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**Services and the search for relevant innovation indicators:
a review of national and international surveys**

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Abstract :

Having been ignored for a long time, innovation in services is now the object of institutional surveys at both the national and international level. The aim of the present article is to review these surveys, which divide up into groups reflecting a range of different theoretical approaches to innovation. It also attempts to examine (and to interpret in theoretical terms) the methodological limits of these studies, and in particular to highlight the difficulties of comparison that they entail.

Qualitative studies of innovation in services have proliferated in recent years (for an appraisal of these studies, cf. in particular Gallouj, 1994; Miles et al., 1995; C. and F. Gallouj, 1996, Sundbo, 1998; the EC SI4S project²). The first effect of these studies was to confound the notion that services are resistant to innovation. Both as producers or co-producers and as users and diffusers of innovation (whatever the nature of the actual innovation may be), services are now important actors in this essential activity. For several years, now, they have been the main users of information technologies and, more generally, the main users of embodied technologies (Roach, 1988, 1989; OECD, 1996; Amable and Palombarini, 1998). The second effect of these qualitative studies has been to highlight the specificities of innovation in services, which find expression in both its nature and its modes of organisation.

Innovation in services is itself a fairly new field of enquiry, and it is this relative recentness that accounts for the methodological choices that were initially favoured, namely surveys based on qualitative interviews. For some time, however, it has been clear that there is a need for quantification. In view of the importance of the service sector in our economies (it accounts for more than 70% of wealth and employment), an attempt to verify the statistical validity of the qualitative findings and their possible generalisation is undoubtedly a legitimate exercise. However, it is one

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² This project, which produced a series of reports too numerous to be listed here, brought together, over a two-year period, 11 research teams from a number of different countries: Germany (DIW, Berlin), Denmark (RUC, Roskilde, and DTI, Copenhagen), France (CLERSE-IFRESI, Lille), Great Britain (PREST, Manchester and CENTRIM, Brighton), Greece (CERES, Athens), Italy (CSS, Turin), Norway (STEP, Oslo), the Netherlands (TNO, Apeldoorn) and Sweden (NUTEK, Stockholm). A part of the reports are made available at the SI4S web site <http://www.step.no/Projectarea/si4s/>. A CD version is also available (contact si4s project coordinator: Johan Hauknes : johan.hauknes@step.no).

that has proved extremely difficult to realise. It leads to often contradictory results that are a major headache to analyse and raise doubts about the validity of an approach to innovation based on surveys.

This methodological paper has several objectives (which, arranged in the following order, will constitute its basic structure):

1. To take an inventory³ of the various studies devoted to innovation in services, with a particular focus on “institutional” studies at national or international level, i.e. those conducted or initiated by national organisations (national statistical services, government ministries, etc.) or international institutions (OECD or Eurostat, the EU’s statistical service).
2. To examine the main methodological limitations of these studies. As we shall see, these limitations are closely linked to the widely acknowledged specificities of service activities.
3. To highlight a certain number of paradoxes and contradictions arising out of the implementation of these studies. This will involve examining some of the results actually obtained.
4. To attempt, by way of conclusion, to answer the following question: in the light of the methodological limitations revealed and paradoxes highlighted, should the survey method be abandoned as a means of apprehending innovation in services?

1. The various studies of innovation in services

The evolution of the use of survey-based quantitative methodologies as a means of understanding innovation in services reflects, to some extent, the evolution of our (economic) perception of services and the service economy. To oversimplify somewhat, this evolution can be divided into three phases: indifference (or ignorance), subordination and autonomy.

Services were in fact long excluded from economic analysis, on the grounds that they were considered “unproductive” by the founders of political economy. Over time, this indifference towards an object considered to lie outside the sphere of economics gave way to a recognition that services had a “second-class” existence as peripheral economic activities, subordinate to manufacturing industry, which was the main engine of economic growth. Finally, arguments began to be advanced that developed the notion that services in fact had an autonomous existence of their own, and could even be regarded as engines of growth (for a discussion of these various theories, cf. Delaunay and Gadrey, 1987; Gadrey, 1996).

Studies of innovation have followed the same trajectory. The early ones wholly ignored innovation (*indifference/ignorance*). They focused exclusively on (technological) innovation in manufacturing industry (for an assessment of these studies, cf. Smith, 1992; Le Bas and Torre, 1993). Little by little, services were drawn into the purview of these studies of manufacturing industry (*subordination*). This subordination manifested itself in an exclusive concentration on technological innovation. Thus the questionnaires designed for use in manufacturing firms were also used in service firms. Attempts are now being made in several countries (and this is a very recent phenomenon) to design studies that are specific to services (*autonomy*), i.e. to adapt definitions, indicators and data-gathering and processing procedures to this area of economic activity. These attempts are prisoners of sometimes

³ For a similar attempt see Marklund (1998).

contradictory objectives. There is, for example, a conflict between, on the one hand, attempts to understand more clearly what innovation in services is and to measure it more precisely and, on the other, the establishment of a basis for comparison with innovation in manufacturing.

On the institutional level, *subordination* is reflected in the straightforward transposition to services of the OECD's Oslo Manual directives (1992), which were drawn up to provide definitions of technological innovation in the manufacturing sector. *Autonomy* manifests itself in the adaptation of these definitions, or even the formulation of new definitions. There are two schools of thought on this issue. One suggests that the definition of innovation should be adapted to cover both manufacturing and services, while the other takes the view that separate definitions and questionnaires are required. These two views are based on different theoretical approaches, which we have described as "integrative" and "service-oriented". Subordination, for its part, equates to approaches that might be described as "technologist" (C. and F. Gallouj, 1996; Gallouj and Weinstein, 1997).

The following review of surveys is based upon the previous distinction between *autonomy* and *subordination*. A particular emphasis is placed on the following aspects (cf. synoptic tables 1 and 2):

- characterisation of the survey on the basis of the institutions, actors and countries concerned;
- the year of commencement, the periodicity of the survey (if applicable) and the period covered;
- the size of the population and of the sample and the corresponding response rates;
- the sectors of activity involved;
- the definitions of innovation used;
- the main themes tackled.

