



New modes of innovation: how services benefit industry

Jean Gadrey, Faïz Gallouj, Olivier Weinstein

► To cite this version:

Jean Gadrey, Faïz Gallouj, Olivier Weinstein. New modes of innovation: how services benefit industry. *International Journal of Service Industry Management, Emerald*, 1995, 6 (3), pp.4 - 16. <10.1108/09564239510091321>. <halshs-01114102>

HAL Id: halshs-01114102

<https://halshs.archives-ouvertes.fr/halshs-01114102>

Submitted on 7 Feb 2015

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

(Published in International Journal of Service Industry Management : GADREY J., GALLOUJ F., WEINSTEIN O. (1995), New modes of innovation : how services benefit industry, International Journal of Service Industry Management, Volume 6, n°3, p. 4-16)

NEW MODES OF INNOVATION: HOW SERVICES BENEFIT INDUSTRY

Jean Gadrey, Faïz Gallouj
Last-Clersé-Ifrési, Université de Lille I

Olivier Weinstein
Crei, Université de Paris-Nord

ABSTRACT

Despite the significance of services in the economic statistics, economic theories of innovation have tended to ignore them, or to assume that innovation in services consists of little more than adopting innovations developed in industry. This view is subjected to a critique based on three questions: (1) why is innovation in services misunderstood or neglected in economic theory? (2) what do field observations indicate are the principal forms of innovation in services? (3) how can these observations help to broaden and enrich the economic theory of industrial innovation?

INTRODUCTION

Economic theories of innovation have tended to ignore services or to assume that innovation in services consists of little more than adopting innovations developed in industry. Yet theories of innovation developed on the basis of observations of industry are inadequate to explain the forms of innovation which predominate in services. The result is a clear gap in our knowledge concerning research and development (R&D) and innovation in the tertiary sector. This is not to suggest that industry and services are unrelated. Concepts derived from industry can prove useful, as long as they are modified, and certain recent theories of

industrial innovation are particularly valuable for understanding services. The reverse is also true; observation and theorization of innovation in services may have much to offer to the analysis of industrial innovation.

This paper is organized as follows. In the first section, we examine why innovation in services is poorly understood. In the second and third sections we describe the forms of innovation in services that we have observed in our field research. In the fourth section we discuss whether innovation in services is fundamentally different from innovation in industry. The paper is based on a study undertaken for the French Ministry for Research, involving interviews at thirty firms engaged in consultancy, insurance, and electronic information services.

WHY INNOVATION IN SERVICES IS POORLY UNDERSTOOD

It is frequently taken for granted that innovation in so-called non-productive activities is not worthy of analysis. This approach is due to a certain theoretical discourse, the silences and omissions in which are as significant as the positive claims.

- a) The general theoretical framework that has had the most impact on the neglect of innovations in services is probably the one (developed over two centuries by professional economists but also taken for granted in the lay world) which consists of an economic structure with industry at the centre and services at the periphery. There are other frameworks that point in the same direction: industry considered as the engine of growth with services as induced activities, industry as a source of competitiveness with services as a "shelter" or "sponge" for the employees industry no longer needs. Indeed there are a host of modern versions which assume service work to be non-productive. Quite clearly, if industry is believed to be the engine of the productive system and the source of wealth and competitiveness, the only

innovation and R&D activities that merit attention are those related directly to industrial processes and products.

In this context it is hardly surprising that innovation in services is accorded little significance, or that few governmental policies actively promote it.

- b) To the above framework at the macro-economic level there corresponds a micro-economic framework: the image of the firm, its functions and its organization as centred around material production (or manufacturing). Once more there are scientific and lay versions, theories and practices, and numerous examples could be given. So it is that company accountants and management controllers are locked in debate over the growth of "indirect costs" which can no longer be "imputed" to the "direct costs" of each product in the traditional manner that used to buttress the view of the firm as based on the manufacture of a range of products.

We do not, of course, need to labour the parallels between the macro-and micro-economic frameworks, nor their implications in terms of an exclusive focus on innovation in manufacturing processes and products.

