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Innovation as a loosely coupled system in services

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Introduction

In this article we will put forward a model of the innovation system in services. The model is theoretical, but based on a review of a large amount of existing empirical research on innovation in services, including a recent E.U. financed project, called the SI4S (Services in Innovation and Innovation in Services) project which we have participated in, and which has been the occasion for us to develop these thoughts¹ (Sundbo and Gallouj, 1998),

We find that the empirical results give us a basis for establishing a general model and that it is a fair generalisation of these results. Even if the service industries are different from one another, the empirical research indicates that there are some common characteristics of the innovation processes due to the specific nature of service production that is common to all service industries.

The main focus of the model is the innovation processes from the perspective of the service sector: How do service industries view their innovation activity? What are the driving forces behind the single service enterprise? More generally, how do these driving forces combine to constitute a system? And how should we characterise this possible system?

This article is divided in four sections. The first section is devoted to an attempt to present some general characteristics of services and of service innovations. On the basis of empirical work, sections 2 and 3 present some typical innovation patterns in services. This presentation leads us to what we mean by innovation system and whether an innovation system may exist in services is discussed in section 4. In the conclusion we discuss how the analysis might contribute to developing evolutionary theory of innovation.

1. Service firms do innovate

Services have been considered in most of the literature as an appendix to manufacturing (e.g. Cohen and Zysman, 1987; Miles et al., 1994), a residual or peripheral sector, or at least as a sector lagging behind the manufacturing sector in form of low productivity, low capital intensity, weak qualification levels and low innovation activity. This is not true. Service firms do innovate, but their innovations may take other forms than in manufacturing and they may be organised differently.

The different forms of service innovations are to some degree related to the specific form of service production, and we will therefore start by briefly stating these characteristics.

By looking at the special forms that service innovations take, we may learn more about innovation processes, which might even be valid for manufacturing innovations as well.

1.1 General service characteristics

The particular innovation pattern in services, for example compared to manufacturing, must be explained by the specific characteristics of service production. We will not detail these here as they have been treated intensively elsewhere (e.g. Gadrey, 1992; Illeris, 1996; Normann, 1991) but only briefly repeat the facts that are most relevant to innovation.

In service industries product is not always perfectly "formatted" and codified, ie precisely determined a priori. Each service transaction may be considered as unique as far as it is produced on demand (tailor-made) in interaction with the client or as a response to a specific, not standardisable problem, and in different environments.

Client participation (in various forms) in the production of the service may be the most basic characteristic of service activities, particularly knowledge-intensive ones. Various concepts have been developed in order to account for this client involvement (co-production, servuction, service relationship, the moment of truth, presumption). At the interface between the service provider and its client different types of interaction are occurring. Different types of elements are being exchanged: information and knowledge, emotions, verbal and gesture signals of civility. This interaction also expresses power struggle, domination and reciprocal influence relationships.

The service industries are also under pressure to reduce the costs and that lead to a standardisation tendency. This standardisation means that service production is not unique in the single delivery situation. The service firms attempt to combine this with the individual customer care in a modulisation system (Sundbo, 1994).

The analytically useful in using (though difficult) a distinction between product and process, is widely accepted in the case of manufacturing goods. The same is not true of services where the product mostly can not be separated from the process. Here, the term "product" frequently includes a process: a service package, a set of procedures and protocols, an "act".

In the case of services, and particularly those in which the intangible and relational aspects are important, the correspondences between the competencies and other means brought to bear by the service provider and the "product" are generally much hazier and much more difficult to codify: they are to a large extent tacit and subject to the difficulties caused by informational asymmetry. The emphasis on quality and trust is therefore an important dimension of service activities.

1.2 Service innovation as an interaction process

The innovation process in services is to a large degree an interaction process, both externally and internally.

It is an interaction with external actors, particularly with customers. The customer's satisfaction with the total encounter (not only the core service delivered, but also the circumstances of the delivery) has been crucial in service production. Customer satisfaction has been more important than the issue of a new core service. Customer satisfaction, in terms of service quality, has thus been more important to service firms than innovation. There have been innovations, but mainly as delivery or process innovations. However, the standardisation or modulisation tendency has made it more relevant to emphasise product innovations and innovation generally.

Nevertheless the tradition has led service firm to still be extremely fixed on the customer encounter, also in terms of their innovation activities. These emphasise the client interaction (sociologically: primary interaction) as an important parameter in the innovation process (Edvardsson et al., 1995). It is a crucial factor in the process of getting the innovation accepted on the market. The primary interaction is often forgotten in the theories on manufacturing innovations that more or less implicitly presupposes that the marketing of a new product is a mass process (sociologically: secondary interaction), and it is so for mass goods.

The innovation process is also an interaction process at the internal level. Innovation is generally an unsystematic, collective process in which employees and managers participate in different interaction patterns at the formal and informal level. The organisation of innovation is differentiated and various patterns can be observed in different types of firm as we will see in section 2. The service firms have not been good at organising the innovation process in a formalised and systematic way and learning from the process. This is even valid for the external interaction with customers (Edvardsson et al., 1995).

The contemporary tendencies in the service sector, however, are towards a more systematic innovation process, often based on certain trajectories. They are often service professional trajectories (ideas and logics within a service professional such as law, accountancy, etc.), but may also be technological trajectories. The service firms still maintain a great deal of flexibility in the innovation activities, which involve several actors and trajectories.

1.3 Innovation and non-reproduced small changes

Innovations in services are a mix of reproducible (although incremental) innovations and “small”, non-reproducible or not directly reproducible changes to solve single customers’ problems (what we also will call ad hoc innovation). The latter is particularly a result of the customer interaction process.

This means that we must understand the development of service business by combining innovation theory (which concerns reproducible renewals - that a new product is produced in more than one copy, a new process element is used generally in the organisation, etc.) and a theory of continuous change as accumulated, not (necessarily or only partially) reproducible ad hoc innovations. We cannot catch all these individual changes in one theory, but we can understand the firms’ attempt to guide this process through a combination of two theoretical elements: 1. On organisational creativity, 2. On organisational learning.

1.4 Three types of approaches to understand innovation in services

A useful distinction can be made between approaches that might be described as “technologist”, which focus on analysis of the introduction of equipment and technical systems, service-oriented approaches that emphasise divergence by highlighting the specific characteristics of service activities and integrative approaches that emphasise convergence by advancing analyses that can be applied to both goods and services. All these works are more deeply analysed in F. Gallouj (1994) and C. and F. Gallouj (1996).

1) Innovation in services and technology: one referent, a multiplicity of relationships

Many studies in this first category (technologist approaches) concentrate exclusively on innovations that are both technological and adopted, usually at the expense of ignoring non-technological innovation and technological innovation produced by service firms themselves.

