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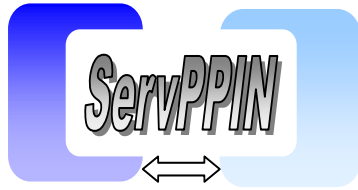
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Université  
Lille1  
Sciences et Technologies

**ServPPIN: The Contribution of Public and Private Services to European Growth and Welfare, and the Role of Public-Private Innovation Networks**

**WP 2: Public and private service innovation and impact assessment**

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**Elaborating the characteristics-based approach to service innovation:  
making the service process visible**

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**Abstract**

This paper tackles the issue of how to make the process nature of services more visible in the characteristics-based service innovation model developed by Gallouj and Weinstein (1997). We argue that the invisibility of the service process in the original model has resulted in minor use of the model for detailed-level analyses within individual services. In our supplemented model four new aspects are added: a separate category for the process characteristics, the 'front office - back office' division, the customer's technology and process, and the distinction between direct and indirect utilities. We apply our model in three empirical cases, which depict KIBS, industrial services and consumer services.

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## **1. Introduction**

Studies on services are today accumulating rapidly, their focus varying from the issues of the service economy to the features of service sectors and service firms, and further to the nature of service products. An important topic which has aroused growing interest during the last decade is innovation in services. Here, we can identify three basic approaches (Gallouj, 1994, 1998, 2002a; Gallouj and Savona, 2008). The earliest studies adopted the *technologist or assimilation approach*, which reduces innovation in services to the introduction of technical systems and focuses on technological cycles and technological trajectories (Barras, 1986; Quinn and Paquette, 1990; Quinn et al., 1990; Rada, 1987; Soete and Miozzo, 1990). As a reaction to this apparently technology- and manufacturing-biased a view, there emerged the *service-oriented or differentiation approach*, which highlights that innovation in services often follows service-specific trajectories instead of technological ones (e.g. Gallouj, 1991; Preissl, 2000; Sundbo, 1997, 1998). A specific manifestation of the differentiation approach is the *inversion approach*, which reflects the ‘revenge’ of the service sector. It emphasises the active role of KIBS in other sectors’ innovation by introducing a model of interactional innovation (Schumpeter III model) or ‘innovation model assisted by KIBS’ (Gallouj, 2002b, 2002c; Muller and Zenker, 2001; Sundbo, 2002; Toivonen, 2004; Wood, 2005). The third approach, which is now increasingly gaining ground, is the *synthesis or integrative approach*, which seeks a common framework for the analysis of innovation in both goods and services without denying, however, the existence of some differences between them (Bröchner, 2006;

Gallouj and Weinstein, 1997; Gallouj, 2002a; Miles, 2002; Sundbo, 2001; de Vries, 2006; Windrum and Garcia-Goni, 2008).

This paper aims to contribute to the further development of the synthesis approach. We argue that goods and services can be analysed using a common conceptual framework, but highlighting within this framework the process nature of services. Both goods and services provide customers with benefits or utilities that are (at least from the theoretical viewpoint) clearly distinguishable from the good or service itself. The point separating these two economic entities is the relationship between the product and the production process. Both goods and services are products but, whereas goods products have an autonomous physical existence, service products are to a great extent identical with their production and consumption: the core of a service is a process, an act, or an activity of transformation of a reality (Gadrey, 1996; Gallouj and Weinstein, 1997; Hill, 1977).

The conceptual framework that we elaborate in this paper is the service model developed by Gallouj and Weinstein (1997) for the analysis of different types of innovation in services. The synthesis view is clearly stated and recognisable in the model: it started from Saviotti's and Metcalfe's work (1984), in which these authors modelled a good using the Lancasterian characteristics-based approach (Lancaster, 1966). Saviotti and Metcalfe divided the characteristics of a good into three groups: final or service characteristics (Y) that describe the utility being performed by a good, technical characteristics (X) that consist of the good's internal technical mechanisms, and process characteristics (Z) that relate to the materials, methods, technologies and organisation used in the production of the good (including its design and marketing). Gallouj and Weinstein applied the same categories in the case of services, adding however the category of competences (C). This category highlights the central role of knowledge and skills embodied in individuals and possibly implemented directly (without previous codification and without technical media) in service transactions.

Using these different groups of characteristics, we can now illustrate the above-specified difference between goods and services. Figure 1 shows that in the case of goods a production process precedes the existence of a product, which is usually consumed later. From the viewpoint of a good, process characteristics (Z) are 'external' and technical characteristics (X) 'internal'. The final or service characteristics (Y) are predefined or embedded in the product and clearly related (consubstantial) with the technical characteristics (X $\leftrightarrow$ Y). The repair of a damaged good (for example a car) is based on

the analysis of correspondences between final characteristics and technical characteristics. These correspondences are clearly presented in any goods construction manual. Mapping them may seem difficult for a layman but it is always easy for experts in the field. The level or performance of a given final characteristic or a group of final characteristics ( $Y_i$ ) comes out in the consumption process, where the utility is derived from the product.

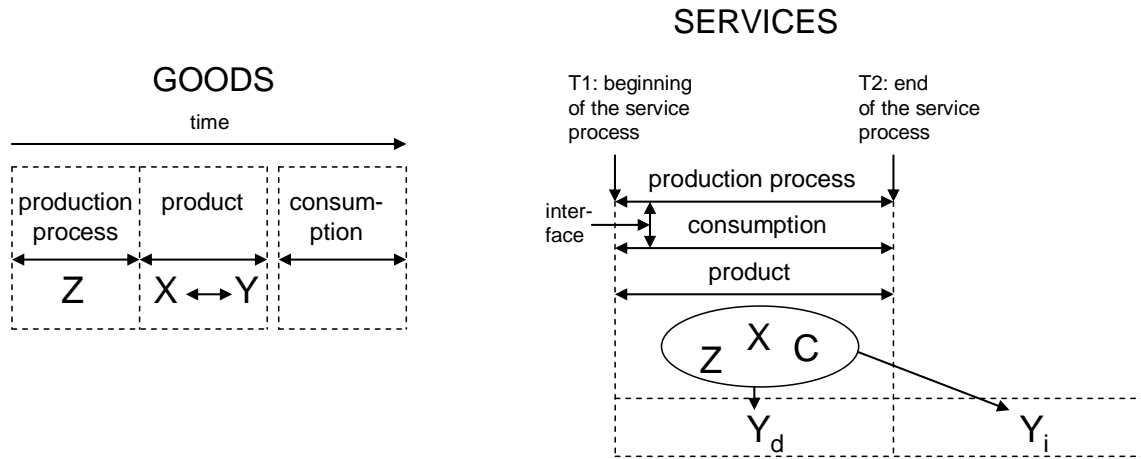
In the case of services, a product, a production process and a consumption process coincide<sup>1</sup>, providing together a utility ( $Y$ ). Thus, not only technical characteristics ( $X$ ), but also process characteristics ( $Z$ ) are ‘internal’ from the viewpoint of a service. However, this ‘internality’ has not the same meaning as in the case of goods. As far as the final characteristics of service products are not primarily embodied in technical characteristics, but rather in competences and processes, they are often much more difficult to define and designate and to associate with corresponding  $Z$ ,  $X$  and  $C$  than in the case of goods. The pattern of mapping is fuzzier, and there is much more room for asymmetries of information (Gallouj C., 1997). That is why ‘repair’ of a ‘damaged’ service is difficult, even for experts in the field, as management science clearly states it (Berry and Parasuraman, 1997; Mack et al., 2000; Maxham and Netemeyer, 2002; Michel, 2001; Tax and Brown, 1998).

Further, it is probably more important in services than in goods to distinguish *direct* final characteristics, linked to the output - or ‘immediate’ output using Gadrey’s (1996) term - from *indirect* final characteristics, linked to the outcome - or ‘mediate’ output in Gadrey’s sense. For example, in the case of healthcare services, direct final characteristics ( $Y_d$ ) are those linked to the techniques and competences mobilised during the hospital stay, whereas indirect final characteristics ( $Y_i$ ) relate to the long term consequences of that stay and corresponding treatments (for example, in terms of the life expectancy or the quality of the ‘adjusted extra years’).