- c) To conclusively test this theoretical imbalance one need merely examine the field of knowledge in the economic literature known as the "economics of innovation", founded by Joseph Schumpeter. While Schumpeter himself had a broad vision of innovation, contemporary research inspired by him is most often characterized by a significant leaning towards technology or industry (for a full analysis see Gallouj (1994)).

WHAT DOES IT MEAN TO PRODUCE A SERVICE AND TO INNOVATE IN SERVICE PRODUCTION? A GENERAL APPROACH

Schematically, it is possible to define a service activity as an operation aimed at transforming some reality (C) possessed or used by a consumer (or client, or user) (B), which is carried out by a provider (A) at the request of B, often in co-operation with B, but not leading to the production of a good capable of circulating in the economy separately from its "support" C.

This definition encompasses a wide variety of service operations and situations, which may vary as a function of their support C (which is to be transformed): for instance; goods or technical systems possessed by B or under B's control; coded or standardized information (including money in its symbolic form); the individual B him/herself with his/her diverse physical, intellectual, locational characteristics; organizations, with their various dimensions (technical, structural, collective competencies and knowledge).

To produce a service, therefore, is to organize a solution to a problem (a treatment, an operation) which does not principally involve supplying a good. It is to place a bundle of capabilities and competencies (human, technological, organizational) at the disposal of a client and to organize a solution, which may be given to varying degrees of precision. If precision is required, the solution may take the form of a range of services or "formulas" which are highly codified or standardized. In this case we have quasi-products which can then be marketed as "solutions in search of problems". If solutions are less precise and are limited to general and very flexible methods and to fields of expert knowledge which need to be combined in a different manner each time they are used, we have "customized" services further removed from traditional industry (mass production or production of ranges of products) but sharing aspects in common with order-driven industrial production of single products ("dedicated" products). As things stand currently, it will be accepted that the "customized" aspect is more significant in services than in industry, and that in services it is more common to find (the two phenomena being linked) "co-production" situations in which clients participate in providing the service (in resolving the problem) and therefore in

individualizing solutions.

What are the implications of these considerations for the most common forms of organizing innovation and R&D in services?

a) If producing a service is equivalent to organizing the accessibility of a bundle of capacities to execute a "repair" activity or "treatment", this implies that innovation assumes two main forms:

- organizing the solution of new problems or conceiving formulas or even service-products which are to varying degrees new to the market or new to the firm (ranging from mere improvements to radical new forms). New problems may be meticulously formulated by the client. They may also be "produced" by innovative service providers anticipating changes in demand. The identification of problems may also result from the interaction between service provider and client.

- a more efficient (in terms of productivity, relevance, or quality) way of organizing a solution to the same type of problem.

It is sometimes difficult to distinguish between process innovation and product innovation. It might nonetheless be conceded that if service-products designate the type of problems they treat, the first types of innovation above are truly "product innovations" (this almost always implies innovation or modification to the process as well) whereas the second types are solely process innovations (methods, organization, technical systems, etc.).

b) The organizational aspect of innovation (which includes technical support) is particularly prominent in services, while one rarely comes across research and innovation related to components and materials^[1] or which calls upon the natural and

life sciences. Priority is more likely to be given to the human and social sciences, to information sciences, sometimes to mathematics (banking and insurance, for instance), and to the new disciplines located at the boundary between the social sciences and the "hard" sciences: such as linguistics, cognitive/psychological sciences, or operational research methods. What frequently results is a blurred distinction between fundamental or "basic" research and "applied" R&D. Very often, in industry, basic research concerns components and materials while applied R&D concerns "architecture", assembly, prototypes and initial testing. In services, almost everything derives from "architectural" innovation, with strong emphasis on the design and development of organizational formulas.

- c) The development of information technologies plays a central, though not exclusive, role in the transformation of many service activities. The implications of the rise of information systems (understood in a broad sense) for the activities of service firms and more specifically for R&D-innovation activities are complex and must be understood at several levels.

At the most immediate level, technology (in the common-sense usage of the word) is penetrating into systems for processing and circulating information in a growing number of service firms. Some of them (banking and insurance in particular) have developed new technologies (expert systems, image processing techniques, for instance).