This technologist approach can be interpreted in various ways, empirical and theoretical. The first consists of recording the extent to which technologies have been diffused within

services, as shown by statistical studies. Service industries are now the main users of information technology in all the developed economies (Miles et al., 1994). The second, linked to the first, is based on investigation of the nature of the effects produced by the adoption of these technologies on economic variables such as productivity, employment, skills, trade, etc. The use, implicit or explicit, of standard neo-classical economic theory (through the production function concept) constitutes a second line of interpretation. This theory has in fact contributed to the development of a "mechanistic" approach to production and to a somewhat reductionistic, "technologist" view of innovation that focuses on process innovations embodied in capital goods. Although they adopt a much wider definition of innovation, the new neo-Schumpeterian and evolutionary approaches to technical change are not immune to this technologist bias, and have even contributed to it to a certain extent (Gallouj, 1997). Their primary objective is usually to analyse the ways in which service firms and industries adopt or, in a few cases, produce technologies. For the moment, their theoretical horizons are limited to the application to the service sector of concepts and methodologies developed with reference to manufacturing industry, such as the natural technological trajectory, the technological paradigm, sectoral taxonomies of forms of technological change, etc. (cf. in particular Soete and Miozzo, 1990). But it is possible as we will see here (cf. also, Gallouj and Weinstein, 1997) to use these evolutionary theories in a less technologist perspective.

Barras' work (1986, 1990) is particularly interesting because of its theoretical ambition. In certain services (banking, insurance, accounting, administration), Barras has observed a product life cycle that is the converse of the traditional industrial cycle. The basic element of this so-called "reverse product cycle" theory is the adoption of an item of computer equipment by a service activity that triggers what might be called a "natural technological trajectory". This leads, in the first instance, to the emergence of incremental process innovations, the purpose of which is to improve the efficiency of the service being provided, secondly to an improvement in service quality through more radical process innovations and finally, in the last phase of cycle, to the emergence of product innovations. Thus innovation is not viewed in isolation from the technological potentialities, and Barras' model is less a theory of innovation in services than a theory of the diffusion within the service sector of technological innovations derived from manufacturing industry.

2) The specificities of innovation in the service sector as a priority for analysis

Without ignoring the technological dimension, the "service-oriented" approaches focus on non-technological forms of innovation; in this respect, they follow Schumpeter's well-known broad and open definition of innovation.

Studies based on this approach often take the "purer" services as their field of investigation, i.e. those in which the criteria of intangibility and the co-production of output are assumed to be most evident. Consultancy services, for example, are an interesting area for empirical analysis of service-oriented innovation. In his study of consultancy firms, Gallouj (1994) highlights the existence of ad hoc forms of innovation that are not immediately reproducible and of institutional "formalisation" trajectories (i.e. the search for a certain degree of formalisation, though not necessarily, or even predominantly, in tangible form).

The studies by Van der Aa and Elfring (1993) Gadrey et al. (1995) and Sundbo [33] also take a broad, Schumpeterian view of innovation. According to Sundbo (1997) innovations in services do not follow a technological trajectory (in Dosi's sense (1982) but rather service-professional trajectories (e.g. a certain number of ideas on management, banking, etc.) in which technologies are only one vector among several others.

3) The search for convergence and the desire for analytical integration

The notion of adopting a similar approach to the economic analysis of both goods and services is based on the observation that the boundary between goods and services is becoming increasingly less clear. Certain services are being "industrialised" and, conversely, the production of certain goods is being "tertiarised". These converging tendencies are often described in terms of the goods-services continuum and functions.

The study by Barcet, Bonamy and Mayère (1987) adopts this approach and results in a classification of the forms of innovation that applies to both goods and services. These authors categorise innovations according to whether they relate to function, specification or the production process. The first category encompasses the emergence of new, undifferentiated, abstract functions, such as the storage of picture and sound in the case of video recorders, or the identification of a new risk to be covered in the insurance industry; the second involves the concrete realisation and differentiation of the functional innovation, while the third corresponds to a cost-cutting activity (as a result of standardisation, the use of new technical instruments, etc.).

The characteristics approach developed by Gallouj and Weinstein (1997) is also integrative. Following and extending Saviotti and Metcalfe's (1984) representation of the product it shows that an approach to products in terms of competencies, service, technical and process characteristics offers a stimulating starting point for the study of innovation in both goods and services without sacrificing any of the specific aspects of innovation in services. Various modes of innovation are highlighted (radical innovation, innovation based on improvement, innovation involving the addition of new characteristics, ad hoc innovation, re-combinative innovation, innovation through formalisation) and interpreted in terms of a characteristics dynamic. This may take different forms : addition, elimination, improvement, bundling, unbundling, shaping of characteristics.

2. Internal and external driving forces: The components of innovation patterns

As a basis for presenting the innovation patterns, we will start by setting up the driving forces of innovation in services in a scheme. These are the determining elements in the innovation process and a possible system is composed by a combination of the driving forces.

The formulation of these driving forces are the result of an investigation of most of the existing research on innovation in service which has been part of the SI4S project². It is also based upon the survey of other existing empirical literature.

