. However, the increasing importance of service industries in the industrialized economies argues for a comparable understanding through measurement of innovation in the service sector. To achieve this, in a way that leads to internationally comparable data, the addition of a module on innovation is proposed for the model surveys of service industries developed by the Voorburg Group at the request of the United Nations Statistical Commission.

Model surveys of service industries have been designed, inter alia, to test the product classes of the Central Product Classification (CPC) and the industry classes of the International Standard Industrial Classification (ISIC) but mainly to collect data on production, trade and accumulation. They were designed to provide performance measures of service industries and the survey questionnaires were published as a set of modules to allow countries implementing them to choose, from a catalogue of data items, those which best suited their requirements and individual circumstances. Innovation is a key performance measure which has not been included in the present set of modules.

The measurement of innovation is more complex than that of research and development, which does have a module devoted to it. Nonetheless innovation, itself, is an important outcome of the 'system of innovation'(1) which includes institutions such as firms, government laboratories, regulatory bodies, funding organizations and universities, and the interactions among these institutions. In the past, the measurement focus has been on R&D, on the assumption that investment in R&D led, through a linear chain, from research to development, invention, innovation, diffusion and on to economic growth. However R&D is now recognized as neither necessary not sufficient for economic growth. Growth can, and does, happen because firms innovate and are able to gain economic advantage from new or improved products or processes.

2. THE MEASUREMENT OF INNOVATION

2.1 Background

Over the last forty years, standards have evolved for the measurement and the international comparison of the performance of research and development. As a result, there is public debate about the role of various sectors of the economy in performing and funding of R&D and it is possible to compare the R&D performance of industries across countries. The public debate and the public policies governing R&D would have been less informed and directed in the absence of internationally comparable data.

The measurement of innovative activity is at an early stage in the same process. Standards are evolving, the process of educating the policy community is just beginning. However,

information about innovation is at least as important as that already produced on R&D. To innovate does not require R&D or invention in the firm that does it but the economic consequences of doing it, of bringing new products to market, of improving productivity through better processes, are enormous. Understanding innovation in service industries, given their economic significance, is particulary important and a strong argument for sound statistical information.

The measurement of innovation has been done in a variety of ways over many years, leading to experience on how to make reproducible measurements of firms which innovate. The collective experience of experts in many countries, and especially the Nordic countries, was brought together in the OECD Proposed Guidelines for Collecting and Interpreting Technological Innovation Data, the 'Oslo manual'(2).

Shortly after the Oslo Manual was released for general use, experts from the OECD and the European Community agreed upon a common EC/OECD questionnaire (3), based on the Oslo Manual and for use throughout the European Union and the OECD. The intention was to encourage the collection of comparable data before going on to review the problems associated with this task and then revising the Manual.

The questions chosen for inclusion in the module in the Appendix are drawn from the common questionnaire with modifications based on experience in Australia (4) and Canada (5).

2.2 A Definition

The meaning of innovation varies. It can range from the first commercial use of an invention to the introduction of a new or improved product or process. The definition used here is taken from the Oslo Manual and refers to technological innovation.

> Technological innovations comprise new products and processes and significant technological changes of products and processes. An innovation has been implemented if it has been introduced on the market (product innovation) or used within a production process (process innovation). Innovations therefore involve a series of scientific, technological and organizational, financial and commercial activities.
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> Oslo Manual, paragraph 90.

2.3 Innovation in the Services Sector

The Oslo Manual was written for surveys of goods producing industries, with the intention of extending the coverage when more empirical evidence became available. This meant that the manual was limited in its treatment of organizational change as innovation, although it was included if it related directly to the production process.

In service industries, organizational change may be more significant than in primary or secondary industries. Some reasons for this are the comparatively lower capital intensity of service industries which makes reorganization of the production process easier and the relative flexibility in modifying products as a result of changes in organization or corporate direction.

Some examples serve to illustrate innovation as a result of organizational change. A bank changes staff hours to provide

more service at peak times during the day. This is a process improvement as the clients are dealt with in a shorter time and it requires nothing more than a change in organization. A retailer introduces self-service with automated check-out facilities. Again, this is a process innovation as fewer staff are required to support the basic service of selling goods. In this case there is both organizational change and investment in equipment to read bar codes and to accept credit cards. If the same retailer introduces a customer club, with privileges of membership, that new service is a product innovation.