At a second level, information systems open up several possibilities for creating new types of services and developing new ways to provide services. This is undoubtedly the most significant impact of information technologies: they themselves create a new dynamic of service innovation. In fact for most service firms this new regime of innovation calls for new methods of design, since the design of new services, or the transformation of existing services, implies a new range of competencies combining

the traditional knowledge of a profession with knowledge about information technologies. The resulting challenges lead to the establishment of ad hoc structures which permit greater autonomy in design. In some cases this in turn leads to the establishment of separate R&D structures.

Finally, at a deeper level still, the development of information technologies and information science is likely to transform the ways in which competencies and bodies of traditional knowledge are "formalized" in the various professions.

INNOVATION AND R&D IN THREE SERVICE SECTORS

The three service sectors under examination here are insurance, consultancy, and electronic information services. In each case our analysis concerns the principal categories of innovation we have encountered and illustrates the multiplicity of these.

Innovation in the insurance sector

In a pragmatic fashion it is possible to identify types of innovation as a function of their objectives. The following types of innovation (not to be confused with types of innovation process) are observable in insurance companies (and frequently in banks too):

1) Innovations in "service-products" where the prime concern is to hone and develop a new service, a new "formula", which many firms tend to call a new "product". A new "service-product" is a new formula for managing the financial problems of a client or group of clients. This is often associated with a new contract (which might correspond to the opening of an account or file, or the signature of an actual contract). This is a service (a formula) of contractually making available methods and competencies for managing the money of clients

under conditions which are novel, "novelty" referring to the perspective of utilization, of the client.

2) "Architectural" innovations, which bundle or unbundle existing "service products", namely:

- the bundling or integration of services, consisting of offering formulas or contracts in which the service provider commits itself to treat a bundle of problems or operations on behalf of the client which were previously dealt with by separate formulas or contracts.
- inversely, the separation of services by isolating a type of service or a sub-set of operations which previously formed part of an integrated service, offering it as a new service sold separately or as an option.

Although in this case new "formulas" emerge, as they do in the first type, it is useful to identify this second modality separately, and consider it as a sub-set of the first type.

3) Innovations which modify the "service-product". In this case we consider that the core of the service, as seen from the client's perspective, is unchanged, which is most often revealed in the fact that its "denomination" remains the same. At the same time, modifications are explicitly introduced into the formulas and the contracts.

4) Innovations in processes and organization for an identical (or almost identical) service. In each of the preceding cases the fact of offering and selling a new service, a modified service, an integrated or separated service in an original way is accompanied by significant transformations of processes and organization and therefore of innovations in these. However, our research shows that processes may be subject to substantial technological and organizational innovations even when the final service is unaltered (or is only slightly modified). In such cases, it may be that the distinction between the process and the service provided retains a certain interest. Moreover, to this category of organizational innovations

can be added apparatuses with the aim of improving the actual delivery, client relations, "fine tuning", deadlines, etc. of a service ("service-product") which remains the same in its formal specification. The focus is therefore on the quality of the service or the process by which it is sold (innovations in marketing), with the contract formally unchanged. Finally, the following changes may be considered as deriving from innovations in process and organization:

1. Certain innovations in financial management which can now be observed in large insurance companies (notably in terms of the assets-liabilities model) which have long been practised in banks;
2. Innovations in methods of risk assessment, particularly in terms of technical risks in industry;
3. Legal changes applied to insurance (for instance, in contracts for selling insurance products by banks in France).

Innovation in business consultancy services

Schumpeter, it should be recalled, distinguished five categories of innovation: introduction of a new good, introduction of a new production method, constitution of a new organization, conquest of a new market, and conquest of a new source of raw materials or semi-finished products.[2] With certain adjustments, this typology seems sufficiently broad and open to permit enumeration of the major categories of innovation observed in consultancy firms.