DRIVING FORCES BEHIND SERVICE INNOVATIONS

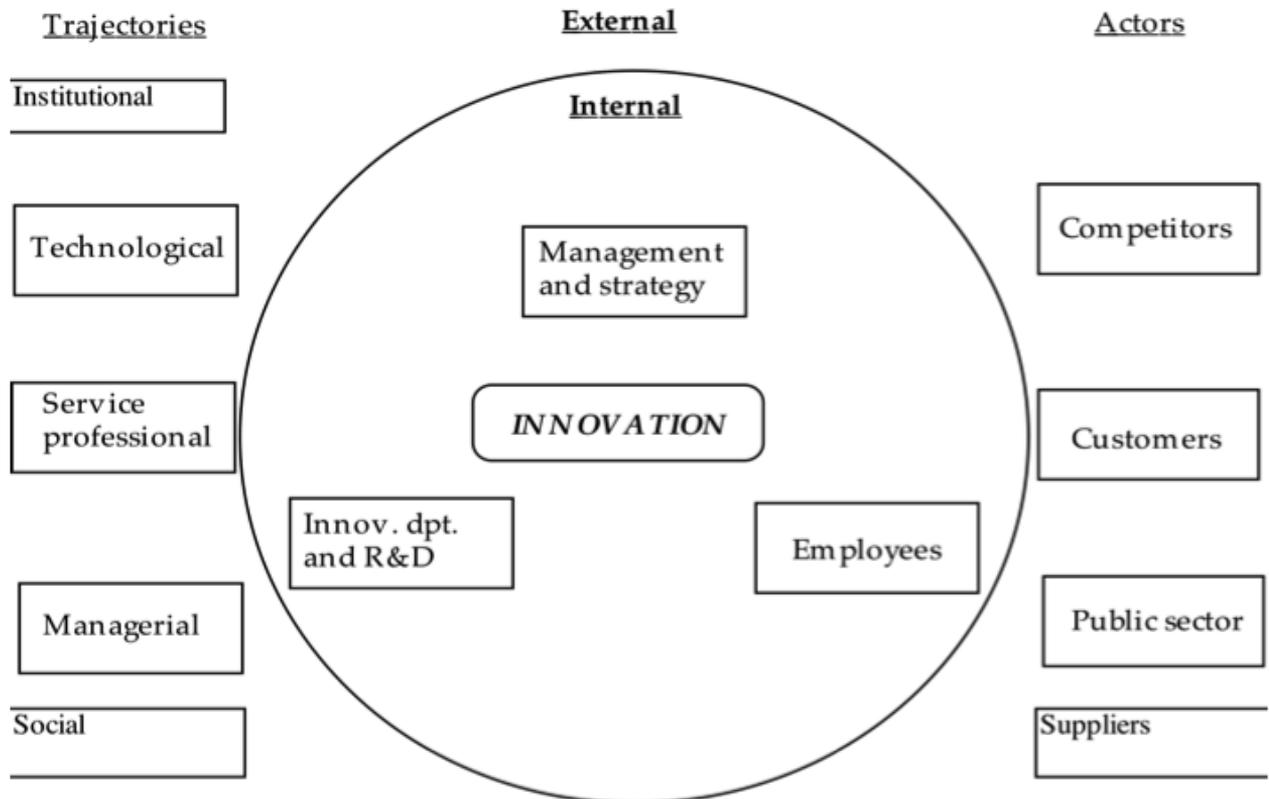


Figure 1: Driving forces behind service innovation
From: Sundbo and Gallouj (1998)

Taking the firm as a landmark, there are external and internal driving forces.

2.1 Internal driving forces

The innovation process in service firms is mainly driven by internal forces (however, this may be said about manufacturing firms as well).

There are three internal forces.

The first is the management and the strategy of the firm. Management could be the top manager, but it is often the management of the marketing department since service innovations very often are market driven and the marketing department, which has the direct customer contact and market knowledge, is the leading actor in innovation activities.

The innovation process in services is mostly a loosely coupled process in which the employees (including managers at all levels) are involved, or they just function as corporate entrepreneurs and start the process. The employees are, therefore, an important driving force. They are the second internal driving force.

A third driving force is formalised R&D departments or other type of formalised department which has the responsibility for ensuring that innovations will appear. The latter is a kind of communication department, that exist in some service firms and which has the task to induce innovation ideas among the employees and managers and to collect these ideas; the innovation department do sometimes innovate itself, but this is not always the case. Since

service innovations rarely are science based, it is very rare to find R&D departments in service firms.

2.2 External driving forces

The external forces can be divided into trajectories and actors. Trajectories are considered to be external driving forces even though the innovation activities of the single firm can contribute to the reinforcement of a given trajectory.

Trajectories are ideas and logics that are diffused through time and through the social system (being a nation, an international network, professional networks etc.) (cf. Dosi, 1982). They are often diffused through many and difficult identifiable actors. The important factor is, however, not the actors, but the ideas and the logic behind the ideas. There may be identified five types of trajectories.

The most important factor is service professional trajectories by which we mean methods, general knowledge and behavioural rules (e.g. ethics) that exist within the different service professions (e.g. lawyers, nurses, catering (how to cook)).

Another type of trajectory is general management ideas or ideas for new organisational forms such as motivational systems, BPR, service management etc. These two first types of trajectories may highly overlap as far as knowledge intensive business services (KIBS) are concerned.

The third type of trajectory is technology trajectories in the traditional economic sense. New logics for producing and using technology that generally influence service products and production processes. Examples are the ICT wave and more specific the Internet, and the freezer and microwave oven which together has created a new distribution system within catering. Some service fields (such as software, financial services, technical services etc.) have contributed more to the ICT development than manufacturing (Miles et al., 1994).

The institutional trajectory describes the general trend of the evolution of regulations and political institutions (for example: the European construction, the European research programs, regulation changes).

The social trajectory displays the evolutions of general social rules and conventions (for example: ecological and environmental consciousness).

These different trajectories are not independent of each other, they may in many situations be intertwined in the same firm.

Actors are persons, firms or organisations who's behaviour has importance for the service firms' possibilities for selling services and therefore for their innovation activities. The actors define the market possibilities and they are sometime involved in the development of the innovations.

Customers are of course actors of major importance. They may be sources of information but they also can contribute more actively to the innovation process. In certain situations, the interface between the service provider and its client can be considered as a genuine laboratory where certain types of innovation are co-produced.

Competitors are also important for the innovation activities. Service firms may imitate competitors' innovations, and since service industries generally not have been characterised by offensive innovation strategies, a condition for starting an innovation activity has often been that the competitors should be moving first.

Suppliers and especially knowledge business service suppliers are important sources of innovation as well. To complement the two well-known Schumpeterian models of innovation (Schumpeter Mark I and Schumpeter Mark II), it is possible to define what could be called "a consultant-aided model of innovation" (cf. Gallouj, 1994). Therefore, knowledge business service suppliers or some of them may be considered as a new locus of the "Schumpeterian

enterprise spirit”. Technology suppliers (including software suppliers) are also sometimes important partners in the innovation process, much knowledge business service suppliers and software has been developed in cooperation between service firms that needed a new technology, and technology suppliers.

The public sector is the least important actor, but nevertheless an actor of some importance. The public sector demands services, and it delivers research and education necessary to innovation activities, but the public sector is rarely an direct actor in service innovation processes, neither as change agent nor as deliverer of knowledge (since service innovations rarely are science based). Further, the public sector has regulated the service sector, a function that in fact has led to many innovations, but also has impeded innovation. Many financial innovations are due to changes of tax laws. The contemporary tendency to deregulation makes this function of the public sector less important.

3. Typical innovation patterns

One can theoretically state many patterns by combining these driving forces. Seven patterns of innovation have been found in empirical research until now. We will call them :

- 1) the classic pattern (traditional or fordistic variant)
- 2) the classic pattern (neo-industrial variant)
- 3) the service-professional pattern
- 4) the organised strategic pattern
- 5) the entrepreneurial pattern
- 6) the artisanal pattern
- 7) the network pattern

3.1 The classic R&D pattern (the industrial pattern of innovation) and its evolution

This pattern is the less frequent in service industries (cf. Barcet et al., 1987). Nevertheless it can be found in large size firms specialised in the production of standardised operational services dealing with material or information. For example: large firms specialising in information mass processing, building maintenance or tele-guarding. This is a copy of the traditional manufacturing R-D pattern which makes a clear dissociation between R-D and production. Compared, for example, to knowledge business service firms one can say that in this types of firms there is generally a dissociation between the service production and its delivery. It is therefore possible to create an R-D department devoted to the improvements of the “ products ” that are to be delivered or to the design of new “ products ”.