In the examples just given, the innovative activity directly affects the services and goods provided by the firm. There are other activities which affect production indirectly and which are also of interest in the analysis of firm behaviour. For example, a firm may introduce a management technique which results in improved supervisory skills. The product and process are unchanged, but there may be productivity gains which cannot be tied directly to either. A firm may decide to buy rather than produce accountancy services, or introduce a safety campaign. In both cases there are savings, but they are not directly linked to products or processes.

2.4 Surveys of Innovative Activity

Surveys of innovative activity have approached the problem in at least three ways: case studies; analyses of innovations; and, analyses of the characteristics of firms which innovate. Such characteristics may include the revenue and expenditure information necessary for the deduction of value added, as well as human resource information and training programmes. Each approach to measuring innovation has advantages but, for statistical purposes, it is easier to treat innovation as a characteristic of the firm. This makes the firm, rather than the innovation, the object of the survey questions, and supports analysis of the characteristics of innovative and non-innovative firms and the estimation of the characteristics of a universe of firms from a sample. For these reasons, and the fact that firm characteristics are easier to standardize for international comparison, the Oslo Manual recommends using the firm as the survey unit.

Survey questions on the subject of innovation are well represented by the EC/OECD questionnaire. It covers 8 areas:

1. **General Information** - including age of business, ownership of business, total income of business, ownership of most significant competitor and profits of business.

2. **Sources of Information for Innovation** - including internal sources and external sources of innovative ideas.

3. **Objectives of Innovation** - classified by economic objective, and relates to innovations introduced in the three year reference period of the survey.

4. **Acquisition/Transfer of Technology** - including information about whether a business has acquired or transferred any technology during a 12 month period using various methods, such as hiring or losing skilled employees.

5. **R&D Activity** - this section includes questions about the extent of R&D activity, R&D co-operation by partner and country group and the existence of central R&D units in the firm.

6. **Factors Hampering Innovation** - including economic factors, innovation potential and other reasons.

7. **Costs of Innovation** - this section collects data on the cost of various activities related to innovation, e.g., R&D, acquisition of technology developed by others, training expenditure related to the introduction of innovations, expenditure for tooling-up, industrial engineering and manufacturing start-up and the marketing of new innovations.

8. **Impact of Innovation Activities** - this section includes questions about the impact of innovative activities. For a manufacturer, this has constituted questions about percent of sales and export sales made from innovations. For a firm in the services sector, this could be related to questions about profitability.

3. SURVEY MODULE AND ANALYSIS

3.1 The Proposed Questions

For the purpose of identifying innovative activity in service industries, a subset of the EC/OECD questions is proposed. This includes the subjects covered in sections 1,2,6,7 and 8 of the EC/OECD questionnaire. R&D activity is covered elsewhere in the Voorburg model survey and the other topics may be more appropriate for follow-up surveys, once respondents are accustomed to reporting their innovative activity.

The questions about the sources of ideas for innovation and factors hampering innovation provide the respondent with six response categories. The first category, irrelevant, allows the respondent to state that the question does not apply. The remaining five provide a scale of significance of the issue raised by the question. While five categories of significance are collected, a smaller number could be published.

The Oslo Manual recommends that respondents divide their sales and export sales between major product innovations, incremental product innovations, and unchanged products, where the innovations were commercialized during the reference period. This may not be suitable for firms in service industries, which is why the relevant questions in the Appendix have been modified. The preference is to identify innovative firms and then to use other characteristics of the firm, such as age, turnover, and profitability to compare those which innovate with those which do not.

3.2 The Time Period

Innovative activity may not happen every year, except in very large firms. As firms in service industries tend to be of small and medium size, a question on this subject may be appropriate every few years, rather than annually. The EC/OECD questionnaire uses a three year period and that is adopted in the set of questions proposed in the Appendix.

3.3 Analysis of Response

With the questions selected, it is possible to compare the characteristics of innovators and non-innovators and industries can be ranked according to their propensity to innovate. As well, barriers to innovation can be studied by industry. Industry differences may suggest priorities for future surveying.

The Australian Bureau of Statistics is conducting a survey of innovation across all service industries for reference year 1993/94. A report on industry differences, which may have international application, will be available for the 1995 meeting of the Voorburg Group.

The impact of innovative activities is an important measure in support of the work of the Voorburg Group in the testing of the Central Product Classification. Innovation may provide an explanation for the change in revenue derived from the set of commodities produced by the firm and may, therefore, indicate the rate at which the CPC will have to be revised for the industries surveyed.