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<sup>1</sup> We have included in our illustration the process of consumption, which has not been explicitly analysed in the earlier characteristics-based studies, but which is essential in order to point out the simultaneity of production and consumption in services. We will discuss it in more detail when introducing the client’s characteristics into the model later in this paper.

**Fig. 1. The difference between goods and services illustrated in the characteristics-based framework**



In their model, Gallouj and Weinstein highlighted the importance of including process characteristics in the case of services. They stated that Saviotti and Metcalfe had in fact abandoned these characteristics in their analysis of goods; they had just mentioned them alongside technical and final characteristics. Even though this may be a relevant simplification in the goods context (where the production process and the product are separated, as shown in Figure 1), it is not possible when developing a conceptual framework for services. Yet, the separation of technical characteristics from process characteristics is problematic in services, because services are at the same time products and processes. Gallouj and Weinstein suggested two ways of getting around the problem. Firstly, the view can be taken that the processes are replacements for internal technical specifications, i.e. technical characteristics and process characteristics are in services one and the same thing. Secondly, the reference to the client interface can be used as an instrument of discrimination. Here, the technical characteristics will be those of the ‘front-office’ technologies (visible to the clients), and the ‘back-office’ technologies (invisible to the clients) will be described as process characteristics. Gallouj and Weinstein regarded the latter solution as more satisfactory, because its discriminatory power is based on the notion of client relationship, which is of fundamental importance in services (Eiglier and Langeard, 1988; Sundbo, 1994). However, in their service model and analysis of service innovation they adopted the first alternative ‘for the sake of convenience’, associating the

process characteristics (Z) and the technical characteristics (X) in the same general vector of technical characteristics (X-Z), or (T) in Gallouj's book (2002a).

The model has been applied in several service sectors: among others, in healthcare (Djellal and Gallouj, 2005), in retail (Gallouj C., 2008), and in building and construction (Bröchner, 2006). Researchers have also modified the model by adding new elements to it. For instance, de Vries (2006) has supplemented the model in order to make it applicable in the network context, and Windrum and Garcia-Goni (2008) have added the role of policy makers to the model when studying hospital services. In all these examples, the model has clarified the nature of services and helped to illustrate the opportunities for innovation. The model has functioned particularly well when information technology has played an important role in the services studied (e.g. de Vries, 2006), or when the services studied have been of a 'packaged' or 'assembled' type consisting of several individual services (e.g. Djellal and Gallouj, 2005, 2008a). An area where more concrete applications would be desirable are deep analyses within individual services, particularly in the cases where service acts essentially change as a result of innovation. It would also be important to extend the model to solution-oriented services (Shepherd and Ahmed, 2000), which have become general and which are comprehensive but not the 'assembled' type.

We suggest that one reason for the difficulty in applying the Gallouj-Weinstein model in these types of situations may be the broad scope of the category of technical characteristics and the 'invisibility' of the process characteristics within it. As stated in the original model, creating an explicit category for the process characteristics would be more satisfactory from the theoretical viewpoint too, because services constitute a process in their basic nature. Thus, in this paper we come back to considering the possibility that process characteristics could be separated from technical characteristics. We start from the solutions presented in the discussion of the original model: the idea that processes are replacements for internal technical specifications and the idea that the client interface could function as the discriminating factor.

However, deviating from the original view that these ideas are alternatives, we combine them. Further, we do not use the client interface as a factor that separates technical and process characteristics from each other, but adopt the division 'front office - back office' as a means to clarify and concretise our ideas. We suggest that not only processes but also technical and competence characteristics can be examined either as phenomena actualised in each individual service case ('front office'), or as phenomena



which enable and prepare specific client interactions or are codified generalisations based on these interactions ('back office'). As regards process characteristics, their core is in the 'front office' - in the contact between the producer and the customer (Greenfield, 1966), called as 'the moment of truth' (Normann, 1984; Carlzon, 1985). However, there are process characteristics also in the 'back office'; they include the development of the service in question before and after the customer contacts. The prototype of the actual service process also belongs to the 'back office', but it is a part of the technical characteristics.

In the present paper, we develop these basic ideas in more detail. From now on the paper has been structured as follows. We first analyse the content of the different characteristics categories in the original Gallouj-Weinstein model and summarise the innovation types recognised by the authors on the basis of the model. Thereafter we describe the results of the applications of the model from the theoretical viewpoint and consider the modifications and extensions made. Then we present our suggestion for a supplemented version of the model; here we utilise some of the extensions introduced by other authors. In the latter part of the paper, we apply the supplemented model in empirical cases. In order to include also innovation analysis in the case study, we have selected services that are novel in nature. Our cases are: 1) 'workplace design' provided by architect's offices, 2) solution services provided by equipment manufacturers, and 3) 'fifty plus' services provided by insurance companies. We have studied the cases in depth at the company level in Finland, but all of them reflect service innovations that have spread internationally. In the final section of the paper, we summarise our findings and make some concluding remarks.

## **2. The characteristics-based service innovation model and its applications**

### *2.1. The original model*

When transferring the characteristics-based model from the context of goods to the context of services, Gallouj and Weinstein (1997) started with final characteristics (Y). They stated that extending the notion of final characteristics to services does not pose any conceptual problems. Both goods and services provide clients with benefits that can be described in terms of quantity, quality, easiness of access, later applicability etc. As regards technical

characteristics (X), Gallouj and Weinstein made a distinction between tangible and intangible technical characteristics. The former contain the same basic elements that Saviotti and Metcalfe (1984) had included in the technical and process characteristics of goods: the tangible technical characteristics of the (service) product and the tangible technologies used in its design, production and marketing. In the case of services, information and logistics technologies are typical examples of these kinds of characteristics. The latter, intangible characteristics are missing in the Saviotti's and Metcalfe's work<sup>2</sup>, but they are highly important when the study focuses on services. They consist of the expertise and the non-technological models and methods applied in the production of the service. Finally, Gallouj and Weinstein mention organisational and spatial characteristics as possible elements of technical characteristics.

As mentioned in the introduction, Gallouj and Weinstein solved the difficulty of distinguishing between technical and process characteristics in services by interpreting these two groups of characteristics as one and the same thing. In other words, they included all the tangible and intangible forms of the service process among technical characteristics. They pointed out that technical characteristics contain both the front-office and back-office technologies and processes.

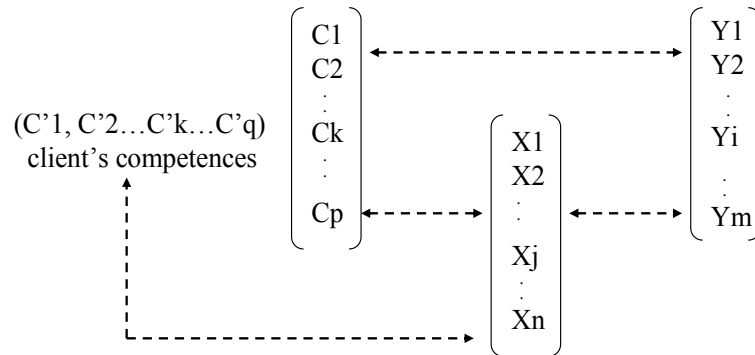
While 'compressing' the model through the assimilation of technical and process characteristics, Gallouj and Weinstein added a new group of characteristics: competence characteristics (C). Each technical characteristic mobilises certain competences. According to the authors, the addition of the competence category is necessary because the provision of a service is the result of two competence-related mechanisms: the utilisation of technical characteristics that are themselves based on competences, and the direct mobilisation of competences. The category of competence characteristics refers to competences of an individual or a group involved in the delivery of the service in question, whereas organisational competences fall within the scope of intangible technical characteristics. As examples of competences, Gallouj and Weinstein present the following broad groups: cognitive competences, internal and external relational competences, combinatory or creative competences and operational or manual competences. In addition to the competences of the service provider, the competences of the client (C') are included in the

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<sup>2</sup> Intangible process characteristics are, however, recognised in Saviotti's later writings, starting from his article of 1985. Here he includes within process characteristics also intangible assets (such as brand name, copyrights and patents), human resources (such as education, training, and the experience and skills of individuals), and organisational resources (such as corporate culture, organisational structure, rules and the procedures of the firm).

model, this being the way in which the co-production relationship typical of services is taken into account. Figure 2 presents the model in its original form.