This industrial pattern of innovation, as it is defined (notably by Barcet, Bonamy, Mayere, 1987) seems to us ambiguous. It refers to the old industrial pattern, which has changed a lot itself. The new industrial model, which has substituted a flexibility logic for the old standardisation logic, is far closer to the functioning of service activities (which are often interactive by definition).

One may distinguish between two variants of the classic R&D pattern: a traditional or fordistic variant, and a neo-industrial one.

A traditional or fordistic variant

This pattern (Figure 2) is defined as above. It is rare in services and it tends to be rarer in manufacturing as well. The main lever of innovation is the pursuit of the technological trajectory (technological and process innovations). One or several departments specialised in innovation do exist. They develop linear relationships (without any real feed-back) with the other departments (traditional linear model of innovation). These innovation departments are

generally production technical departments or information technology departments. The client is present in this pattern but only as a passive source of information.

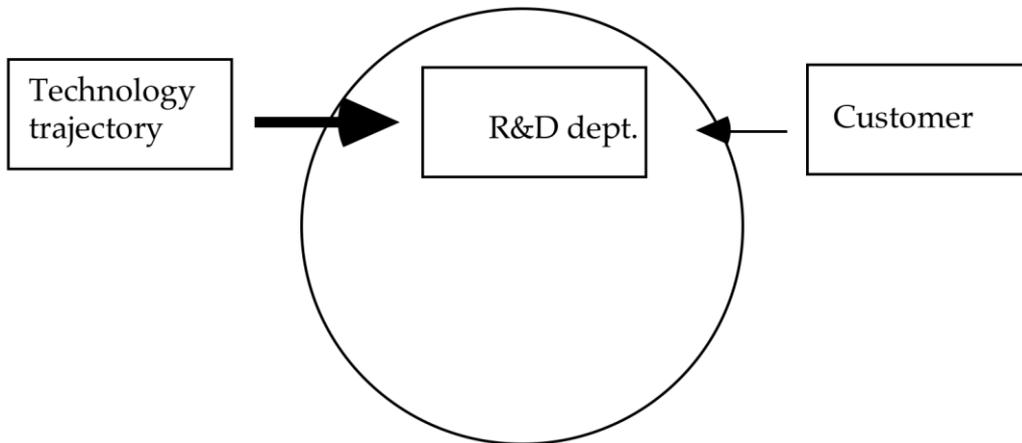


Figure 2: The industrial pattern: traditional or fordistic variant

A neo-industrial variant

Firms run according to the traditional industrial pattern tend to move towards this new one. The neo-industrial pattern refers to certain evolutions that are occurring in mass informational services that traditionally were following a fordistic pattern and that now are facing important competition pressures (banks, insurance companies, postal services). In these firms innovation is produced by interacting sources or actors. The innovation process does rarely follow the linear model, but often a more complex pattern (cf. Kline and Rosenberg, 1986). These interactions are “technical” unavoidable relations, no matter their quality and efficiency. In insurance companies the actors are for example, information technology departments, the various actuarial departments, the marketing department, possibly a genuine research laboratory (cf. Gallouj and Gallouj, 1996). Transversal project groups are favoured and multiplied with more or less success. In this pattern, the levers of innovation are both the technological trajectory and the service-professional trajectory. The main actors participating in each trajectory and its corresponding forms of innovation interact. Management and strategy play an important role as well.

This model is more customer oriented. More innovations come from a pull effect, namely the expected future needs of the customers.

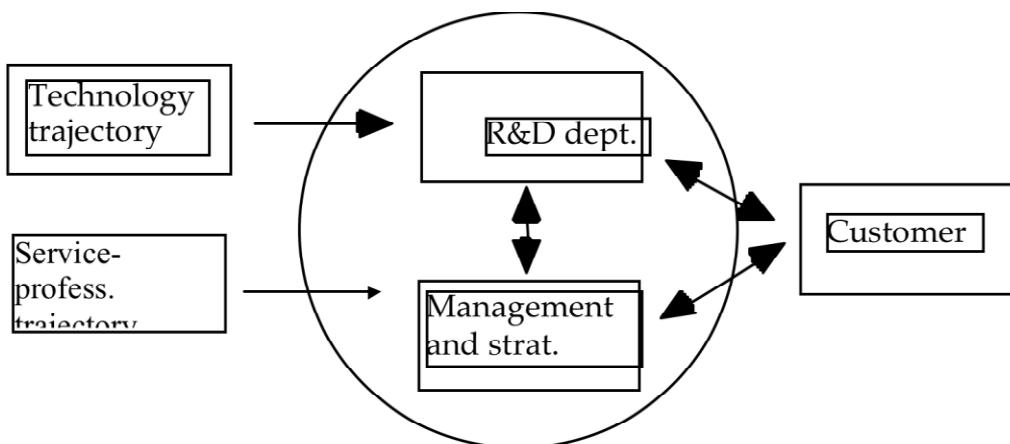


Figure 3: The neo-industrial pattern

One can distinguish between two sub-variants of this neo-industrial variant Gallouj et al, 1997) :

- 1) The variant in which the technological trajectory and the service trajectory are in an imbalanced interaction ;
- 2) The variant in which they are in balanced interaction.

In the first case, if we define a product as a set of service, technical and process characteristics in correspondence (Saviotti and Metcalfe, 1984), one can say that the service characteristics change much more rapidly than the technical and process characteristics. There is, to a certain extent, proliferation of new services characteristics (or functions) while the technical and process characteristics remain unchanged. The incremental model of innovation (innovation by adding characteristics) play a very important role here.

In the second case (when the technological trajectory and the service trajectory are in a balanced interaction), certain members of the organisation have in charge to produce technical and process characteristics and others service characteristics. There is a share of tasks and a certain balance of power, which doesn't mean a lack of conflicts.

3.2 The service professional pattern

This model which has also been described by Barcet, Bonamy and Mayère (1987) characterises the professional knowledge service firms. They are generally medium size firms devoted to knowledge intensive business services. These firms don't really sell product-services, but competencies, abilities to solve problems in different expertise areas (consultancy and engineering).

In this pattern formalised structures dedicated to innovation do not exist. The innovation trajectory is of the service-professional type.