1) Product innovation. An analogy can be drawn on condition that the notion of "product" is defined so as to encompass the following cases: investment in a new area of law by a legal consultant; development of a new training "product" (based on a new theme or area of expertise); development of a new service by discovering and defining new functions; development of a test when this is sold as merchandise rather than used by a recruitment consultant during the process of service provision; perfection of methodologies sold as such.

2) Process innovation. Again, to use this terminology might be considered an "abuse of language". Process innovation cannot be reduced to the use of technical systems in the process of producing the service. It includes the introduction of information systems as well as telecommunications systems: the perfection of expert systems, of methodologies used to support the process, of evaluation tests; the improvement of the impression made by an advertisement; the perfection of new means of supporting the advertisement (these last three concerning recruitment consultancies).

3) Organizational innovation. The fusion of the professions of "avocat" and "conseil juridique" within legal consultancy; the emergence of firms specialized in searching for candidates in the domain of recruitment consultancies; these appear to be instances of this category of innovation.

4) Market innovation. Within this category are: in France, the opening up of the market for legal representation (in court) to former legal consultants who became lawyers when the two professions merged; for recruitment consultancies, moving into recruitment of people for functions which the consultant did not previously deal with.

5) The fifth category in the Schumpeterian typology (conquest of a new source of raw materials) does not easily lend itself to the analogy. One possibility might be to consider the creation of the Single European Market as a new source of raw materials for legal consultants, or a new source of candidates to be recruited by recruitment consultants and managed by human resource management consultants.

6) In addition to these five categories of innovation inspired by Schumpeter is a category that might be designated ad-hoc innovation, which has also been called innovation-valorization (Gallouj, 1991). Ad-hoc innovation is specific to consultancy activities, and refers to an innovation produced during the very process of providing a service, with, therefore, the collaboration of the client. It consists of contributing novel solutions to the client's problems, on the basis of accumulated expertise. Ad-hoc innovation concerns an innovation

(organizational, strategic, fiscal, etc.) which is induced in the client's organization. As a general rule it cannot be reproduced elsewhere in its totality, yet some of its "components" (knowledge, whether codified or other experiences, methods used to produce or transfer it) can be reproduced in part.

Innovation in electronic information services

Regarding the dominant forms of innovation in this sector, the major distinction observed is that between ex-nihilo innovations and progressive innovations. It is generally possible to identify the following three generic categories:

1) The creation of a new product or new service: there are two categories here:

- * the first concerns the nature of the new product or service, and includes four principal modalities:
 - the creation of a new data base, or more broadly the computerization of a product or information service. It is clear that we have now arrived at a point where in terms of a data base, there exists a "dominant design" (in the sense of Abernathy and Utterback (1978)).
 - the provision of a data-bases or another type of product on a new support system, such as CD-ROM. This may be a particular version of the previous case, with innovation involving one particular technical characteristic.
 - the design of a new type of service based on a new mode of processing and utilizing information, using one or more existing data bases. This might include novel systems for searching for information or innovations in system architecture such as the creation of a new service by linking or integrating different products and/or services (for instance linking research software to analytical software).

- the perfection of a new technique or new product capable of being used in conjunction with various data bases or information products, for instance an enquiry system using a natural language, an integrated text management system, or perhaps an enquiry system that can be applied to particular types of data.
- * The second distinction concerns the "degree of novelty" of the service-product and the techniques it involves.

At one extreme, novelty and innovation can exist merely in the idea of combining existing techniques in an original way, and at the other extreme, a new service might rely upon previous research leading to a radically new technology. One procedure frequently observed in the domain of electronic information services involves attempting to first create a new product or service (or improve upon an existing one) out of existing technologies. This is justified by the fact that the basic technologies to permit the creation of new electronic information products already exist, together with the fact that the possibilities for utilizing them remain considerable. It also results from the fact that the sector is largely "supplier dominated". Nevertheless the design of a new product frequently implies significant work.

2) Innovations in the improvement of products or services. Innovations aimed at improvement are identifiable by the type of modification they make to the characteristics of the information product or service and by the type of modifications to technical characteristics upon which they are based. What has been said above about the degree of innovation equally applies here. Improvement may only include exploiting available new techniques so as to improve certain characteristics of the service-product, or it may involve the development of new methods, even of existing research.