**Fig. 2. The model by Gallouj and Weinstein (1997) in its original form**



Gallouj and Weinstein defined innovation as any change affecting one or more of the above described characteristics. They specified different types of innovations based on their model. *Radical innovation* means that a totally new system of  $[Y^*, X^*, C^*]$  replaces the old one. *Improvement innovation* is created when the value of a certain  $Y_i$  is increased by improving certain  $X_j$  or certain  $C_p$ . *Innovation by addition or substitution* occurs when one or more new elements are added to vector (Y), or one or more of its elements are replaced. This generally involves the addition of new elements to vector (C) and (X) or the replacement of some of their elements. *Ad hoc innovation* refers to a situation where a tailor-made service originally provides benefit (Y) to one client only, but includes elements that can be formalised afterwards in C and X and hereby used generally. *Recombinative or architectural innovation* takes place when a new service is developed either by combining characteristics of two or more existing services (bundling), or by splitting up an existing service (unbundling). Finally, the benefit provided by a service can be increased through *formalisation innovation*, which refers to increasing the visibility and concreteness of the service; this can be achieved by putting the technical and final characteristics 'into order' and by clarifying the relationship between them.

## 2.2. The model supplemented with new groups of characteristics

There are two important studies that have supplemented the original Gallouj-Weinstein model with new groups of characteristics. De Vries (2006) has broadened the model to take into account *networks of organisations* and *the client's technical characteristics*. He has also applied the revised model to describe innovation in four empirical cases (an insurance company, a social security agency, an IT company and an educational network) and in one literature-based case (a telecom operator) in the Netherlands. Windrum and Garcia-Goni (2008) have introduced *policy makers as a new type of actor* into the model and further supplemented it with *the preferences* of the provider, user and the policy maker. In this sub-section we explain briefly the basic ideas included in these two revisions of the model and note which of them we will use in our own version.

According to de Vries, two trends in innovation require enhancement of the original Gallouj-Weinstein model: the delivery of bundles of products and services by networks of providers, and provider-customer contact and co-production through technological channels (internet, cellular telephony etc.). Regarding the latter, a particularly important fact is that customers increasingly use their own technology in addition to, or instead of, the provider's technology when contacting the provider. To take into account the possibility of interaction between competences and technologies of different providers in a network, de Vries uses the symbols PC and PT to refer to these characteristics (the original X has been replaced here with T). Then he describes different organisations in a network with the symbols  $P_1...P_n$ . As the result, the competence characteristics can be represented in the form  $((P_1C_1...P_1C_q)...(P_nC_1...P_nC_q))$  and the technical characteristics in the form  $((P_1T_1...P_1T_q)...(P_nT_1...P_nT_q))$ . To incorporate the possibility of customer technology - provider technology interaction into the model, customer technology characteristics  $(CT_1...CT_q)$  are introduced. (De Vries has changed the original symbols also here, separately depicting the actor - in this case the customer - and the actor's characteristics. Accordingly, he uses CC instead of C' when referring to the customer's competence characteristics.)

De Vries emphasises that network-based services cannot be described through multiple usage of the Gallouj-Weinstein model, because this would not enable representing the interactions between the different types of characteristics of different service providers. Yet, it is just these interactions which are essential in network organisations and offer

opportunities for innovations. The revised model also includes the idea that customers may co-produce not only with one, but with several providers. The other important phenomenon - the customer using his/her own technology - also requires revision of the original model, where the technical characteristics have been explicitly represented only on the provider's side. The development of ICT has essentially increased the importance of the customer's technology, but there are also other types of technologies which should be considered from the viewpoint of both the provider and the customer; de Vries mentions logistics technology as an example. In the present paper, *we adopt the idea of including the customer's technical characteristics in the model*. However, even though the network perspective is very relevant too, we restrict ourselves to studying the relationship between one provider and one customer in order to illustrate clearly enough our main point, which is the process nature of the service.

Like de Vries, also Windrum and Garcia-Goni (2008) point out that innovations are developed and selected in a multi-agent environment. They want to develop a framework which captures the key groups that are involved in innovation processes and exert an important influence on the evolution of innovations. In particular, the authors want to take into account the role of policy makers and public sector service providers in addition to firms and customers. The framework is translated into a model of health services innovation by combining the characteristics-based approach with Schumpeter's (1934) five-class categorisation of innovations and with Barras' theory of the reverse innovation cycle in services (Barras 1986, 1990). The model adopts from the original Gallouj-Weinstein representation the competence characteristics and the final characteristics. Competence characteristics are interpreted very broadly: they also include the technical and process characteristics<sup>3</sup>. While dispensing with a separate category of technical characteristics included by Gallouj-Weinstein, the model introduces a new category of preferences (interests). The preferences describe the selection environment of innovations which determines their success or failure. The preferences, as well as competences, are linked to three different types of actors: service provider, user (customer) and policy

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<sup>3</sup> Windrum and Garcia-Goni interpret that in the original Gallouj-Weinstein model process characteristics are replaced by producer competences, the latter including tangible and intangible assets as well as human and organisational resources. Even though it is difficult to find grounds for this interpretation in the original text by Gallouj and Weinstein (1997), it makes understandable why the authors do not consider the inclusion of technical characteristics within competences to be a big issue - it is just 'a step further' (Windrum and Garcia-Goni, 2008, p. 655). An additional reason behind the easy abandonment of a separate group for technical characteristics is probably the narrow view of the concept of technology in Windrum's and Garcia-Goni's model (in their healthcare framework, the authors mention surgical instruments, X-rays, computer tomography and pharmaceuticals as examples of technical characteristics).

maker. In the empirical case study presented in the paper, the service provider is a public organisation.

As a result of these modifications, the framework no more describes the characteristics of a service product, but the characteristics of the actors involved in the innovation process. In that sense, it goes to the opposite direction - to a more general level - compared with our present effort, which tries to go deeper into the details of the service product. As the authors themselves state, their work has linkages to the innovation systems thinking, which comprises interactions between economic, social and political spheres (e.g. Lundvall, 1988). In this framework, 'service products are the medium through which different agents communicate their preferences and competences' (Windrum and Garcia-Goni, 2008, p. 668).

There is, however, one important new solution in Windrum's and Garcia-Goni's model which corresponds to our aims: *the 'front office - back office' separation*. The authors adopt this separation in the form presented by Barras (1986, 1990), which means that it focuses on the competences of the service provider. These competences are divided into 'back office' competences and competences needed in face-to-face discussions with clients or users. Because Barras, as well as Windrum and Garcia-Goni include in competences also technical characteristics, the division concerns the major part, if not the whole service at the provider's side (the coverage depends on the handling of process characteristics that the authors do not explicitly discuss). The 'user facing' competences are specified here to include all the tangible and intangible skills, know-how and technologies mobilised by service providers when interacting with their users in order to define, produce and deliver the final service. Except the lacking attention to the process characteristics, this specification is well in line with our view. Further, defining the competences broadly and linking them to all types of actors mean that Windrum and Garcia-Goni implicitly include technical characteristics, not only in the case of the provider, but also in the case of the customer (even in the case of the policy maker) - the point that deVries makes explicit and highlights in his model. However, they do not apply the of 'front office - back office' distinction to the customers.