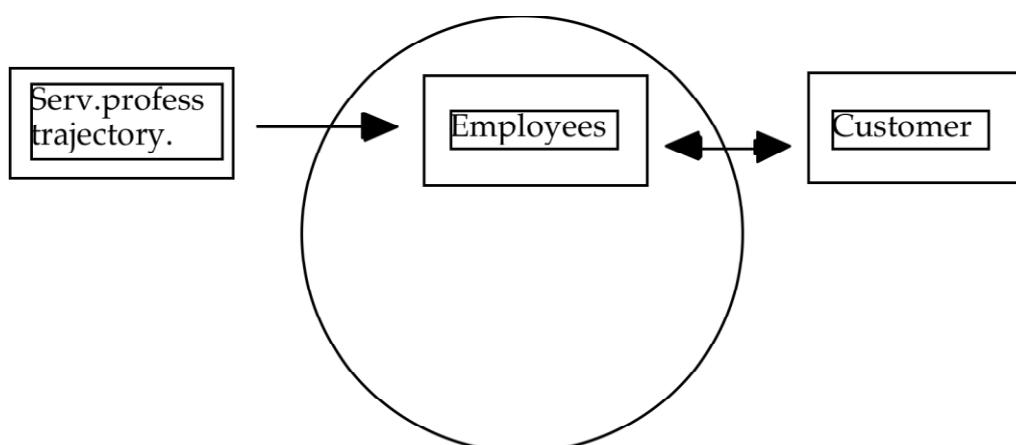


Figure 4: The service professional pattern

The innovation process is a collective process in which all the professionals are supposed to participate. It will often be a more disciplined, and less “wild” and radical, process than in the entrepreneur model (see below). The professional often follows certain professional norms and methods in their innovation.

Extrapolating Martin and Horne's analysis (1995) one can describe this pattern as bottom-bottom or top-top. Because of this the service professional pattern has a certain number of advantages : it is flexible, able to answer quickly to market signals, able to cross synergically the individual ideas and experiences of its members. Conversely, as far as it heavily depends upon its individual components it also has a number of disadvantages among which are the risk that the innovation process is not completed, and the absence of enterprise projects.

In the service professional pattern, the main driving force or lever of innovation is individual expertise and competencies which correspond to the service-professional trajectory. An important locus of innovation is the interface with the customer. Thus the client who is present here plays a much more active role than in the previous pattern. The ad hoc type of innovation (cf. section 1.3), without being exclusive, plays an important role here.

The analysis of the different steps of such an ad hoc type of innovation shows that the steps of production, selling and innovation take place simultaneously or are merged. The client's problem (in its concrete sense) is the starting point of the innovation process. An important point here is that this service production process, which a posteriori becomes an innovation process ends with a formalisation step. This formalisation step is achieved without the client's participation. It aims at going through the problem and the innovating final solution again and at formalising and modifying them in order to re-appropriate some of their components and to capitalise them in the organisational memory of the firm (for example paper, software, IT-files audio-visual, routines, etc.).

As a product of the customer interface, ad hoc innovations, particularly in consultancy firms, depend upon the nature and components of this. Thus sparring type interfaces conversely to jobbing type (Gadrey and Gallouj, 1998) are most propitious for the creation and success of this form of innovation, because they help to assure a better understanding and acceptance (legitimacy) of the innovation. Moreover, problems of a strategic nature, themselves potential sources of innovation, are most often the object of a sparring type interface. However, one must not conclude from this that only creative problems (as Kubr, 1988 calls them) - those where one seeks to develop a completely new situation - are carriers of *ad hoc* innovation. Corrective problems, in which the consultant plays the role of therapist, and progressive problems, in which the consultant are expected to improve a given situation that is feared to be deteriorating, are also ad hoc innovation carriers. Furthermore, the opportunities for ad hoc innovation appear to increase with the size of the service provider and that of the client. The effective implementation of ad hoc innovations also depends upon the quality of the professionals in the client organisation participating in the interface.

Some of the professional knowledge service firms have currently a tendency to move towards the third pattern, the organised strategic innovation pattern. The innovation process becomes guided by the top management and the firm's strategy and less anarchic and free for the professionals.

3.3 The organised strategic innovation pattern

The organised strategic innovation pattern (or the managerial model of organising the innovation) is the most typical within the service sector. It is definitively so for large service firms, but even small service firms are moving towards this model.

This pattern corresponds to the real existence of a policy, a strategy or a function of innovation in the firm, but to the absence of a permanent R-D-innovation department. Research and more precisely new ideas research is every one's task, but design and development, which require much time, are done by ad hoc project teams. The logic which is favoured is that of designing products which are as reproducible as possible. Whether we can conclude that a trend of industrialisation does exist in service, is difficult to say. Empirical research suggests different conclusions. In some research an industrialisation tendency has been found (Sundbo, 1994, 1997), in other it was found that a professional rationalisation logic (combining technology, service-professional, managerial strategies or trajectories) prevails rather than an industrial rationalisation logic (Gadrey, 1994).

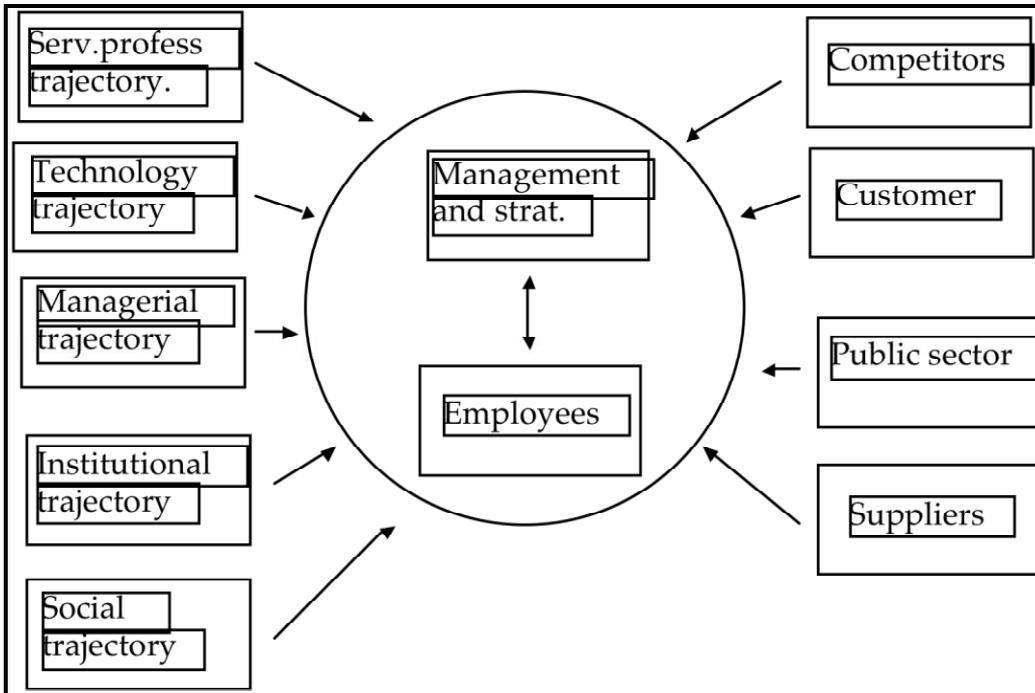


Figure 5: The organised strategic innovation pattern

In this model the innovation policy is supplemented with two important actions: 1) knowledge accumulation in order to facilitate its reproducibility and the share of individual knowledge among the firm ; 2) quality control as a mean of checking the respect of service standards, but also as an indicator of the evolution of the nature of clients' demand. The innovation process becomes a process of balanced entrepreneurship (Sundbo, 1992, 1996) : The employees act as corporate entrepreneurs, but the management attempts to regulate and control the corporate entrepreneurial process. The framework for the management's regulation is most often the strategy, which contents the policy for innovation (which types, for which market segment etc.). The strategy can also function as an inspiration for innovative ideas.