1.1 "Subordinate" surveys

The first type of surveys that we describe as "subordinate" (cf. Table 1) confine themselves essentially to applying to services definitions and questionnaires intended for manufacturing activities. They are concerned solely with technological innovation. As a result, they give preference to a restrictive concept of innovation.

a) Several of them (particularly the two Dutch surveys) place R&D at the heart of their analysis (of innovation) and take their definitions from the OECD's Frascati Manual. According to the latest version of this handbook, "research and experimental development (R&D) comprise creative work undertaken on a systematic basis in order to increase the stock of knowledge, including knowledge of man, culture and society and the use of this stock of knowledge to devise new applications".

The initial hypothesis underlying the compilation of this handbook is the notion that R&D is the main source and indicator of (technological) innovation and that it is actualised by clearly identifiable specialists working within clearly identifiable structures. Thus the indicators in the Frascati Manual have contributed to the underestimation of innovation in services, since innovation in this type of activity is not necessarily technological and can be, and often is, realised without any prior R&D. R&D (and consequently innovation) is also underestimated, since it is seldom carried out in a designated R&D department. Rather, it is usually diffuse, multilocational and linked to innovation projects implemented by flexible, temporary project groups (Gadrey et al. 1993). The definition of R&D laid down in the Frascati Manual also excludes a certain number of activities, in particular the involvement of certain consultants (and, more generally, of providers of high-level, knowledge-intensive services) in some innovation projects.

R&D in social sciences seems to play an important role in innovation in service activities (Gadrey et al. 1993). Whereas the first two versions of the Frascati Manual took account only of the exact, natural and engineering sciences, R&D in the human and social sciences has been included since the third edition of the handbook (OECD, 1976). However, those surveys of innovation based on these versions of the manual have hardly availed themselves of the opportunity thus offered⁴.

b) However, the majority of surveys in this first group draw primarily on the Oslo Manual for their indicators of innovation (OECD, 1992) (cf. Box 1).

The Oslo Manual was compiled on the basis of the notion that R&D (Frascati Manual) is not an adequate indicator for taking account of innovation in firms. This manual is a collection of definitions, concepts and methods for collecting and interpreting data on innovation (its nature, costs and economic effects).

The shift from the Frascati Manual to the Oslo Manual reflects the substitution of an interactive concept of innovation for a linear, Taylorist conception, in which R&D is not only the phase that precedes all innovation processes but also a phase that is independent of the others (absence of interactions). In other words, it is the model developed by Kline and Rosenberg (1986) that provides the theoretical foundation for the Oslo Manual. Innovation is here conceived of as a collective process in which, at various points in time and by means of links of variable length and frequency, various chains (research, accumulated knowledge, innovation) are articulated.

The guidelines proposed by the Oslo Manual (in the 1992 edition) are reductive in various respects:

- They take account only of manufacturing activities. They explicitly exclude market and public services (in contrast to the Frascati Manual, which includes R&D in the public sector and services in general).
- They take account only of *technological* process and product innovation⁵. The Oslo Manual excludes organisational innovations (except those linked to process innovations, or those that are combined with such innovations) (cf. Box 1). Various difficulties emerge when attempts are made to apply such a concept of innovation to services. Firstly, the distinction between product and process innovation may prove difficult to apply. Secondly, innovation in services can be realised without recourse to technology, particularly organisational innovation, which may have a direct impact on the nature of the service and seems to play a very important role in this type of activity.

The Oslo Manual makes a distinction between radical innovation and incremental innovation that is important in theoretical terms, although some have questioned whether it can be maintained in a questionnaire intended for service activities.

Despite these limitations, however, this conception of innovation is significantly more extensive than that contained in the Frascati Manual. In consequence, application of it to services will help to elucidate certain aspects of innovation in this area of activity.

Box 1 : some definitions of innovation according to the OECD Oslo Manual (1992)
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⁴ Very few countries have taken the opportunity. In the case of France, the statistical reports compiled by the Department of Research and Technology clearly indicate that “R&D work in the social and human sciences is not taken into account because of the small role they play in industrial research and the difficulties specific to this area”.

⁵ The very title of the Oslo Manual is very explicit, alluding as it does to “guidelines for collecting and interpreting technological innovation data”.

Technological innovations comprises 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 organisational, financial and commercial activities.

Major product innovation is a product whose intended use, performance characteristics, attributes, design properties or use of materials and components differs significantly compared with previous manufactured products. Such innovations can involve radically new technologies, or can be based on combining existing technologies in new uses.

Incremental product innovation is an existing product whose performance has been significantly enhanced or upgraded. This again can take two forms. A simple product may be improved (in terms of better performance or lower cost) through use of higher-performance components or materials, or a complex product which consists of a number of integrated technical sub-systems may be improved by partial changes to one of the sub-systems.

Process innovation is the adoption of a new or significantly improved production methods. These methods may involve changes in equipment or production organisation or both. The methods may be intended to produce new or improved products, which cannot be produced using conventional plants or production methods, or essentially to increase the production efficiency of existing products.

The Dutch survey carried out in 1993-1994 (cf. Brouwer and Kleinknecht, 1995a) occupies a particular position in this first group (cf. table 1). It is based on a slightly modified version of the questionnaire used in the first EC innovation survey. Whereas the questionnaire designed for use in manufacturing industry defines innovation as “the development or the introduction of new or technologically improved products or services”, the word *technologically* is missing from the questionnaire intended for service firms. Despite this semantic precaution, which reveals an awareness of the fact that innovation in services is not necessarily technological, we classify this survey in category A on different grounds:

1) This “extended” general definition is rapidly called into question by supplementary definitions that are narrower in scope (i.e. they omit the “semantic precaution”), such as the following: “innovation can be: the use of a new or improved *technology* (designed by you or by others) or an original application of an existing *technology*”.

2) The examples of innovation listed in the questionnaire are, without exception, technological to varying degrees: remote-access information, tele-shopping, freephone numbers, magnetic cards, to cite the service innovations listed, and electronic data interchange (EDI), CAD/CAM, monitoring and location systems and voice mail systems, to cite the process innovations listed.