### *2.3. The model supplemented with an analysis of the service media, corresponding operations and technologies, and innovation trajectories*

In 2005, Djellal and Gallouj developed a new variation of the characteristics-based model in order to analyse complex systems with various constituent services. As regards innovation, this variation does not concentrate on adding/subtracting vectors, i.e. groups of characteristics, to the model but provides an alternative way to analyse service technologies and processes and their dynamics. Instead of the category of technical characteristics (including process characteristics), Djellal and Gallouj - inspired by Gadrey's definition of the service (1996) - adopted as a new variable the media of service provision, with corresponding operations and technologies. Because the framework was planned for the analysis of complex systems, the constituent services are included as another new variable. From the original Gallouj-Weinstein representation, the provider's competence characteristics and the final characteristics (utilities) are adopted as such into the new model. The model is presented in a form of a table where the vertical axis describes the constituent services and the horizontal axis comprises the competences, service media and final characteristics (cf. Table 1). Djellal and Gallouj originally developed this renewed model in the hospital context, being able to show that there is lot of space for many types of innovations in many types of services (cleaning, catering, recreation, management etc.), not only in the medical treatment or nursing care. Later, the model has been generalised to be applicable in all 'assembled-type' services, i.e. services that are packages of constituent services (Djellal and Gallouj, 2008a), and it has been examined in detail in large scale retailing (Gallouj, C., 2008) and in the building and construction sector (Bröchner, 2006).

From the viewpoint of the present paper, the most important aspects of this renewed model are included in the analysis that starts with the introduction of the media and targets of service provision. In accordance with the notion of the service triangle (Gadrey, 1996), Djellal and Gallouj suggest that the provision of a service consists of a set of operations affecting various media or targets, namely material objects (M), information (I), knowledge (K) or individuals (R). Thus four groups of operations can be identified (Gadrey, 1996; Gallouj, 1999) which are combined in differing proportions each time the service is provided: 1) material transformation operations (M), 2) information processing operations (I), 3) operations involving the intellectual processing of knowledge (K), and 4)

contactual or relational service operations (R). The nature of these operations differs depending on the type of target. In the first case, the targets are tangible objects that have to be processed in some way, i.e. transported, transformed, maintained, repaired etc. In the second case, it is codified information that has to be produced, captured, diffused, stored or revealed. In the third case, the processing is based on codified methods and routines and intangible technologies. The fourth case, in which the main medium is the customer, involves the provision of a direct service with a greater or lesser degree of interactivity with the customer. Each of these groups of operations can be associated with particular families of technologies. This is particularly evident in the case of the first three groups of operations, which correspond, respectively, to material processing technologies, information processing technologies and cognitive technologies.

**Table 1: A framework for analysing the output and the innovation of an assembled service (Djellal and Gallouj, 2005, 2008a)**

| Constituent services  | Competences mobilized  | Service medium, corresponding operations or functions and associated technologies |  |   |  | ('External') use, final or service characteristics or functions     |
|---|--|---|--|---|--|---|
|   |  | M   | I  | K   | R  |   |
| $S_i$   | Competences in (the use of) technologies or competences directly mobilized | 'Material' operations (+ corresponding sciences and technologies)                 | 'Informational' operations (+ corresponding sciences and technologies) | 'Methodological' operations (+ corresponding sciences and technologies) | Contractual or relational service operations (+ corresponding sciences and technologies) | Service functions and characteristics (+ corresponding disciplines) |
| $S_1$ ( $S_{i1}, S_{i2}, \dots$<br>$S_{ij}, \dots S_{im}$ ) |  |   |  |   |  |   |
| $S_2$   |  |   |  |   |  |   |
| $S_3$   |  |   |  |   |  |   |
| ...   |  |   |  |   |  |   |
| $S_i$   |  |   |  |   |  |   |
| ...   |  |   |  |   |  |   |
| $S_n$   |  |   |  |   |  |   |

The analysis of innovation on the basis of the model starts from the identification of the organising principles that can change either the variable of constituent services or the variable which consists of competences; media, corresponding operations and associated



technologies; and final characteristics. According to Djellal and Gallouj, there are four organising principles that can drive innovation in this framework: extensive, regressive, intensive and combinatory. The extensive principle means that new constituent services are added to the existing service, and the regressive principle involves the elimination of constituent services. The intensive principle means that new competences and/or (tangible or intangible) technologies are added, a process that may be accompanied by the elimination of old competences and/or technologies. Also the value of existing competences and/or technologies might be increased or reduced. Within this intensive organising principle, four innovation trajectories can be identified. These trajectories correspond to the different types of operations included: a material transformation trajectory, an information processing trajectory, a methodological and cognitive trajectory, and a relational trajectory. The fourth principle driving innovation - the combinatory principle - is the most common according to Djellal and Gallouj. It draws on the basic mechanisms outlined above, which it links in number of different ways.

The organising principles in the Djellal-Gallouj model have much in common with the innovation typology presented by Gallouj and Weinstein (innovation by improvement, addition, substitution and recombination). A totally new contribution is the explicit *analysis of different types of operations* in the service provision and the analysis of the corresponding innovation trajectories. Even though the operations are considered mainly from the viewpoint of technologies, the approach highlights the process nature of services more clearly than the original Gallouj-Weinstein model.

The authors also point out that the model can be used at various levels: at the organisational, intra-organisational and inter-organisational levels. This can be done by changing the level at which the 'service' and its constituents are specified (see a concrete application of this idea in retailing by C. Gallouj, 2008). Even though this iterative process is possible both in a more general and a more detailed direction, it finally comes to the end. In the case of more and more detailed analysis, there is a limit where the unit of analysis is no more divisible in a reasonable way. Our aim in this paper is to tackle just these kinds of situations: we try to model individual services that are not divisible in their general form. (The organisation-specific applications may be divisible, for instance due to the modular structure of the service. However, because the modules usually vary from case to case, this does not enable the construction of a general model.) Thus, we cannot apply the Djellal-

Gallouj model as such, but we utilise their discussion of different technologies and operations when specifying the technical and process characteristics in our model.

### **3. Making the process nature of services more visible in the model**

#### *3.1. Basic ideas for a supplemented model*

In this section we present our modification of the original Gallouj-Weinstein model, the core of this modification being an attempt to make visible the process nature of services. For this purpose, we introduce three new aspects into the original model: 1) we adopt a specific category for the process characteristics, i.e. we separate them from the technical characteristics, 2) we adopt the division between ‘front office’ and ‘back office’ which we apply to all groups of the provider’s characteristics, and 3) we include in the model the customer’s characteristics, not only in the case of competences, but also in the case of technology and process, and apply the ‘front office - back office’ division also to these characteristics. Our focus is on the separate category for process characteristics, but we think that its illustration requires the ‘front office - back office’ division and a versatile representation of the customer’s characteristics in order to achieve clarity.

As mentioned in the introductory part of this paper, Gallouj and Weinstein suggested in their original model that a division between the technical and process characteristics could be made by linking the technical characteristics to the ‘front-office’ and the process characteristics to the ‘back office’. An aim to find an analogy with goods is apparent in this suggestion: in goods the production process is usually not visible to the clients, and what is visible is the good itself. Thus, in goods it is natural to link the process characteristics to the ‘back-office’ and the technical characteristics to the ‘front-office’. Applying this view to services, even though it would enable a nice parallel with the model of Saviotti and Metcalfe (1984), is difficult as it leads to naming as process characteristics those parts of the service that are outside the client interaction. While this result is against the unanimously stated importance of client participation in services, turning around the idea - linking all process characteristics to the ‘front office’ and all technical characteristics to the ‘back office’ - does not work either. Evidently there are processes that prepare client interactions outside the client’s view (‘back office’) and there are technologies mobilised in actual interactions (‘front office’).