The principal ways of improving products are: adding new functions; improving conditions

of access (in particular, simplifying or improving enquiry languages and improving interfaces); and improving the content of the data? base (types of data supplied, quality of data, how up-to-date it is).

3) Process innovations. New automated methods for retrieving information and (certain forms of) information processing are typical here. There is also the perfection of specific technology in order to produce particular data (for instance, research on a new type of aerial camera at France's National Geographical Institute). This is the domain in which the interpenetration of industry and services is at its strongest, with the production of new types of services involving the development of industrial technologies. In contrast, there are innovations in methods of information production which are much more "service-like", such as the development of methods for collecting "unofficial" data by the French firm S&W.

INNOVATION IN INDUSTRY AND IN SERVICES: CROSS-FERTILIZATIONS

We do not believe there to be any conceptual specificity to services. Instead, there is a greater preponderance of R&D practices and organizational forms that have only recently emerged and been conceptualized in industry; for instance the interactive model of innovation, the lowering of organizational barriers between R&D structures and innovation structures (project groups), the difficulties of identifying the institutional reality of "R&D". From one perspective, services are behind industry in the relative weight of R&D functions. However, from an alternative perspective the most innovative service firms organize the introduction of R&D into the process of innovation in a "modern" way, closer to the highly innovative high technology industry model than to the traditional "staff and line" industrial model. Further inspection of how innovation occurs in services may in turn "render a service" to the analysis of innovation and R&D in industry.

Contributions that industrial innovation can make to innovation in services

Some approaches to innovation in industry seem more appropriate than others to what we have observed in services. This is the case, for instance, with 1) the interactive model of innovation (in contrast to the linear model), or 2) at a different level of analysis the new recombination model of innovation.

a) In traditional economic analysis R&D and production are two independent activities which succeed each other and which involve different actors. Moreover, the client who will finally adopt and consume the innovation plays no role in its detailed development. These hypotheses of non-interaction are behind what is generally known as the "linear model of innovation" in which phases of research, development, production and sale are articulated in an ordered way without any feedback loops. The character of many services is incompatible with the hypotheses of a strict separation between production and use, on the one hand, and production and research, on the other. Hence this model seems unsuited to represent innovation in services. Moreover, it is becoming less and less suited to the analysis of industrial innovation.

b) It is now, for example, quite often the case that the origin of industrial innovation lies in problems encountered by company employees in close contact with the client, those in marketing and sales. Thus Kline and Rosenberg (1986) suggest substituting a "chain-link" model for the linear model. This new model is comprised of five levels rather than the single level of the previous model. The first level corresponds to the "central chain of innovation" which extends from invention and/or analytical design to marketing by way of development and production. The second level consists of feedback loops which link each phase of the central chain to the immediately preceding phase, or the final phase of the central chain (the client, the market) to the others. The third level represents links between the "central chain of innovation" and science. Science, as a stock of accumulated knowledge, feeds innovation (and the reverse takes place) along the entire length of the central chain of innovation, not

simply at its beginning. If the stock of knowledge does not furnish an answer to a particular problem, a link to research is then activated. The fourth level is the rather rare link between science and invention which leads to the creation of radical innovations (eg semi-conductors, lasers, the atomic bomb, genetic engineering). The fifth level is the feedback loop which connects the output of innovation to science. It represents the significance for scientific progress of innovations related to scientific instruments and equipment (the microscope and the telescope, for instance).

Service activities fit almost naturally into this type of model, even though it was not designed for them.