3) Organisational innovations are explicitly excluded.

c) The set of national surveys recently carried out as part of the second Community Innovation Survey (CIS-2) also belong to this “subordinate” group of service innovation surveys. These national surveys are based upon the 1997 revised version of the Oslo Manual. In the revised version, the concern with services is manifested in three main changes: the introduction of a paragraph stating that the “the term “product” is used to cover both goods and services”, a warning about the difficulty of distinguishing, in some cases, between product and process innovations and the introduction of a box listing some examples of innovation in services. As we will see (§ 1.2), paradoxically, the pilot surveys carried out in order to revise the Oslo Manual and to prepare the CIS-2 rather belong to the “autonomous” surveys group.

CIS2 (double-lined in table 1) has been conducted for market services in all of the European Union (excepting Spain) but all the results are not yet available in each country (see Muzart, 1999).

Characterisation of the survey : institutions actors, counties concerned	Year of commencement or periodicity Period or year covered	Size of the population : (PS) Size of the sample (SS), Response rate (RR)	Sectors involved	Definition of innovation	Main themes tackled
Dutch Ministry of Economic Affairs (Kleinknecht, Reijnen, Verweij, 1990 ; Kleinknecht, Reijnen, 1992)	1989 1988	PS : 7500 (half belonging to the service sector) SS : 4352 RR : 58,1% (equally distributed between the two sectors)	Manufacturing and service sectors as a whole	R-D in Frascati manual's sense is the basis of the questionnaire Distinction is made between product and process innovation The same questionnaire is used for manufacturing industries and services	- Patents - National and international R-D cooperation - R-D employees (men-year) distributed according to innovation types (product/process) - Acquisition of sophisticated technical systems for office or production automation - software internal development or external acquisition - Innovation impediments - Personnel training strategies - Use of innovation support public institutions - Current or foreseeable importance of basic technologies such as information technologies, biotechnology, new materials.
Dutch Ministry of Economic Affairs. Extension to services of the Community innovation survey (CIS) : Dutch pilot survey, (Brouwer, Kleinknecht, 1995a and b)	1993-1994 1990-1992		Public utilities, building, retailing and wholesale, hotels, restaurants, transport, communication, bank, insurance, other commercial services, other non commercial services	Use of a slightly modified variant of the CIS questionnaire (in order to allow comparisons between manufacturing and services)	Focus on R-D, innovation costs, innovation effects. In order to reach a satisfactory enough response rate, exclusion of the following questions: protection modes, impediments, sources, objectives
National research council (Evangelista and Sirilli, 1995)	March-July 1995	9 interviews	Banking and financial services, insurance, waste disposal, power supply, telecommunications, market research	Eurostat questionnaire experimentation (cf. table 3) but a more restrictive definition of innovation (i.e. more focused on technology) is used.	Conceptual and methodological problems analysis: - innovation definition - product and process distinction - innovation costs evaluation - economic impacts - innovation examples
Austria (CIS-2)	1994-96 or 1996	SS: 1003 RR : 39%	CIS-2 sectors : -Wholesale trade and commission trade -Transport and telecommunications -Financial intermediation -Computer and related activities-Engineering services	Oslo manual (1997): Innovation = introduction of technologically new or significantly improved services or implementation of technologically new methods for service delivery.	CIS-2 themes : -general information about the enterprise -scope and impact of technological innovation and innovation activity of the enterprise - factors influencing innovation activity
Belgium (CIS-2)	<i>id.</i>	SS : 1394 RR : 65%	CIS-2 sectors	Oslo manual (1997)	CIS-2 themes
Denmark (CIS-2)	<i>id.</i>	SS : 1073 RR : 28%	CIS-2 sectors	Oslo manual (1997)	CIS-2 themes
Finland (CIS-2)	<i>id.</i>	SS: 964 RR : 71%	CIS-2 sectors	Oslo manual (1997)	CIS-2 themes
France (SESSI, INSEE) (CIS-2)	1997 <i>id.</i>	PS : 500 RR : 54% PS : 3000 RR : 85%	- Banking and insurance - Transport, Telecommunication, engineering and IT services	Oslo manual (1997)	CIS-2 themes
Germany (CIS-2)	<i>id.</i>	SS: 5951 RR: 22%	CIS-2 sectors	Oslo manual (1997)	CIS-2 themes
Greece (CIS-2)	1995-97 or 1997	SS : 1000	-	Oslo manual (1997)	CIS-2 themes
Iceland (CIS-2)	<i>id.</i>	SS: 300 RR: 60%	Transport and telecommunications	Oslo manual (1997)	CIS-2 themes

			Real Estate, Renting and Business activities		
Ireland (CIS-2)	1994-96 or 1996	SS: 967 RR: 29%	CIS-2 sectors	Oslo manual (1997)	CIS-2 themes
Italy (CIS-2) (Sirilli, Evangelista, 1998)	November 1996 February 1997 1993-1995	SS : 6005 RR:29%	Market services : Wholesale and retail trade, Transport, storage and communication, Financial intermediation, Real Estate, Renting and Business activities	Revised Oslo Manual (1997). Actually there are some differences as far as the final version of the revised manual wasn't available when the survey was launched	CIS-2 themes (few differences)
Luxembourg (CIS-2)	1994-96 or 1996	SS: 238 RR : 81%	CIS-2 sectors	Oslo manual (1997)	CIS-2 themes
Netherlands (CIS-2)	<i>Id.</i>	SS: 3590 RR: 74%	CIS-2 sectors + others	Oslo manual (1997)	CIS-2 themes
Norway (CIS-2)	1995-97 or 1997	SS: 1102 RR: 90%	CIS-2 sectors + others	Oslo manual (1997)	CIS-2 themes
Portugal (CIS-2)	<i>Id.</i>	SS: 2469 RR: 72%	CIS-2 sectors	Oslo manual (1997)	CIS-2 themes
Sweden (CIS-2)	1994-96 or 1996	SS: 1108 RR: 72%	CIS-2 sectors + others	Oslo manual (1997)	CIS-2 themes
United Kingdom (CIS-2)	<i>Id.</i>	SS: 2114 RR:36%	CIS-2 sectors + others	Oslo manual (1997)	CIS-2 themes
Innovation Research Center (IKU), Hungary	30 march 1999 15 June 1999 1998	SS: 1000 RR: 25%	Financial intermediation Wholesale and retail trade (excluding motor vehicle repair) Communications Computer and related activities Research and Development Engineering and other technical activities (excluding architectural activities)	Oslo manual (1997)	CIS-2 themes
Consejo Nacional de Ciencia y Tecnologia (CONACYT), Mexico	mid June 1997 mid august 1997 1994-96 or 1996	SS: 205 RR: 87%	Telecommunications Financial intermediation Computer and related activities	Oslo manual (1997)	CIS-2 themes + : Description of the main innovation of the firm
Federal Office for Economic Development and employment + Konjunkturforschungsstelle (Switzerland)	1994-96 or 1996	SS: 2200 RR: 32%	Private services	Oslo manual (1997)	CIS-2 themes + : Market conditions, Qualitative information, Effectiveness of various appropriation instruments,...
State Instate of Statistics (Turkey)	May1998- August 1998 1995-97 or 1997	SS: 1224 RR:40%	Telecommunications Financial intermediation Computer and related activities	Oslo manual (1997)	CIS-2 themes + : Use of Internet, Factors which have changed the establishment, Work being done by engineers in the establishment
INSEE (French statistic Office), France (Cases, 1998)	1997 <i>Comparison</i> 1997 – 1994	PS : 1616 RR : 76%	Accountancy firms	This survey is not directly devoted to innovation but rather to computerisation.	Types of hardware and software available. Types of use. Constraints and obstacles. Consequences on work organisation. Training.