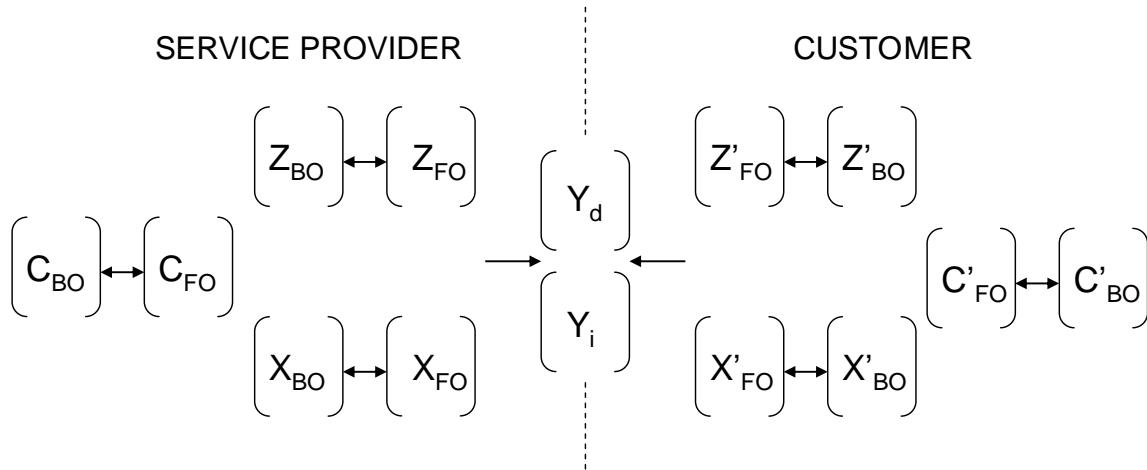
Thus, we give up solutions which would locate all technical characteristics on one side and all process characteristics on the other side of the client interface. Instead, we make *a division within technical, process and competence characteristics, dividing them into those actually mobilised in the client interaction and those preparing or being based on this interaction.*<sup>4</sup> We call the former ‘front-office’ characteristics and the latter ‘back-office’ characteristics. This way of interpreting the discriminatory function of the client interface corresponds well to writings of the authors who have profoundly discussed the ‘front office - back office’ division, without applying, however, the characteristics-based approach (e.g. Silvestro et al., 1992). Compared with the original Gallouj-Weinstein model, our solution means a greater detachment from the thoughts by Saviotti and Metcalfe, i.e. it depicts the special nature of services. However, we want to emphasise that it still *enables the analysis of both goods and services using the same basic characteristics* (except the competence characteristics that were added in the original Gallouj-Weinstein representation and have been included also in our renewed model). This point is important, because we want to keep the synthesis view which does not see services and manufacturing as totally separate research objects.

In addition to the solutions aiming to increase the visibility of the service process, we include in our model the division between direct and indirect final characteristics, which we discussed briefly in the introductory part of this paper (cf. Gadrey, 1996). The former refer to utilities that manifest themselves during the service process, whereas the latter are utilities that manifest themselves in the longer term. We consider this division important at least in some types of services (for example public services), and especially for performance definition and measurement (Djellal and Gallouj, 2008b). Our modified model in a general form is presented in Figure 3.

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<sup>4</sup> Our model means that we also give up the alternative solution presented, and actually used, by Gallouj and Weinstein in their article. This is the solution that technical and process characteristics are one and the same thing if processes are interpreted as replacements of internal technical specifications. According to our model ‘front office’ processes can be partially interpreted as replacements of internal ‘back office’ processes, and ‘front office’ technologies can be partially interpreted as replacements of internal ‘back office’ technologies; but these two groups of characteristics cannot be mixed.

**Fig. 3. A revised characteristics-based model of services (the Gallouj-Weinstein model supplemented with process characteristics and the ‘front-office - back-office’ division for both the provider and the customer, and with the distinction between direct and indirect final characteristics)**



Corresponding to the original Gallouj-Weinstein representation, (Y) refers to the final characteristics (utilities) of the service. We use the symbol ( $Y_d$ ) to refer to the direct (immediate) utilities and the symbol ( $Y_i$ ) to refer to the indirect (longer-term) utilities. (X) refers to the technical characteristics and (C) to the competence characteristics of the provider. The provider's process characteristics are introduced as a new vector (Z), the symbol being the same which Gallouj and Weinstein used for processes included in (X). The characteristics (X), (Z) and (C) are divided to ‘front office’ characteristics, denoted by the subscript FO, and to ‘back office’ characteristics, denoted by the subscript BO.

On the customer's side, ( $C'$ ) refers to the competence characteristics of the customer, and the original representation has been supplemented with technical and process characteristics (respectively ( $X'$ ) and ( $Z'$ )), i.e. the same framework of characteristics has been applied throughout both in the case of the service provider and the customer. As regards the customer's technical characteristics ( $X'$ ), their inclusion is justifiable at least in the cases where customers contact their service providers or more generally interact with them using their own ICT devices - a point emphasised by de Vries (2006). The customer's process characteristics ( $Z'$ ) are essential for the illustration of the fact that in

many cases customers participate in the production process of the service (Eiglier and Langeard, 1988; Sundbo and Gallouj, 2000).

In Figure 3, we have not indicated all the relationships between the different vectors (the pattern of mapping in Saviotti's and Metcalfe's terminology) in order to simplify the representation. It should be noted that these relationships can have different meanings (mobilisation of resources, consubstantiality, interaction, etc.), and that the general representation of Figure 3 encompasses several particular service cases and cases including both goods and services (self-service; 'pure' service with or without coproduction; services related to goods, i.e. industrial services; etc.).

### *3.2. Contents of the different characteristics groups*

The category of the provider's process characteristics (Z) in our model has a more limited content compared with Saviotti's and Metcalfe's (1984) definition of process characteristics in manufacturing. What is common is the inclusion of all stages of the process within this group of characteristics: design, marketing and actual production. In services these stages often coincide. Design continues in actual production, where the service gets its final shape as a result of the customer-provider interaction (Edvardsson et al., 2006; Lusch et al., 2007; Sundbo and Gallouj, 2000; Toivonen et al., 2007; Ulwick, 2002). In marketing, some separate efforts are often done, but the linkage to production exists: Sundbo (1994) has pointed out that the co-production situation provides a very special possibility for personal marketing combined with fulfilment of needs of the individual customer. All this emphasises the importance of 'front office' process characteristics in services. However, there are also significant processes in the 'back office': preparations for the customer interaction and activities based on this interaction, e.g. processing material and information concerning the service in question, and handling the customer feedback.

After separating the process - the genuine acts - from the technical characteristics, there remain two types of characteristics in this category (X). The first group reflects maybe most clearly the product nature of the service (in the usual sense of the word). It includes in the 'back office' the basic idea of the service in question - the service concept and the prototype of the process. In the 'front office' it includes the concrete results in those cases where the result is separable from the utility - as an example can be mentioned an

insurance document (result) that guaranties a certain amount of safety (utility). Other examples are a legal document or a research report (results), which contain utilities for legal protection or strategic actions, or software (result), which allows different functions (utilities). The second group can be called 'enablers'; it includes the technology (in the narrow sense) as well as the non-technological methods and models used in the service production. Further, it includes the organisation and spatial characteristics. In this group, the 'front office' characteristics are partially mobilised expressions of the corresponding 'back office' characteristics. However, there are also technologies and models, as well as organisational and physical elements, that serve 'back office' operations, e.g. book-keeping software, manuals for personnel training, administrative parts of the organisation, and the ergonomics of the work environment. Our solution to locate the 'enablers' in the category of technical characteristics clearly deviates from the analysis of a good by Saviotti and Metcalfe, where the 'enabling type' characteristics were seen as a part of the production process. However, in services the inclusion of the 'enablers' in the process characteristics would lead to broadening the concept of the service process in a way which is unfamiliar in service literature, irrespective of the school of thinking.