- 1) For a number of large service firms (particularly those providing services to individuals), two types of market can be identified: an external market (the final client), and an internal market (the sales force, the interface personnel), which may both play a role in the innovation process. In the insurance sector, for instance, prior to satisfying the final client, an innovation must satisfy the sales force as internal clients: the network of employees, general insurance agents, brokers, etc.
- 2) The production phase becomes confused with the marketing phase. Interaction is thus far stronger than is depicted by a simple feedback loop. Accordingly, in certain large catering service firms, for instance, employees who work in close contact with the client firm, on its premises, tend to identify more with the client than with their employer.
- 3) The link between science and revolutionary invention can be eliminated in the case of services.
- 4) The research chain has to be maintained, but seems atrophied in comparison to industry.
- 5) A significant part of this chain (and the knowledge chain) is related to the human and social sciences.
- 6) In the "innovation chain", the design phase occupies a central position. The distinction

between invention (which is identified by how novel the innovation is to a specialist in the field) and design (defined as the combination of existing components) is of particular importance for service activities. This point is developed further below.

c) Recent developments in the economic analysis of industrial innovation have revealed a new innovation model called the "recombination model" (Foray, 1993) or model of "architectural innovation" (Henderson and Clark, 1990). This model stands in contrast to both the radical innovation model (driven by the principle of absolute novelty) and the incremental innovation model (driven by the "first improvement" principle in which the main characteristics of the product are retained while replacing some secondary characteristics). In a Lancasterian mode, innovation according to the "recombination model" can be defined as follows (Foray, 1993):

- 1) it retains all the known characteristics of a product;
- 2) it re-combines these different characteristics;
- 3) it favours the systematic re-utilization of "components";
- 4) it may perhaps add a small difference.

This type of innovation taking the form of recombination, which can be seen at work in the electronics and biotechnology industries, lies at the heart of R&D and innovation mechanisms in service activities.

The recombination model of innovation can shed new light on certain characteristics generally attributed to innovation and research in the service sector.

1. The unspectacular nature of product innovation. Defined in terms of "the routine use of a technological base", the recombination model does not operate through ruptures, but rather through the continuous and cumulative production of knowledge.
2. The difficulty of evaluating R&D. Traditional measures elaborately developed by national and international institutions are in fact based on criteria of novelty which are not relevant within the framework of the recombination model.

3. The low cost of innovation. If research or innovation rarely requires substantial investment, this is perhaps due to the process of recombination and the "systematic re-utilization" of components to enable major resource savings.
4. The relative lack of research in the classical sense: the production of new knowledge. The recombination model produces and also demands more in terms of "architectural knowledge" (as in engineering) than of knowledge of the components themselves.
5. No prototype perfection. Innovation consists of assembling existing components which have been proven in practice.
6. The difficulty of protecting innovations, which can be imitated relatively easily. If the validity of the recombination model is accepted, what matters is not so much to protect innovation and impede imitation as to facilitate recombinations.

Contributions that innovation in services can make to industrial innovation

Reciprocally, the study of innovation in the service sector may be a source of new thinking and new lessons for industrial innovation. Several arguments, closely linked but treated separately here, are emerging to support this thesis.

- 1) The service is the principal component in the value of numerous goods. As Giarini (1990) has remarked, "for each product we buy . . . , the production or manufacturing costs very rarely exceed 20-30 percent of the final price, whereas the operating cost of a complex service and distribution system generally represents 70-80 percent of the final price".
- 2) Certain goods (essentially high technology goods) possess characteristics traditionally associated with services, such as intangibility or interactivity. If examination of these aspects of these particular goods permits certain conclusions to be drawn about the service sector, it might inversely be reasoned and assumed that these aspects lead to

an organizational form for innovation to which service firms have long been accustomed, and which might serve to inspire industrial firms.

- 3) The distinction traditionally made between industrial firm and service firm tends to lose its meaning in certain situations. A number of high technology firms are simultaneously producing capital goods as well as high technology services: examples of this case are the major manufacturers of computer equipment and telecommunications. Firms belonging to sectors as traditional as textiles, for instance, can now be qualified as service firms: Benetton, the prime activity of which has become the management of information (marketing, sales), and the innovations of which are essentially service oriented, is a case in point.
- 4) Industrial innovation may be associated in more or less intimate ways with innovation in services. The following three examples are of considerable interest to us.
 - a) a relatively abundant literature in the management sciences has been developed around services "to support goods" (for instance, after-sales services) that are seen as components of a "mix" (De Brentani, 1989; Edvardsson, 1990) in which goods are the real object of research interest. Even if these analyses develop a subordinate vision of innovation in services (innovation that does not have a goal of its own), the least that can be said is that the addition of a support service or the improvement of a support service bestows on the good an innovative status.
 - b) The model put forward by David Teece (1986) analyzes why, in certain situations, the innovator profits less from his/her innovation than does the imitator. This paradox is explained by the conjunction of the following phenomena: first, when patents are inefficient at protecting innovation, if