Table 1 : The “subordinate” surveys

1.2 The “autonomous” surveys

These various surveys all share a desire to take account, to some extent, of *the specificities of innovation in services*. They do not confine themselves to compiling inventories of technological innovation, but seek, in their various ways, to take other aspects of innovation into account.

This group of surveys can be divided into two subgroups:

- 1) The experiments carried out within the framework of Eurostat and the Voorburg group (an international group bringing together representatives of the various national statistical services) with a view to amending the Oslo Manual. They have a particular status, in the sense that they actually constitute experimental mini-surveys intended to test questionnaires and definitions. Nevertheless, their concern with methodological issues deserves particular attention.
- 2) National surveys of varying scope: large-scale surveys such as those conducted by the ZEW and the DIW in Germany and the small, exploratory surveys, such as those carried out by DTI in Denmark and IFRESI-University of Lille I in France.

a) As far as the first group is concerned, we will limit ourselves to two examples of varying scope in order to illustrate the relatively extensive definitions of innovations used: the 1995 Germany survey (Licht et al., 1995; Hipp et al., 1996) and the 1997 French survey (Djellal and Gallouj, 1998).

The German survey identifies three types of innovation: product innovations, process innovations and organisational innovations. In the first two categories, account is also taken of technological intensity and degree of novelty.

The 1997 French survey, for its part, identifies four types of innovation (as does the Danish survey, incidentally):

- product-service innovation, defined broadly enough to encompass tangible and “intangible” products (e.g., a new training method, a new area of consultancy, etc.);
- process innovation, again defined in such a way as to include technical systems and more intangible processes (such as consultants’ methods);
- (internal) organisational innovation, which differs from the previous type in that it constitutes the structure within which activities and processes take place. The introduction of a matrix structure, for example, belongs in this category;
- external relational innovation, defined as the establishment of particular relationships with a firm’s partners, whether they be customers, suppliers, public authorities or competitors (e.g. strategic alliances, new types of interface, appointment of a mediator or ombudsman, etc.)

Like the German survey, the French survey focuses on the technological content of each of these innovations by introducing a distinction between 1) “innovations in which technology plays no role at all”, 2) “innovations that are not technological but that cannot be realised without the use of technologies” and 3) “technological changes, in the sense that the innovation is a technology embodied in tangible equipment”.

Furthermore, in order to be able to encompass certain innovations that fall outside the preceding typology, the French survey makes attempt to deal with specific modes of innovation such as : ad hoc innovation, custom-made innovation, architectural innovation, formalisation innovation (for a theoretical appraisal of these modes of innovation see Gallouj and Weinstein, 1997).

b) The Voorburg group has engaged in some interesting thinking on ways of amending the Oslo Manual in such a way as to take better account of innovation in services. As part of its deliberations,

the Australian and Canadian statistical services (Gault and Pattinson, 1994, 1995; Pattinson, Ovington, Finlay, 1995)⁶ have suggested, contrary to the Oslo Manual (OECD, 1992), using a broad definition of innovation that eliminates all references to technology and introduces types of innovation not taken into account by the Oslo Manual. Thus innovation is regarded as “the introduction of new or significantly changed services or ways of delivering services” or [to the extent that innovation in services may involve the introduction of new goods] “as the introduction of new or significantly changed goods”. In addition to product and process innovation, three other forms of innovation are also referred to in the Australian and Canadian questionnaires: the implementation of advanced management techniques, significant changes in organisational structure and the implementation of new or significantly altered company strategies.

This debate on the nature of innovation in services is being conducted against the background of a general desire, jointly affirmed by the OECD and the European Union, to revise the Oslo Manual, particularly by taking innovation in services into account. Eurostat has entrusted several European countries with the task of testing a questionnaire specially designed for services with a view to incorporating these activities into the EU innovation survey.

The various pilot surveys on innovation in services launched by Eurostat (and with which the Netherlands, Germany and Italy have been entrusted) are based on the following definitions of innovation in general and product process innovation in particular (Gault and Pattinson, 1995; Eurostat, 1995):

- Innovations in the service sector comprises new services and new ways of producing or delivering services as well as significant changes in services or their production or delivering. An innovation has been implemented if it has been introduced to the market (product innovation) or used in producing services (process innovation).
- Product innovations are services whose intended use or performance characteristics differ significantly from those already produced. Innovations should be results of the use of new or new combinations of technologies or of other substantive investments in *new knowledge*⁷.
- Process innovations are new or significantly improved ways of producing or *delivering*⁸ services.