The service concept and the prototype of the process deserve some further comment. They were not explicitly mentioned in the original Gallouj-Weinstein model; yet, they are an essential part of the intangible technical characteristics of a service. The service concept includes the basic idea of the service in question as well as its structure and role in the total offering of the provider organisation (Edvardsson, 1997). The concept is based on an understanding of the customer needs and how these needs can be fulfilled. This understanding may be in the form of tacit knowledge, or it can be clearly expressed in the form of a service promise which describes the utilities (Y) to be provided. An advanced service concept also includes the analysis of the structure of the service: a division into the core and the supporting elements (Grönroos, 1990) and, along with the increasingly common practice of modularisation, also the service modules (Sundbo, 1994). The prototype of the process is closely linked to the service concept. Since the beginning of the 1980s, specific instruments have been developed in order to systematise the design of the service process. For instance, blueprint diagrams where processes are drawn as boxes and lines have become widespread (Shostack, 1981, 1984; Fliess and Kleinaltenkamp, 2004). Blueprints illustrate the service in question both from the viewpoint of the provider (the

provider's process) and from the viewpoint of the customer (the customer's process), and they also depict the points where the processes coincide (the interface).

As mentioned earlier, our definition of competence characteristics (C) is in line with the thoughts of Windrum and Garcia-Goni (2008), but focuses on 'pure' competences instead of including technical characteristics in the same group (the solution of Windrum and Garcia-Goni). The introduction of 'front office - back office' division also enables an additional clarification to the original Gallouj-Weinstein model. In this model, the vector C included only the individuals' or small groups' competences implemented directly in service transactions, and the organisation-level competences were located within intangible technical characteristics. We consider it more consistent to interpret also the latter - i.e. competences linked to organisational learning and organisational memory - as genuine competence characteristics, belonging to the 'back office'. As regards the 'front office' competences, we keep the original Gallouj-Weinstein definition, including in them all the individual and small-group skills and know-how mobilised in the real life service delivery. Corresponding to the case of technical characteristics, some individual competences are also mobilised directly in the 'back office'. For instance, the use of CRM (customer relationship management) systems requires its own specific skills.

Gallouj and Weinstein mentioned cognitive, creative, operational and relational competences as examples of competence characteristics. Another useful categorisation has been made by Kuusisto (2000), who divides competences and skills needed in service production into three levels: business level, service process level and personal interaction level. Toivonen (2004) has specified the contents of these categories in more detail. According to her, business level skills include understanding the basics of economy and business, understanding the on-going changes, and overall management of one's own value chain. Skills needed at the service process level cover mastering the contents and methodology of one's own sector, know-how concerning client industries, and management of actual service processes. Finally, the personal interaction level requires marketing and sales skills, cooperation skills, and social and personal skills. We can add to this that business skills seem to be mainly of 'back office' type, interaction skills are most critical in the 'front office', and process skills are needed in both. Table 2 summarises our analysis of the contents of the characteristics groups (X), (Z) and (C).

**Table 2: Technical, process and competence characteristics of the service provider according to the ‘front office - back office’ division**

|                      | technical characteristics X   | process characteristics Z  | competence characteristics C   |
|----------------------|---|--|--|
| ‘back office’<br>BO  | <ul style="list-style-type: none"> <li>- service concept</li> <li>- prototype of the process (blueprints, flowcharts)</li> <li>- tangible technology</li> <li>- non-technological models and methods</li> <li>- organisation</li> <li>- physical environment (e.g. ergonomics)</li> </ul> | <ul style="list-style-type: none"> <li>- those parts of the service design and production which take place outside the customer contact; preparatory activities regarding marketing</li> </ul> | <ul style="list-style-type: none"> <li>- competences linked to organisational learning and organisational memory</li> <li>- individual competences mobilised in service administration (e.g. CRM)</li> </ul> |
| ‘front office’<br>FO | <ul style="list-style-type: none"> <li>- concrete results (reports, contracts, software etc.)</li> <li>- tangible and non-tangible technologies mobilised</li> <li>- organisation mobilised</li> <li>- physical environment (if relevant)</li> </ul>                                      | <ul style="list-style-type: none"> <li>- the main part of service marketing and those parts of the service design and production which include customer contact</li> </ul>                     | <ul style="list-style-type: none"> <li>- individual competences of the personnel mobilised in the interaction with the customer</li> </ul>   |

Until now we have concentrated on the characteristics of the service provider. An equally detailed discussion of the characteristics of the customer is not possible in the limits of this paper, but we highlight the points that we consider most important. First and foremost it should be noted that the ‘front office - back office’ division is relevant, not only in the case of the service provider, but also in the case of the customer: customer characteristics are only partially visible to the provider. As regards the process characteristics of the customer (Z), researchers have used the term ‘customer journey’ or ‘customer path’ to describe the particular ordering of customer activities (Gummesson and Kingman-Brundage, 1992). The steps on this ‘path’ have been categorised in different ways; for instance, Whittle and Foster (1989) identify six main steps: search, arrival, pre-contact, contact, withdrawal and follow-up. Among the customer’s technical characteristics (X), we have already mentioned - based on the article of de Vries (2006) - the importance of the technology that the customer uses when contacting the provider or interacting with him. However, we have to add that the customer may also use in this



contact non-technological models and methods, which exist on the customer's side as well as on the provider's side (especially in the case of business customers with large internal service departments). Further, the customer's organisation may play a significant role in the realisation of a service. Among the competence characteristics of the customer (C'), particularly important are the ability to make correct assessment of one's own needs and situation, communication skills for 'educating' the service provider, decision making skills, and the ability to evaluate the service quality. In addition, in the cases of a strong co-production relationship, customers have to possess the skills associated with the fulfilment of tasks in the service delivery. Performing concrete service-specific tasks is needed in self-services too, but instead of cooperation the focus is here on the ability to operate independently of the provider. (Chervonnaya, 2003)

#### **4. Applying the supplemented model in empirical cases**

In this section, we apply our modification of the Gallouj-Weinstein model in empirical cases. We started this article with the argument that modifying the original model is necessary for deep analyses within individual services in particular. Thus, we focus on this type of research setting. We aim to show that our model enables the analysis of individual services at a reasonably detailed level and facilitates the identification of innovations occurring in these types of services. Like Gallouj and Weinstein, we are specifically interested in applying the characteristics-based model to the examination of service innovations. Therefore we have selected as our case examples services in which one or more innovations have taken place. Our cases are: 1) 'workplace design' provided by architect's offices, 2) solution services provided by equipment manufacturers, and 3) 'fifty plus' services provided by insurance companies. In order to show that our model works in various contexts, we have gathered our cases from different sectors. The first case represents KIBS, knowledge-intensive business services that expert companies provide to other companies and organisations. The second case is an example of services in the industrial context, a phenomenon which is rapidly generalising today. The third case represents consumer services, i.e. services offered to individuals and households.

We have studied the case services on the basis of both literature and empirical material. The empirical material has been gathered in Finland; we have studied each service in one company using interviews and company workshops as research methods. Due to the length

restrictions of this paper, we cannot discuss our case methodology in detail here, but refer to another article where we present it (xxxx, 2008). In the following analysis, we describe each of the three services before and after innovation, identify the characteristics that have changed, and examine the type of innovation(s). Regarding the innovation types recognised by Gallouj and Weinstein, we restrict ourselves to four: innovation by improvement, innovation by addition or substitution, innovation by recombination, and innovation by formalisation. In concrete cases, our model also enables the examination of the proceeding of the innovation process. This topic is, however, vast and its detailed discussion has to be postponed to another occasion; we just summarise the main lines of development in the Finnish case companies.