The innovation process is often organised in different steps, starting with a free corporate entrepreneurial idea phase, which turns into a more guided development phase, often organised as team work, and finally ending as a test and marketing activity in which the marketing and a production department have the main role. The marketing department when it exists is often the strongest department in the innovation processes.

The innovation policy in this pattern is very broad, which means that the firm is looking for many fields in which it could make innovations, e.g. in marketing, production organisation etc., and since the innovation policy is determined by the strategy, the management focuses much on what is going on in society. This will namely determine the future customer needs. Thus, all the trajectories are relevant here as are all the actors.

In previous works devoted to consultancy sector Gallouj (1995) shows that this pattern (for example the design of a formatted method or product-service) may follow the standard scheme of industrial R-D (be more or less formalised) : as in the R-D pattern, innovation, production and selling may be at least in theory be separated. A certain formalisation of the ideas' genesis is possible through internal gathering procedures of ideas; gathering procedures of customer ideas and dissatisfactions (user groups for example).

3.4 The entrepreneurial pattern

This pattern corresponds to the creation of service firms on the basis of a radical innovation. These firms are small and do not have any R-D department. Their main activity is

to sell the initial radical innovation. The innovation processes that might follow later are generally focused on the improvement of the latter. The appearance of IT services, of repairing services, etc. may be interpreted in these terms.

Numerous firms set up by university researchers often corresponds to this entrepreneurial pattern as well, but the pattern can be found in all service industries. Some of the service industries, and in particular retail, are characterised by many new firms. However, they don't belong to the entrepreneurial model because most of the corresponding new firms are not based on any innovative idea.

Because of the radical character of the basic innovation that lays at the foundation of this pattern, one can say that none of the different innovation trajectories can be excluded from the entrepreneurial pattern.

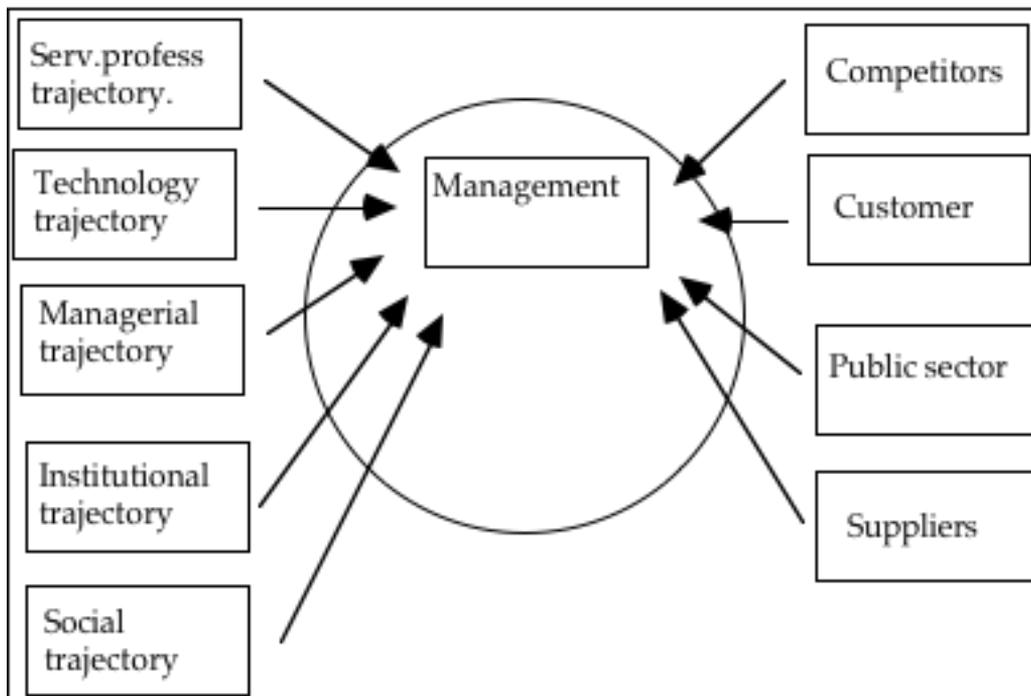


Figure 6 : The entrepreneurial pattern

3.5 The artisanal pattern

This pattern describes small firms involved in operational services (cleaning, guard services, hotels, restaurants etc.). These firms do not have any innovation strategy. They do not have any R-D department nor information technology department.

Generally, these firms are not innovative, and if they are, the renewals are normally small, non-reproduced changes. The firms are generally conservative, not-change and trajectory oriented and therefore not oriented towards external trajectories. The external innovation drivers are the actors. If innovation is present, it is through improvement models and learning processes.

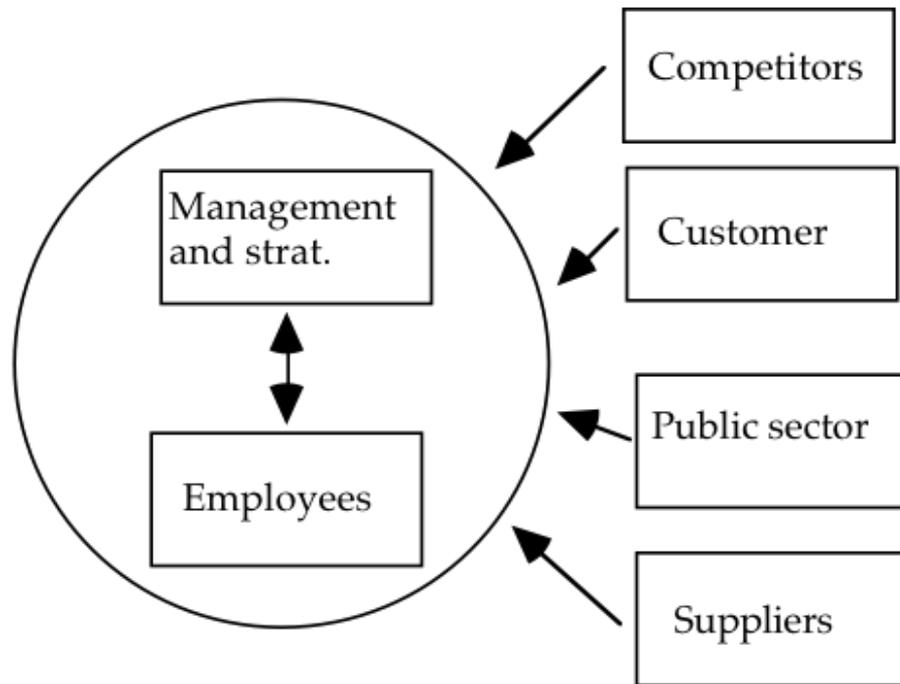


Figure 7: the artisanal pattern

3.6 The network pattern

One pattern is a situation where a number of service firms have created a common network firm that has the purpose to innovate on behalf of the member firms or induce innovations in these. This pattern is found in tourism (Sundbo, 1997) and in certain financial groups (Gallouj et al., 1997). This is a situation where the service firms lay the innovation activity and the relation to actors and trajectories in the hands of a professional organisation for innovation outside the firms.