These definitions of innovation give rise to the following observations:

- They do not view innovation solely from the point of view of its technological characteristics. Only the definition of product innovation contains an explicit reference to the technological aspect. Further, the introduction of the notion of knowledge considerably extends this definition of innovation.
- They maintain the distinction between product and process innovation and introduce a new, subtle distinction, namely innovation in “delivery”⁹.
- Unlike the proposals put forward by Gault and Pattinson (1994) and Pattinson, Ovington and Finlay (1995), they do not take organisational innovation into account.

⁶ These proposals were drawn up by the Voorburg group at the request of the UN Statistical Commission, which wanted to add an innovation module to its standard surveys on services activities in order to facilitate international comparisons.

⁷ Our italics.

⁸ Our italics.

⁹ Delivery innovation is according to Miles (1997) a major form of innovation in services.

- They do not reject the distinction between radical and incremental innovation that exists in the Oslo Manual.

Characterisation of the survey : institutions actors, countries concerned	Year of commencement or periodicity <i>Period or year covered</i>	Size of the population : (PS) Size of the sample (SS), Response rate (RR)	Sectors involved	Definition of innovation	Main themes tackled
Australian Bureau of Statistics (Pattinson, Ovington, Finlay, 1995; Gault and Pattinson, 1994, 1995)	1994 <i>1st July 1993-30 June 1994</i>		Mining, electricity, gas and water supply, construction, Wholesale trade, accommodation, cafés, restaurants, transport and storage, communication services, finance and insurance, property and business services, education, health and community services, cultural and recreational services, personal and other services	Oslo manual, important adaptations in order to take account of different types of nontechnological innovations (organisational innovations, new advanced management techniques, substantially new corporate directions or strategies). Rather integrative approach : possibility of comparison between manufacturing and services	- Types of innovation - Sources - Obstacles - Costs - Comparison manufacturing services - List of concrete examples
Statistics Canada (Gault and Pattinson, 1994, 1995) Results not published to our knowledge	1994		Idem.	Idem	Idem
Swiss pilot survey, carried out by ETH for Bundesamt für Konjunkturfragen (Etter, 1995)	1994	SS : 77 firms	Construction and the whole service sector (except public services)		- Sources - Cooperation - Objectives - Obstacles - Costs - Examples
Statistics Netherlands for Eurostat/DGXIII. Pilot survey (de Lanoy, Meijer, 1995)	1995	13 interviews	Wholesale and retail trade, communication, banking and insurance, IT services, engineering et technical consultancy		Conceptual and methodological problems - innovation definition - product and process distinction - innovation costs evaluation - economic impacts - innovation examples
ZEW et Stifterverband, Germany for Eurostat/DGXIII. Pilot survey (Akerholm, Jutte, 1995)	1995	20 interviews			Same themes as above
Statistics Sweden for Eurostat/DGXIII. Pilot survey (Rosengren, Ouazzani, 1996)	29 April-7 June 1996	20 interviews	Wholesale of machinery, equipment and supplies, land transport, Post and telecommunications, banking, software consultancy and supply companies, technical consultancy companies, advertising and marketing companies		Same themes as above
ZEW (Zenter für Europäische Wirtschaftsforschung ; FhG-ISI (Fraunhofer Gesellschaft-Institut für Systemforschung und Innovation) and Infas Sozialforschung Survey commissioned by the Federal Ministry of Education, Science, Research and Technology (BMBF) (Licht et al., 1995;	1995 <i>1993-1995</i>	PS : 11 000 firms SS : 3000 firms RR : 27%	Wholesale trade, retail trade, transportation, banks/insurance, financial consultancy, software, technical consultancy, other business services	Oslo manual definitions adapted. - Enlarged definition of innovation (open question in order to let the firm representative decide) : Object approach - distinction product/process maintained - No focus on technology. Technology is just one of the possible characteristics of products and processes - organisational innovation (which is not include in the Oslo manual) is taken into account	- Innovation and R-D efforts - Clients-suppliers interfaces - Relevance of certain technologies - Obstacles - Structure of innovation expenditures - Sources of information - Impacts on employment - internationalisation and innovation - Examples

Hipp et al., 1996)					
ZEW ; FhG-ISI and Infas. Survey commissioned by BMBF (Ebling et al., 1997)	1997 1994-1996	PS : 11 000 SS : 2500 RR : 23%	idem	idem	idem
DIW, Deutsches Institut für Wirtschaftsforschung (Eickelpasch, Pfeiffer, 1997 ; Preissl, 1997)	1996	TE : 775 firms	IT services, management consultancy, architecture, technical planning, R-D, marketing, other business services	Frascati and Oslo manuals adapted. Introduction of organisational innovations. Enlarged definition of R-D. This survey is devoted to innovation in services in Berlin only.	- Innovation abilities - Technological dimensions - R-D and R-D collaboration - Public support for R-D - Sources
Djellal and Gallouj, 1998, France, EC DG XII (SI4S project)	June 1997- october 1997 1992-1997	PS: 3500 firms SS : 324 firms RR : 10%	Bank, insurance, consultancy, hotels, restaurants, retail trade, transport, cleaning	Large definitions taking non technological dimensions into account Product, process, organisation and external relationship innovations. But also tailor made, association, dissociation innovations.	- Types of innovation - Technological content - Novelty degree - Objectives - Obstacles - Sources of information - Internal and external actors - Innovation process - R-D - Costs - Projects duration - Protection means - Concrete examples
DTI Denmark, 1997, EC DG XII (SI4S project)	1997 1993-1997	SS = 637 firms	Financial services, Hotels, Restaurants, Retailing, Transport, Cleaning services, Publishing, Entertainment, Telecommunications, Estate agents, Health care, Business services	Large definitions taking non technological dimensions into account Product, process, organisation and external relationship innovations.	Same themes as above
Australian Bureau of Statistics	Mid-August 97-End September 97 1-7-94 to 30-6-97	SS: 2600 RR: 95%	Telecommunications and information technology Finance and Insurance	Oslo Manual (1997) + organisational and managerial innovations	CIS-2 themes + : -Organisational and managerial innovation -Abandoned innovations -Business strategies -Impacts on business activities -Source of funds -Case studies -Use of advance technologies
Statistics Canada	February 97 End May 97 1994-96 or 1996	SS: 6150 RR: 88%	Telecommunications, selected finance and insurance, and selected business services (software developers and computer service providers, consulting engineering and scientific and technical services)	Oslo Manual (1997) + organisational changes	CIS-2 themes + : -Use of Internet -Organisational changes -Frequency with which new products replace old ones - Frequency with which innovation is introduced -Relationship between innovation and selected technologies -Time between the start of activity and commercialisation of innovation -Impact of innovation on exports -Employment -Skills

Table 2 : The “autonomous” surveys

2. The methodological limits and their theoretical interpretations

As has already been stressed, it is the (specific) nature of service activities that makes it difficult to design and conduct surveys. These limits have, therefore, to be considered in the light of the specificity of services and of innovation therein.