innovation is characterized by a weak regime of appropriability; second, if there are certain assets (or capacities) that are complementary to innovation knowledge. This is the case in information-service activities such as financial or commercial channels, etc. Certain consultancy activities (regardless of the nature of the service provided: legal, strategic, organizational, human resources, auditing and accountancy, information systems) can also be included in this category. In as much as protection by means of a patent is inefficient, an imitator which possesses a competitive advantage over the innovator in terms of complementary assets will be able to win out over the latter.

- c) The co-production model of innovation describes a situation in which industrial clients have access to certain service providers as supports for their internal innovation processes.

CONCLUSIONS

Particular modalities of innovation currently emerging within industry can be seen to have appeared earlier and on a larger scale in the service sector. In the extreme case, the service sector illustrates how restricted are our definitions of R&D and innovation. Moreover, these restrictions also refer to industrial activity. The increasing power of the "recombination model" in the industrial domain should facilitate awareness of this phenomenon.

Generally speaking, it might be said that services can contribute to making the "interaction model" of innovation a more operational model, less general and less theoretical. Having been confronted over a long period by the question of managing multiple inter-functional interfaces, service firms have perfected ad-hoc solutions to what is considered to be one of the major practical difficulties of the interaction model (Aoki, 1988). By their very

nature, firms in the service sector have acquired significant expertise in terms of managing the particular interface which is the client relationship. They have also accumulated great breadth of experience in the management of "project-oriented flexible laboratories". In each of these domains service firms have overtaken industrial firms, and are now in a position to constitute sources of innovation in their turn.

FOOTNOTES

1. Except in the case of services such as transport and telecommunications, with their high capital intensity.
2. Typologies utilized for insurance and electronic information services sectors can be included in this rather wide classification without difficulty.

REFERENCES

Abernathy, W. and Utterback, J. (1978), "Patterns of Industrial Innovation", Technology Review, Vol. 80, pp. 41-47.

Aoki, M. (1988), Information, Incentives, and Bargaining in the Japanese Economy, Cambridge University Press, Cambridge.

De Brentani, U. (1989), "Success and Failure in New Industrial Services", Journal of Product Innovation Management, Vol. 6, pp. 239-258.

Edvardsson, B. (1990), "Service Production and Service Marketing in Manufacturing Companies", Proceedings, 1er séminaire international de recherche en management des activités de service, Université d'Aix-Marseille III, June, pp. 201-219.

Foray, D. (1993), Modernisation des Entreprises, Coopération Industrielle Inter et Intra-Firmes et Ressources Humaines, rapport pour le Ministère de la Recherche et de la Technologie.

Gallouj, F. (1991), "Les Formes de l'Innovation dans les Services de Conseil", Revue d'Economie Industrielle, Vol. 57, pp. 25-45.

Gallouj, F. (1994), Economie de l'Innovation Dans les Services, Editions L'Harmattan, Paris.

Giarini, O. (1990), "L'Economie des Services et la Gestion du Risque", Futurible, November, pp. 55-65.

Henderson, R. M. and Clark, K. B. (1990), "Architectural Innovation: The Reconfiguration of Existing Product Technologies and the Failure of Established Firms", Administrative Science

Quarterly, Vol. 35, pp. 9-30.

Kline, S. and Rosenberg, N. (1986), "An Overview of Innovation", In Landau, R. and Rosenberg, N. (eds), The Positive Sum Strategy: Harnessing Technology for Economic Growth, National Academic Press, Washington DC.

Teece, D. (1986), "Profiting from Technological Innovation: Implications for Integration, Collaboration, Licensing and Public Policy", Research Policy, Vol. 15, pp. 286-305.