The network firm could in principle have an R&D department, but this is not reported in any empirical research. The whole set of innovation trajectories are involved in this pattern.

The network firm may be supposed not to be very customer or supplier oriented because it does not have the contact with these actors, who interact directly with the member firms. The clients are the member firms.

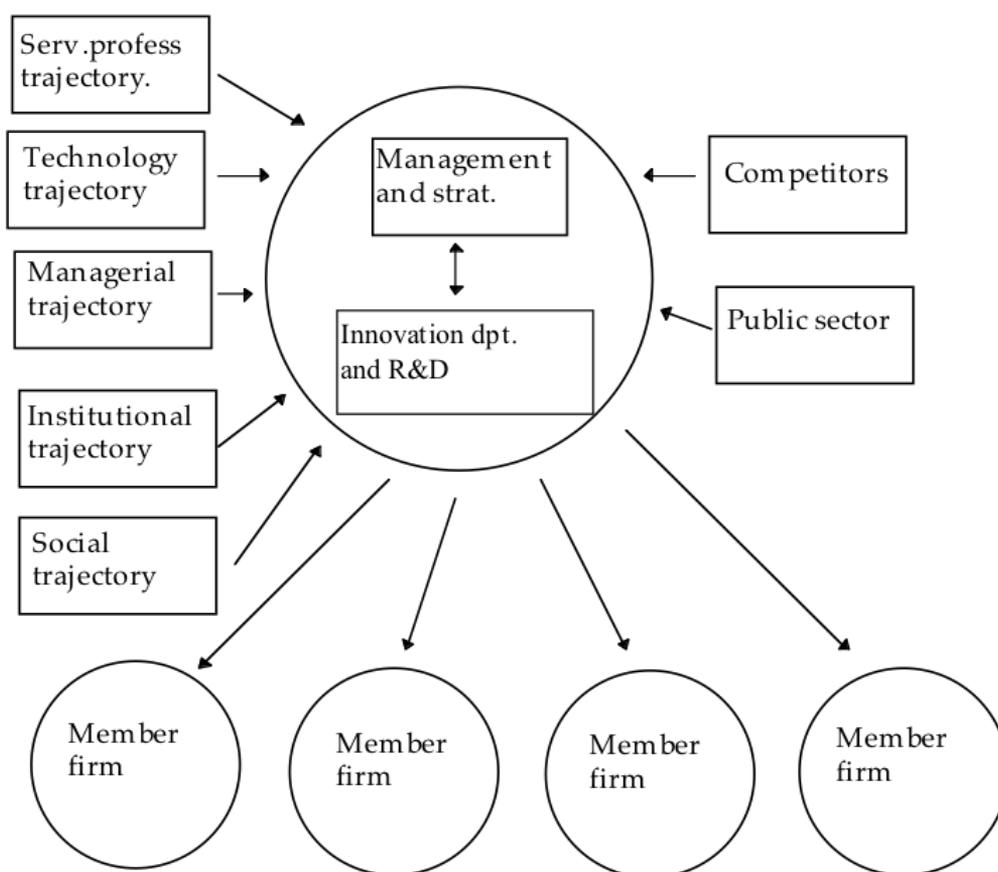


Figure 8: the network pattern

4. Innovation system and services

The existence of an innovation system requires, as we will see, the fulfilment of two conditions: one of coherence, the other of repetition. Before we can discuss whether an innovation system does exist in services, we have to define more precisely that concept.

4.1 The notion of innovation systems

By innovation system we mean a general pattern that can describe the innovation activities in a sector, in this case the service sector. That a pattern exists means that certain elements are determining the innovations and the development of new ideas and innovations and their diffusion follows certain ways. If there is some repeated common characteristics of the pattern, we may call it a system.

An innovation system can be either institutional or loosely coupled.

An *institutional innovation system* is a coherent system with a series of relationships between different actors through which knowledge and ideas for innovations are diffused. The actors interact and through this system of interaction innovations are developed. It may also include a “snow ball” effect (one new idea leads to the generation of another in the system). One can follow the diffusion process because it follows certain patterns. The system can be said to be institutionalised because the interrelationship between the actors often follows a certain pattern with long lasting relations and co-operations and often the relationship is formalised through contracts or well-known norms for co-operation. There are often fixed positions in the system and generally accepted norms for the relationships and interactions.

A *loosely coupled innovation system* is composed of certain actors, certain trajectories of development within important fields like technology, management etc. and some forms of behaviour that are common to the sector in case. The constellation between the actors, the trajectories and the behavioural forms is not very fixed, it may take various forms. It is not an institutionalised system in the way that there is no fixed norms for behaviour and relations that everybody in the sector know and follow. The firms co-operate less with external actors than supposed in the institutional innovation system, but they relate to the external actors, i.e. these actors are important providers of input or purchasers of the output from the innovation process or are competitors. The interaction may be as large, or even larger, than in the institutional system, it is just more competition oriented and not institutionalised. Further, the output purchasers mean more than the input providers in this system compared to the institutional system. The diffusion process does not follow a straight line, but is complex with many informal and often in-observable elements like intuitive idea generating of one person who's identity has been forgotten by everybody if you ask the actors some time later. The loosely coupled innovation system can not be theoretically understood from a coherent, explanatory model as the institutionalised system because of the loose coupling of all elements and non-fixed behavioural patterns and traditions. The actors, trajectories and major behavioural and interactional elements can nevertheless be described and some scientific rules or laws of the average behaviour and relationships formulated. Strategy is a social behaviour and the actors are social beings thus the innovation process and the interaction system follow sociological laws as do all other human groups.

The loosely coupled innovation system may be supposed to characterise a situation with hard market competition and weak common push elements such as a common scientific or technological basis of the production (a trajectory). This calls for more strategic game approach towards the market of the single firm and little co-operation with other actors outside the firm.

The institutionalised innovation system may be supposed to characterise a situation in which a sector has gone through a long history where the independently determined behavioural patterns of the single actors have been common and fixed, general norms have been established with a sanction system to ensure that all actors follow the institutionalised norms and rules. Although this may look like a description of an inefficient conservation system, that does not need to be the case. One can argue that an institution could be oriented towards change and creativity. However, there could be a tendency to a routinisation of the creativity thus changes follow certain paths or trajectories that can not be broken. Radical innovations might not appear in an institutionalised system.

4.2 Are there evidence of the existence of an innovation system in services?

Do the different patterns that we have described in section 3 constitute a system? To describe them as a system demands that two conditions could be fulfilled: 1. There is at least some coherence in these patterns. 2. There is some repetition in the patterns thus one or a few patterns are general.