The specificities generally attributed to services can be summarised by means of a number of statements that will be examined below with a view to identifying the consequences they may have for innovations.

2.1 The product is a “nebulous” process

It is difficult to locate the boundaries of a service in the same way as those of a good can be fixed.

They have to be considered within a three-dimensional space:

- The time horizon of the service provided, which is made up of the delivery of the service in the short term, what Gadrey (1996) calls the “service in actuality”, and its long-term effect.
- The reference universe or “world”, in the sense of the term developed by Boltanski and Thevenot (1991), i.e. the “value system” used to evaluate the “product” in all its various dimensions¹⁰.
- The degree of materiality or tangibility in the service (which is often linked to its technological content).

In other words, unlike a good, a service does not have an autonomous existence defined by its technical specifications. It is a *social construction* (reference universe) that maintains various forms of relationship with *time* (time horizon) and *matter* (degree of materiality).

This concept of service has a certain number of consequences for the definition of innovation and the development of innovation indicators. It is to these consequences that we now turn.

- Since a service is a process, a sequence of operations, a formula, a protocol, a mode of organisation, the traditional distinctions between product, process and organisational innovation are clearly going to be problematic. For the same reasons, it is difficult to enumerate innovations. These difficulties are further compounded by the fact that a service is generally intangible.
- The relationships between technological innovation and goods are not the same as those between such innovation and services. In the case of goods, the technology is intrinsic, since it provides the use (or final or service) characteristics. On the other hand, the technology is not consubstantial with services, except to some extent in the case of certain “quasi-goods” that are defined ultimately as the collective or temporary provision of “capacities” (ATMs, rentals of all kinds). It is an external factor in the production of service (or use) characteristics. If absolutely necessary, the service could be provided without it. The service may be embodied not in technologies but in competences called on directly or in an organisation. Thus organisational innovation cannot be excluded from any investigation of innovation in services. Further, it should be noted that the fact that services are not necessarily embodied in technological systems that can be readily appropriated gives them a certain degree of volatility that means they can be more easily imitated by competitors.
- The nebulosity of the output (as reflected in the difficulty, frequently experienced, in characterising services as independent products) also causes considerable difficulties when it comes to evaluating,

¹⁰ Boltanski and Thevenot’s approach emphasises the diversity of “worlds” i.e. of value systems and of criteria of legitimacy. According to the nature of the dominant value system it distinguishes six “worlds”: the industrial world, the market world, the domestic world, the civic world, the creative or inspirational world, the opinion world (based upon reputation and self-esteem values).

as the Oslo Manual (1992) suggests, the economic effects of innovation (e.g. in terms of employment or effect on sales).

- The nebulosity of the output has other consequences as well. In the absence of stable reference points, it can be difficult to convince customers that the service is sufficiently new to justify them paying the price of the innovation, or to establish the difference between mere diversification or differentiation, on the one hand, and genuine innovation, on the other.

Informational asymmetries, which are generally considerable in service transactions, especially because of the “nebulous” nature of the product, are undoubtedly further compounded when the proposed service is a new one. This makes it even more difficult to persuade customers to pay the price of the innovation and to measure its economic impacts.

2.2 Services are interactive

Services are consumed as they are being produced and involve some degree of customer participation. On the theoretical level, this particular characteristic of services would seem to prohibit a linear conception of innovation. On the other hand, it is particularly consistent with an interactive model, like that advanced by Kline and Rosenberg (1986). This characteristic has certain consequences for the definitions and indicators of innovation.

- It leaves considerable space for the various forms of custom-made or ad hoc innovation that are not taken into account in the traditional questionnaires and which are less easily accommodated, it is true, within the categories of a questionnaire. To the best of our knowledge, only the 1997 French survey (Djellal, Gallouj, 1998) has attempted to take account of this type of innovation.

- It highlights the possibility of client participation in the production of the innovation (collaboration). Thus the customer can be one of the actors in innovation, with the success of the innovation process depending on the quality of the interaction.

- It reveals certain methodological difficulties when it comes to estimating the cost of innovation. In cases of custom-made or ad hoc innovation, the innovation process merges with the production process. The cost of the innovation equals the cost of delivering the service plus that of formalising or “registering” the results (cf. C. and F. Gallouj, 1996).

- It raises the problem of appropriation regimes. To whom does the innovation belong if it has been co-produced? This is not simply a technical problem (concerning the legal means of protection) but also raises the equally difficult question of the distribution of the fruits of a jointly produced innovation.

2.3 The service sector is one of extreme diversity

Differences in respect of innovation sometimes seem greater within the service sector than between some service industries and some manufacturing industries. For example, the innovation behaviour of computer services and telecommunications companies is relatively close to that of manufacturing firms and may, to some extent, be captured by the same survey arrangements. On the other hand, the types of “products” vary widely from one service activity to another. Thus the content of product innovation is not necessarily the same for a hotel service, a consultancy service or a financial service. The difficulty of applying the traditional definitions seems to increase in the case of services which

target is information, knowledge or individuals. Custom-made or ad hoc innovation occupies an important place in consultancy services, for example.

Particular attention should be focused on this type of activity and, more generally, on knowledge-intensive business services. They pose particular methodological problems, in that the providers of such services, while producing innovations in their own right, are also participants in the innovations produced by their clients, thereby contributing to what we have elsewhere termed the interactional or co-produced innovation model (Gallouj, 1998). Since the appropriation regime for co-produced innovations may not be firmly established, care needs to be taken here to avoid any double accounting of innovation.