#### *4.1. Case 1: 'Workplace design' provided by architects*

'Workplace design' is an approach which highlights the integration of architectural design with the client's overall strategic direction. Workplaces are seen as a strategic asset, and the aim is to create workplaces that support and enhance the client's business. According to workplace specialists, the fulfilment of this aim is achieved in several ways. Spaces can be used as a means to increase productivity on one hand and to stimulate employee satisfaction on the other. Spaces can also be used to reinforce organisational identity: architecture reflects organisational culture and the company's way of doing business. Further, changes in the workplace layout are a concrete way to support the changes that an organisation wants to make in its strategy and operations. (Chan et al., 2007) 'Workplace design' usually starts with a visioning session with the top management of the client. Thereafter representatives of the architect's office spend an intense one- to two weeks' period on-site, gathering information and developing recommendations for the design together with the client. The methodological repertoire is versatile compared with traditional architecture. For instance, behavioral observations and on-line social network surveys are applied in the examination of work processes and the use of spaces. (Kampschroer et al., 2007)

'Workplace design' has focused on developing architectural solutions that take into account the specific requirements of knowledge work. Knowledge work tends to be more team-based and collaborative, information transfer among workers and groups playing a central role. In addition, the rapid rise of the internet and various other communication

tools has made work more mobile. The proponents of 'workplace design' argue that the physical space in which work occurs should change hand in hand with changes in the organisation of work. The workplaces discussed in this framework have primarily been offices, which are the most important physical venues for knowledge work. However, applying the approach also in other types of spaces has been considered possible, as all work is becoming increasingly knowledge-based in modern economies. (Levin, 2005)

Architects nowadays work together with other experts - environmental psychologists and sociologists among others - in 'workplace design'. Also academic research is active concerning the role of office spaces in knowledge building, knowledge sharing, learning and cooperation. In the early stages of 'workplace design', there was an extensive discussion of traditional office space versus open-plan, the proponents of open-plan reporting heightened interaction and communication. Later studies and practical experiences suggest that there is not a single answer to optimising space arrangements. The real challenge lies in providing workspaces that allow both creativity-enhancing interaction and individual reflection, and which can be adjusted to the constantly changing demands of the contemporary work. (Brennan et al., 2002)

We have studied the application of 'workplace design' in a Finnish architectural company. The company has been one of the pioneers in the development of this service in Europe, starting the first 'experiments' with the new approach at the end of the 1980s. Nowadays 'workplace design' is a formalised service product in the company. It has a modular structure and it includes an explicitly expressed service promise: 'workplace service helps the clients to make their work processes more efficient via the development of office spaces'. The case company is well aware of the international models and methods used in 'workplace design', and it has developed some of them further. Workshops as a tool are emphasised in particular: common, profound discussions about future office layout makes the employees committed to changes - they feel that their opinions are appreciated. The interviewees in the company emphasised the essential change that 'workplace design' had brought with it to architect's service: architectural expertise has to be supplemented with know-how in management consultancy.

After the general description above, we now examine 'workplace design' using the characteristics-based analysis (see the summary in Table 3). When comparing 'workplace design' with the traditional architect's service, we find changes in all characteristics

groups. The most important changes are *the increase of front-office tasks among both the provider and the client, and the general activation of the client's role.*

Earlier architect's offices concentrated on making plans that corresponded to the order of the client (Z). The technical characteristics (X) as well as competences (C) were focused narrowly on architecture-specific methods, technology and know-how, and the service provider met the client quite rarely - in the original negotiations and in the presentations of drawings. The client's organisation was usually not broadly involved in the design process. After selecting the architect, the interaction (Z') was delegated to a contact person/group. Competences required from the client included the ability to somehow evaluate and communicate space needs and to make decisions based on the architect's proposals (C').

The 'workplace design' approach means continuous interaction between the service provider and the client, i.e. the service is co-produced. This co-production relationship is clearly manifested in the increase of 'front-office' activities in the service process. The service provider spends time in the client's premises, making observations and organising workshops ( $Z_{FO}$ ), where the client's personnel broadly participates ( $Z'_{FO}$ ). The general activation of the client's role means that also its 'back office' tasks have increased: the client has to analyse in detail its strategies, work processes and the related space needs ( $Z'_{BO}$ ). The changes in the process require changes in competences. Instead of a single profession, architect's offices have to become multidisciplinary - recruiting behavioural, management and business experts ( $C_{BO}$ ). Clients have to develop their strategic abilities and readiness for changes ( $C'_{BO}$ ). 'Workplace design' implies changes in technical characteristics too. Concerning the service provider, essential changes are a clear service concept and multiple methods ( $X_{BO}$ ), as well as versatile reporting ( $X_{FO}$ ). On the client's side, more organisational resources have to be allocated for space issues than before. Finally, internet technology plays an important role in the service, as surveys of space users' opinions are usually carried out on-line ( $X'_{BO}$ ).

'Workplace design' is an example of a service where separating direct ( $Y_d$ ) and indirect ( $Y_i$ ) utilities is useful. The inclusion of a futures perspective is essential in this approach, and is reflected in striving for flexibility, variability and sustainability in space solutions, i.e. striving for indirect utilities that may be realised after years or even decades later. Even though these viewpoints have been present in traditional architecture too, in practice they have often been trampled by short-term economic goals (Chan et al., 2007). The fact that indirect utilities are taken more seriously in 'workplace design' is shown by our

interviewees, who told that they accept only assignments where a long-term perspective is included.

**Table 3: A characteristics-based analysis of the traditional architect's service and of the service based on the 'workplace design' framework**

Traditional architect's service

|                 |  |  |   |                  |
|-----------------|--|--|---|------------------|
| X <sub>BO</sub> | no clear concept, tacit knowledge central; methods focus on 'drawing' and technology on architects' software     | Y <sub>d</sub><br>the plan is in line with the client's order, which often favours brand supporting and economical solutions | specific technology is not needed; some organisational resources are mobilised (a project group/person) | X' <sub>BO</sub> |
| X <sub>FO</sub> | results presented as 'drawings', supplemented with reports and multimedia presentations                          |  | organisation is central also here; the project group/person cooperates with the architect               | X' <sub>FO</sub> |
| Z <sub>BO</sub> | the process follows the construction project (from general plans to details); cooperation with other planners    | Y <sub>i</sub><br>the plan focuses on the near future and rarely includes longer-term analysis                               | the client seeks suitable planners, organises tendering and selects an architect (and other planners)   | Z' <sub>BO</sub> |
| Z <sub>FO</sub> | presenting the plans to the client in recurring meetings during the process                                      |  | the client's order starts the process; later the client accepts or rejects plans or requires changes    | Z' <sub>FO</sub> |
| C <sub>BO</sub> | architect's expertise is enough: design of functional and aesthetic spaces and awareness of laws and regulations |  | ability to analyse one's own space needs and make decisions based on the planner's suggestions          | C' <sub>BO</sub> |
| C <sub>FO</sub> | ability to show one's expertise: to reconcile the client's desires and the external limitations                  |  | ability to communicate one's own space needs to the planner   | C' <sub>FO</sub> |

## Service based on the ‘workplace design’ framework

|                 |   |   |   |                  |
|-----------------|---|---|---|------------------|
| X <sub>BO</sub> | a clear service concept; new methods for data analysis (e.g. behavioural maps); internet technology central     | Y <sub>d</sub><br>the new office spaces support the strategy of the client; the process makes | both organisational resources and technology are needed (surveys are carried out via internet)          | X' <sub>BO</sub> |
| X <sub>FO</sub> | on-site methods (e.g. observation); results presented as reports and illustrations                              |   | the client establishes a project group; big companies even have specific ‘workplace departments’        | X' <sub>FO</sub> |
| Z <sub>BO</sub> | analysis of the client’s space needs on the basis of data gathered on-site, linking the space needs to strategy | Y <sub>i</sub><br>the solutions are planned for the future; they are flexible and changeable  | in addition to earlier tasks, active in-house working is needed on the suggestions of the architect     | Z' <sub>BO</sub> |
| Z <sub>FO</sub> | observing the behaviour of personnel in the client’s premises, organising change workshops                      |   | top management defines the aims of the project; in later stages personnel is broadly involved           | Z' <sub>FO</sub> |
| C <sub>BO</sub> | understanding human behaviour and strategic issues; multidisciplinary; proactive attitude                       |   | strategic and future-oriented thinking, readiness to changes, devoting time for the project             | C' <sub>BO</sub> |
| C <sub>FO</sub> | ability to illustrate how spaces influence everyday work and to act as a change agent                           |   | cooperative capabilities and active participation are highlighted due to the central role of workshops) | C' <sub>FO</sub> |

The innovations included in ‘workplace design’ are first and foremost *innovations by addition or substitution*. In the analysis above we have identified several new elements in technical (X), process (Z) and competence (C) characteristics (internet surveys, workshops and multidisciplinary serving as examples) which lead to new direct and/or indirect utilities ((Y<sub>d</sub>), (Y<sub>i</sub>)). In addition, the movement of architectural practice towards management consultancy means that some earlier elements have been substituted with new ones: for instance, instead of ‘drawings’ a significant part of results are presented in a written form. A second innovation type that manifests itself in ‘workplace design’ is *innovation by formalisation*. Simplifying a little, we can say that in traditional architecture the provider sells experts’ working hours, whereas in ‘workplace design’ the entity sold is a clearly structured service product with explicitly stated utilities.