The possible system could be institutionalised if the coherency is strong and there is only one pattern that is repeated very much. If there are several patterns and it cannot be predicted which pattern will appear in which situations and if the coherence in the patterns is weak, it is a loosely coupled system.

Thus, we have three possibilities concerning the innovation system in service: A. There is an institutionalised system, B. There is a loosely coupled system, C. There is no system at all.

Lack of coherence

The innovation activities are only coherent to a small degree in services and we would state as a hypothesis that it would be difficult to find a route of imitation where different actors have a mutual relation and the diffusion of new ideas and concrete innovations could be followed through several links. Even the trajectories are often not coherent systems, service firms are still not very scientific-professional based, so the service professional trajectory is often weak; innovations are still often quick, practical ideas.

The technology trajectory is also often weak if we discuss it as a coherent system that leads to a wave of innovations that generates each other. The innovation process and the introduction of new technology are still often unsystematic and are a result of firm internal trial-and-error decisions and not a consequence of any external system.

However, this is a matter of degree, the service professional and, to a less degree, the technology trajectories have been found to be the strongest patterns in services and those that has been most institutionalised. Further, these are general statements about the total service sector, there are differences between different service industries. Thus, a generalisation to all service industries might be doubtful, but the service industries have some common characteristics (that we have briefly emphasised in this article) thus it can be allowed to propose over-all models at the general level of this theoretical discussion. In empirical studies one must investigate the possible innovation systems that each industry or maybe firm is involved in.

The lack of coherence means to that we can find only a loosely coupled system of service innovation and even that may in some service fields be weak. The service innovation process as a societal activity could be characterised as an anarchic market based process. However, this is an exaggeration because more systematic relations already exist and there are developments towards formation of innovation systems that can already be observed as we shall demonstrate below.

Some repetition of a few patterns

As argued above, there are several patterns of innovation in the service sector, and not only one. They are not always repeated in the same firm or industry, a new pattern may be selected for a new innovation. Service firms are only moderately aware of innovation as a means for developing the firm (to get a better competition position on the market, and to grow in turnover and profit). This means that they are not very clear about how they want to organise and manage their innovation activities. The form of organisation, which actors and/or trajectories they choose and how the relationship with actors should be, becomes often a coincidental decision, determined by the actual situation.

Nevertheless some patterns are more common than others. There is also a tendency for one pattern to become dominant in most types of services and firms. That is the case to the organised strategic innovation pattern and, within specific service areas, to the service professional and artisanal patterns, although the domination of these patterns is less clear. This means that there is at least some repetition of one, or maybe two or three, innovation patterns.

Our conclusion (i.e. our answer to the question does an innovation system exist in services) is that since there is some coherence and some repetitions in the innovations patterns and since a limited number of patterns are repeated and seem to characterise the main part of the innovation situations, we can say that there is a system.

Since there is only some coherence, some repetitions and there are several patterns, it is only a loosely coupled system.

The system is not much of a national system, which has been observed in manufacturing (Nelson, 1993; Porter, 1990). If it might be defined geographically - which is not sure, it is international and internationalisation forwards innovation.

Conclusion and perspectives

We can conclude that there is a system of innovation in service, but it is a loosely coupled system and there is a variation of patterns within the system. The system is not a national system, and the varied and loosely coupled character of the system makes it difficult to use it as a basis for political regulation and stimulation.

Whether the service innovation system in the future will be more institutionalised, is difficult to say, but since it still will be much characterised by a large variety of relations between trajectories and actors and by many widespread interaction situations between actors, it is mostly likely that it will remain at least less institutionalised than we know from the manufacturing system. This may, however, not be a disadvantage to the service sector, on the contrary it may create a more dynamic innovation system that even manufacturing could learn from (and which it, according to our hypothesis stated below, will).

The service innovation system is different from the manufacturing innovation system as this has been discussed in literature, but one can assume that the service and manufacturing systems are converging and will converge more in the future. There is some empirical evidence for stating such a hypothesis.

In the current post-fordistic period manufacturing innovations get traits from the service innovation system: A heavy customer and market orientation, less standardised and more flexible products and production organisation and mainly dominated by incremental innovations. The employees may be supposed to get a more central role as corporate entrepreneurs even in manufacturing.

Service innovations is moving into the directions of the manufacturing system in some ways; it seems to become more systematic, more technology is involved, and the service innovations may be supposed to be more push determined through R&D, although the sciences on which the service innovations will be based, are more human and social social sciences than natural and technical sciences.

However, the service innovation system keeps some of its own elements: The customer encounter and (non-technologic) person-to-person contact as core driver; many small, non-reproduced changes; a relatively more loosely-coupled organisation system, characterised by less R&D, more corporate entrepreneurship, strategic guidance, and service professional trajectories.

Evolutionary economics which is particularly interested by interaction-intensive economic phenomenon is obviously at the heart of our analysis. It offers promising ideas to cope with innovation in services. Indeed there is for example a kind of proximity or similarity between the nature of the service and the way one could say that evolutionary economics defines innovation, or should define it. Both are a process, an act and not merely a result. Both are interactive and both have some difficulties to follow optimising principles. We will now briefly discuss how the attempt to define and find an innovation system in services could contribute to develop evolutionary economic theory

The patterns described above (section 3) are a proposal for a model of the organised and complex innovation systems that follows after the breakdown of the entrepreneur model (a "Schumpeter I" model), but another proposal than the R&D system (the "Schumpeter II" model). The most dominant pattern in the service innovation system is the organised strategic

pattern. It emphasises the dualism of the corporate entrepreneurship of the employees and the management who induces and controls the innovation process within the framework of the strategy. This model is within the theoretical framework of the strategic innovation theory (Sundbo, 1998), which points to this dual innovation organisation as the important and the firms strategy as the framework for the management's decision and inducement.

This model might be more dynamic and more valid than the technological R&D model that has been discussed as the proposal for a Schumpeter II model. Further research will be necessary to show that.

The above structuring of a service innovation system can thus contribute to develop evolutionary theory in the way that it offers a version of the determining and structuring mechanisms in the innovation process and thus in the evolution of the production system and the economy. This version may include elements, and constellation of these, that have not until now been stressed in evolutionary theory. Compared to Pavitt's general sectoral taxonomy (1984) or to Soete and Miozzo's service innovation taxonomy (1990) our model does not focus on technological trajectories alone, but it also takes into account several other trajectories: service-professional, managerial, social, and institutional which may be deeply intertwined.

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¹ In the SI4S project national reports on innovation in services have been produced by the following research teams: DIW, Berlin, Germany; TNO, The Netherlands; STEP group, Oslo, Norway, NUTEK, Stockholm, Sweden; PREST, University of Manchester, UK; Roskilde university, Centre of Service Studies, Denmark; and IFRESI, University of Lille 1, France.

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