3. Some difficulties of comparison and some paradoxes

Some of the methodological difficulties outlined above can be examined in a more concrete way. Consideration will now be given to actual survey results rather than to methodological principles. In general terms, it can be said that, in the surveys examined here, there is a certain degree of consensus in the following areas: the sources of information, the objectives of innovation and the constraints on innovation. Most of the surveys suggest that, in services, the main sources of information are clients, sales and other staff in contact with customers, suppliers (of equipment and advice) and competitors. It is also fairly common to come across the somewhat paradoxical finding that universities and other teaching and research institutions are rather unimportant sources of information and ideas on innovation.

The most frequently cited objectives of innovation are satisfaction of customer requirements, extension of the range of services, the opening up of new markets and the reduction of costs. The principal constraints listed are a lack of financial resources, official regulations and bureaucracy.

In view of this relative consensus, it does not seem prejudicial (to our understanding of the phenomena of innovation in services) to eliminate this type of questioning in order to reduce the size of the questionnaires (and thereby increase response rates) and to put the emphasis on the more problematic issues.

On the other hand, most of the questions relating to the nature of innovation produce such widely divergent responses that the validity of any comparative analysis (from whatever perspective: international, intertemporal, intersectoral...) seems to be seriously compromised. The list of problematic areas of comparison could be considerably extended, but we will restrict ourselves here to examining the following three areas: R&D, the relative frequency of the various types of innovation and comparisons between manufacturing and services.

3.1 R&D

The question of R&D has been the subject of specific surveys and investigations (cf. Young, 1996) that have not been included in this assessment of surveys on innovation. However, this subject is very frequently alluded to in most of the surveys included in the present assessment, since R&D is considered to be one of the elements, and sometimes even the main element, in the innovation process. All we are seeking to do here is to highlight the difficulty of interpreting the results and developments observed.

a) Thus the estimates produced by the OECD (according to Gault, 1995) show that, in the USA in 1992, service activities accounted for almost 25% of all R&D carried out in firms, compared with only a little more than 4% ten years earlier, in 1982.

Should it be concluded from this that investment in R&D carried out in firms increased sixfold over ten years? Our response to this question is as follows. 1) While R&D activities in service firms have indeed increased, it is perhaps not solely because of the increased investment in R&D and 2) it is likely that this increase is actually considerably greater than the figures given above.

In fact, there has not necessarily been any increase in R&D activity, but rather an improvement in our perception of it, i.e. in the sharpness of our analytical apparatus: changes in the definition of R&D, institutional changes affecting the statistical classifications and nomenclatures for manufacturing and service activities and changes in the categories to which given activities are allocated (e.g., the R&D department in a large manufacturing firm, now regarded as a service provider).

However, it may also be the case that even this degree of acuity is inadequate. The definition of R&D used in most of the surveys seldom takes into account R&D in the social sciences (even though, as we have noted, it has been included in the Frascati Manual since its third edition). Whereas this narrow definition of R&D might to some extent be acceptable in the case of manufacturing, the same cannot be said of services, where research in the human and social sciences seems to play a relatively important role (Gadrey et al., 1993). Further, as we have already noted, this definition of R&D fails to take account of the role of consultants upstream, downstream or in the course of some of their clients' innovation processes. And, despite a certain amount of progress, it still fails to take sufficient account of certain aspects of software development, which is a widespread practice in the service sector. Finally, it should be noted that R&D in services is frequently "diffuse", in that it seldom takes place in R&D departments but is often devolved to flexible project groups.

b) There can be contradictions even among surveys conducted in the same country. Thus according to the 1993-94 Dutch survey, 25.1% of manufacturing firms engaged in some R&D activity in 1992 (in-house or subcontracted), compared with 8.1% of service firms. On the basis of the 1989 survey, however, Kleinknecht and Reijnen (1991) show that the number of firms engaged in R&D activities is virtually the same in manufacturing and in services. These authors also note that there are many more firms with fewer than 20 employees engaged in R&D in the service sector than in manufacturing. More generally, it would seem that R&D is underestimated in small firms. According to the 1993-94 innovation survey, the share of small firms engaged in R&D activities is significantly greater than the R&D surveys carried out by the Dutch statistical service would suggest. According to Kleinknecht and Reijnen (1991), this difference is attributable to the simplicity of the R&D indicator used in the innovation survey, namely the number of people per year engaged in R&D. More generally it seems that official data underestimate R-D because almost all R-D surveys are based on samples of believed R-D performers and miss out small firms and other unknown R-D performers who get picked up by representative samples and censuses¹¹.

3.2 Intersectoral comparisons

One conclusion emerges, implicitly or explicitly, from many of the surveys, particularly from those of the "subordinate" type (category A), namely that *manufacturing industry is said to be more innovative than services*. This conclusion is an ambiguous one, since it applies only to technological

¹¹ This comment was suggested to us by one of the anonymous referees of the review.

innovation. Within the service sector itself, moreover, the most innovative firms (in the technological sense of the term) are those most closely linked to information and telecommunications technologies (computer services firms, telecommunications companies, etc.). The survey conducted in France by SESSI as part of the second EU survey clearly shows that the frequency of innovation in this area of activity is greater than in manufacturing industry as a whole.

On the other hand, if a broader definition of innovation is used, as in the “autonomous” surveys (Table 2), then the conclusions may be significantly different.

3.3 Comparison between different types of innovation

The question raised here is that of the commonest form of innovation. Examination of the findings produced by different surveys shows that, depending on the case in question, the frequency of a given type of innovation may be greater than that of another (cf. table 3). At present, this observation does not seem to have any real economic significance. Indeed, the variety of definitions used by those conducting the surveys, and the diverse ways in which these definitions are interpreted by the survey “subjects”, combine to make any comparison a tricky matter.