4. A PROPOSAL

The proposal is that the module presented in the Appendix be adopted as part of the set of modules which constitute a Voorburg Group model survey and that data be collected for subsequent comparison at a Voorburg Group meeting.

REFERENCES

1. National Systems of Innovation: Towards a Theory of Innovation and Interactive Learning, B-Å. Lundvall ed., Pinter Publishers, London (1992).

2. OECD Proposed Guidelines for Collecting and Interpreting Technological Innovation Data, OECD/GD(92)26, Paris (1992).

3. EC Harmonized Innovation Surveys 1992/1993: Final Questionnaire, Commission of the European Communities, Directorate-General XIII, Luxembourg (1992).

4. Innovation in Industry Pilot Survey, Working Paper, Australian Bureau of Statistics, Catalogue No. 8116.0.00.001, Belconnen (February 1994).

5. The Canadian Innovation and Technology Survey: Survey Questions, Statistics Canada, Ottawa (1993).

APPENDIX: Survey Module

Identification of Innovative Activity

1. Has the firm introduced any new or significantly changed services or ways of delivering services during the period (reference year minus 2) to (reference year)?

   No ☐ Please go to 2
   Yes ☐ Please provide a brief description of the innovative services(s)

2. Has the firm introduced any new or substantially changed goods during the period (reference year minus 2) to (reference year)?

   No ☐ Please go to 3
   Yes ☐ Please provide a brief description of the innovative goods(s)

3. In addition to any innovations in noted in the previous questions, has the firm undertaken any of the following activities?

   Implementation of advanced management techniques

   No ☐
   Yes ☐

   Significant change in the organisational structure

   No ☐
   Yes ☐

   Implementation of new or substantially changed corporate directions or strategies

   No ☐
   Yes ☐

Sources of Ideas for Innovation

4. Please indicate the importance of the following sources of information for your firm's innovation activities during the period (reference year minus 2) to (reference year)?

	Irrelevant	Insignificant	Slightly significant	Moderately significant	Very significant	Crucial
Internal sources within the business group	☐	☐	☐	☐	☐	☐
Within your industry	☐	☐	☐	☐	☐	☐
Outside your industry	☐	☐	☐	☐	☐	☐
Suppliers	☐	☐	☐	☐	☐	☐
Clients or customers	☐	☐	☐	☐	☐	☐
Consultancy firms	☐	☐	☐	☐	☐	☐
Educational/research institutions	☐	☐	☐	☐	☐	☐
Generally available information	☐	☐	☐	☐	☐	☐

Barriers to Innovation

5. Please indicate which of the following factors have particular significance to your firm as impediments to your innovative activity?

	Irrelevant	Insignificant	Slightly significant	Moderately significant	Very significant	Crucial
Lack of skilled personnel	☐	☐	☐	☐	☐	☐
Lack of information on technologies	☐	☐	☐	☐	☐	☐
Lack of information on markets	☐	☐	☐	☐	☐	☐
Deficiencies in the availability of external technical services	☐	☐	☐	☐	☐	☐
Barriers to co-operation with other firms	☐	☐	☐	☐	☐	☐
Barriers to co-operation with scientific and educational institutions	☐	☐	☐	☐	☐	☐
Government standards and regulations	☐	☐	☐	☐	☐	☐
Innovation costs too high	☐	☐	☐	☐	☐	☐
Resistance to change in your business	☐	☐	☐	☐	☐	☐
Excessive perceived risk	☐	☐	☐	☐	☐	☐
No need to innovate due to earlier innovations	☐	☐	☐	☐	☐	☐
Innovation too easy to copy	☐	☐	☐	☐	☐	☐
Lack of customer responsiveness to new or changed services	☐	☐	☐	☐	☐	☐
Other	☐	☐	☐	☐	☐	☐

Costs of Innovation

6. What was the approximate cost to your firm of the following innovation-related activities in (12 month reference period)?

Research and Development (R&D)	□□□□□
Acquisition of technology developed by others (e.g., patents, trademarks and licenses)	□□□□□
Training expenditure related to the introduction of innovations	□□□□□
Expenditure for tooling-up, industrial engineering and manufacturing start-up	□□□□□
Marketing of innovations	□□□□□
Expenditure related to introduction of organisational and/or managerial innovations	□□□□□
Total costs of innovation	□□□□□