Surveys	Survey 1 : Netherlands (93-94)	Survey 2 : Italy	Survey 3 : Australia (93-94)	Survey 4 : Germany (ZEW, 1995)	Survey 5 Germany (DIW)	Survey 6 : France IFRESI (92-96)	Survey 7 : Denmark DTI (92-96)
Main types of innovation	22,3% of firms have introduced product innovations during the period 90-92 13% process innovations	The most of the innovations introduced are process innovations, introduced either in isolation (30.7%) or in conjunction with new services (17.1%) 18,1% of firms have introduced product-service innovations in isolation.	5,4% of firms have introduced new goods 8,7% new services 11,5% technological innovations 13,9% non technological innovations (i.e. the implementation of advanced management techniques, substantially changed corporate directions or strategies, changes in the organisational structure)	1/3 of innovations are product innovations 1/2 process innovations 13% organisational innovations 59% non technology-intensive product or process innovations 28% technology-intensive product or process innovations	40% are organisational innovations 38% product innovations 22% process innovations	70,4% of firms have introduced product innovations 61,4% process innovations 48,8% organisational innovations 41,7% external relationship innovations	36,8% of firms have introduced product innovations 38,3% process innovations 55,1% organisational innovations 45,2% external relationship innovations

Table 3 : Comparison of the main types of innovations introduced

For example, the 1997 French survey, which covers the period from 1992 to 1996, identifies four types of innovation: product innovation, process innovation, organisational innovation and innovation in external relations. It finds that these various types of innovation are declining in frequency. In reality, the problems of defining the boundaries between the various categories reduces the import of such a finding. Using the same questionnaire, the Danish survey produces not only significantly different frequencies but also a completely different classification, since the most frequent forms of innovation in Denmark are organisational and external relational innovations, while product innovation is the least frequent.

Two relatively large-scale surveys conducted in the same country - Germany - produce contradictory results. In the ZEW survey, the hierarchy of frequency is as follows: process innovations (53%), product innovations (34%) and organisational innovations (13%). In that conducted by the DIW, which focuses on Berlin, the hierarchy is completely reversed: organisational innovations (40%), product innovations (38%) and process innovations (22%). If we reject the unlikely hypothesis of a peculiarly Berlin specificity¹², then the explanation for these differences may lie in a certain degree of confusion between process and organisational innovation or, more generally, in the inability of these three categories adequately to apprehend innovation in services.

As far as the “subordinate” group surveys are concerned (i.e. those based on a restrictive definition of innovation), comparisons are no more satisfactory. The 1993-94 Dutch survey, for example, shows that product innovations are more common than process innovations (22.3% of service firms are said to have introduced product innovations, compared with 13% that had introduced process innovations). On the other hand, the Italian survey (which, it is true, covers a different period) indicates that most of the innovations implemented are process innovations, introduced either in isolation (30.7%) or in conjunction with new services (17.1%). Firms that have introduced product innovation in isolation are rarer (18,1%).

4. Conclusion: should surveys be abandoned?

As far as national and international surveys on innovation are concerned, thinking on methodology, and the corresponding experiments, have followed the same cycle as theoretical deliberations. As already noted, strictly technological concerns (conveyed by the innovation indicators adopted by national and international organisations) have been followed, though not replaced, by questioning about the specificities of innovation in services (service-oriented concerns) and a desire to take account of these various types of concerns without sacrificing either the technological dimension or the question of the specificities of innovation in services.

The debates that took place in the course of the project to revise the Oslo Manual (the main points of which have been summarised above) opened up a number of new and very fruitful paths, some service-oriented, others more integrative in scope, as witness the large number of memoranda written on that occasion¹³. However, these new paths have not been taken into account in the most recent edition of the Oslo Manual (OECD, 1997). The revised manual clearly reflects a concern to integrate services into innovation surveys, but retains the restrictive and technologist definitions of innovation (see §1.1.c above). Various types of argument might be advanced to justify this institutional choice:

- It endorses the (conscious or subconscious) argument that, ultimately, only technological innovation is of any importance.
- The undeniable rise to prominence of information technologies in services (including in some that have traditionally been concerned largely with material operations) is indicative of a trend towards a reduction in the importance of the non-technological dimension. If this were the case, it would not be necessary to investigate an element of innovation that might be regarded as being “in the process of disappearing”.

¹² Even if Berlin is a capital, a site of HQs, media, consultancies, etc.

¹³ Some of these memoranda are referenced in the bibliography (Akerhlof and Jutte, 1995; De Lanoy Meijer, 1995; Eurostat, 1995; Gault, 1995; Gault and Pattinson, 1994, 1995; Pattinson, Ovington and Finlay, 1995; Rosengren and Ouazzani, 1996...)

- The choice is indicative of a certain pragmatism. It is intended to keep open certain opportunities for international comparisons. In a way, a form of integration has taken place, a minimalist form in which account is taken of technological innovation in both the manufacturing and the service sectors.

For our part, we would argue in favour of a more extensive (maximalist) form of integration that would take account of both technological innovation and non-technological forms of innovation (not only in services but in manufacturing industry as well). Certain areas of activity that are now of considerable importance in our economies (hotels and catering, tourism, etc.) have their origins in very simple ideas wholly devoid of technological content. In other words, technology is important, but organisation and other forms of innovation that are not necessarily technological are equally important. The rise to prominence of information technologies should not be considered within the framework of a zero-sum game. On the contrary, there is a wealth of examples (in distribution, financial services etc.) that illustrate the existence of a dialectical relationship between the all-pervasive use of information technologies and the increase in service levels.

True, there are serious methodological problems to be resolved, but reasonably wide-ranging surveys have already been conducted in some countries and have produced relatively satisfactory results. If it is necessary at all, pragmatism should be used not in restricting the object of analysis but in changing survey practices. It is likely, for example, that tailor-made processing and questionnaires are currently preferable to more general questionnaires covering all service activities. In other words, in attempting to come to terms with the extreme heterogeneity of the service sector, it would seem useful to construct questionnaires tailored to relatively homogeneous "sub-groups". Thus the following sub-groups, which differ from each other particularly in the degree of service standardisation, could be envisioned: intellectual services (e.g. consultancy), operational and manual services (cleaning, transport, catering, caretaking...), informational and relational services (banking, insurance...) and combinations of goods and services (such as distribution and hotel services).

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