As regards the proceeding of the innovation process, the interviewees of our case company reported that the process started from front-office technical characteristics ( $X_{FO}$ ): from the observation methods adopted abroad. Developing methods for data analysis in the 'back office' ( $X_{BO}$ ) was a natural next step. Strategy linkage ( $Z_{BO}$ ) and the co-production practice ( $Z_{FO}$ ) - issues linked to process characteristics of 'workplace design' - were the next developmental targets. At the final stage the development focused on competences, first in the 'back office' (multidisciplinarity) ( $C_{BO}$ ) and then in the 'front office' (change agent competences) ( $C_{FO}$ ). Thus, the following sequence of stages  $X_{FO} \dots X_{BO} \dots Z_{BO} \dots Z_{FO} \dots C_{BO} \dots C_{FO}$  describes the innovation process in this case.

#### *4.2. Case 2: Solution services provided by equipment manufacturers*

Services today are provided not only in service sectors, but increasingly also in the manufacturing context. Our second case is an example of these types of services, i.e. industrial services that manufacturing companies offer in addition to goods. Industrial services are usually targeted to other companies and organisations, and they are divided into pre-purchase, at-purchase and after-sales services. Pre-purchase services clarify the often complex situation of clients in order to help them to achieve the best possible benefit from the goods and services acquired later. At-purchase services include, among others, different kinds of logistics and storing services, and after-sales services focus on repairing and maintenance and of the goods sold. (Homburg and Garbe, 1999)

Innovations in industrial services are today typically linked to the transfer from services sold one by one to services provided on the basis of long-term partner agreements. In after-sales services these agreements may cover a significant part of the life cycle of goods. Another phenomenon is the transfer from services that support a good to services that support the client's processes in the production of the good, or even the client's business in general. (Mathieu, 2001) Moving from goods-related services to business-related services is often linked to the so-called solution offerings. Here the clients only need to present their problems; the responsibility for organising the means is the task of the provider. The provider sells availability, among others: it assumes some of the equipment related risk that the client earlier carried. Offering tools for maintenance management and selling additional services are means to reduce this risk. Additional services may include

instructions, training, and monitoring the condition of the equipment remotely. (Paloheimo et al., 2004)

In the provision of solutions, the provider becomes more or less a part of the client's operations and business system. Researchers have found the following typical pattern of actions in the transition towards a more comprehensive and long-term industrial service. Firstly, the provider consolidates its product-related services and often relocates services in a separate unit. Secondly, the provider defines and analyses its products possessed by clients, creating an infrastructure for marketing and delivering additional services. Thirdly, the provider expands to relationship-based services or focuses on process-centred services. At the final stage, the provider takes over some parts of the client's operations. (Oliva and Kallenberg, 2003).

When applying our modified characteristics model to industrial services, we focus on equipment manufacturing. We use a Finnish manufacturer of warehouse trucks as the case example. Earlier this company provided two types of services that were offered separately. Firstly, the trucks sold were maintained and repaired on the basis of a standard agreement (in some cases the agreement was tailor-made including a more comprehensive service). Secondly, the company rented out trucks. Some training was also provided according to the requests of clients. During recent years the company has actively developed its offering as an integrated whole, which includes multiple services, focuses on long-term partnering, and expresses increasingly features of solution business. In addition to earlier goods-related services, several services are now offered that support the client's processes and business. These new types of services are targeted to key clients in particular. In the most advanced cases, clients outsource to our case company all tasks linked to the procurement, maintenance and operation of their trucks fleet. Our case company secures not only the availability of well-working trucks, but the availability of skilled truck-drivers as well. For the latter purpose, it cooperates with specialised recruitment companies. An interesting new service is also the optimisation of the client's logistics fleet. This service consists of the analysis of the client's present fleet and operating environment, and of the development plan regarding the purchase, maintenance and use of trucks and other logistics equipment.

Table 4 summarises the comparison between traditional goods-related services (which in the equipment manufacture primarily focus on after-sales maintenance and repair) and new solution-based services. Some similarities but also big differences can be identified between this case and the first case. In both of them, the *front-office tasks of the service*



*provider have increased.* However, instead of the activation of the client (which characterised ‘workplace design’), the main idea of solution services is to *relieve the client of responsibilities and transfer them to the service provider.* This means that *also the back-office tasks of the provider have significantly increased.*

The different characteristics groups in equipment-related services can be described as follows. Technical characteristics ((X), (X’)) include different types of tools and equipment used in the maintenance and repair of trucks, and in the case of renting also the truck itself. In addition, this characteristics group includes organisational resources of the provider (a service ‘unit’ consisting of mechanics) and the client (mid-managers and supervisors who are in charge of the availability of equipment and cooperate with the service provider). Thirdly, maintenance agreements and some administrative software - in the service company also maintenance software and service manuals - are a part of technical characteristics. These resources and technology exist continuously in the ‘back office’ and are mobilised in actual assignments (primarily in the ‘front office’). The process characteristics show that clients have multiple tasks in equipment-related services: the client’s process (Z’) consists of defining service needs, ordering repair or preventive maintenance, and conducting all the administrative tasks linked to tenders, agreements, orders and payments. The process of the provider (Z) focuses on maintenance and repair operations in the ‘front office’, and receiving, confirming and invoicing the assignments in the ‘back office’. Marketing is typically restricted to mentioning the availability of services in the provider’s brochures. Surveys concerning client satisfaction are, however, quite common. Competence characteristics focus on equipment-related skills both in the client company (C’), which has to define its needs and evaluate service quality, and in the provider company (C), which has to keep the client’s equipment fully functioning. Our case company had also emphasised interactive skills and the initiative ability of its mechanics right from the start.

In solution-based services, material handling technologies and tools remain important as before, but other parts of the technical characteristics ((X) (X’)) change considerably. The transfer of responsibilities from the client to the provider means that agreements are made at a higher level - both parties mobilise top management for this task. In the provider company several other changes take place too. A clear service concept, which makes the service transparent to the client, is important: the entity purchased is complex and more immaterial than goods-related services. New types of manuals and directions are needed,

as the work is more versatile (it does not focus only on repair and maintenance). For efficiency reasons, IT-systems become central both in the 'front and back office'; they include equipment monitoring and management systems, and CRM- and ERP-systems. Long-term agreements favour electronic invoicing which is not profitable when orders are made one by one. From the organisational point of view, solution business may require a specific department and the use of sub-contractors. The process characteristics show an essential reduction in the client's tasks ( $Z'$ ). After negotiating a long-term partner agreement, the client mainly reacts to the service provider's suggestions concerning the 'main lines'. The provider takes care of the availability of equipment and personnel, solves problems, supervises the service quality, makes reports, analyses costs etc. ( $Z$ ). It also actively develops and markets these services. As regards competences ( $C$ ), solution services require an understanding of the client's business and operating environment. For instance in our case company, knowledge about warehousing and logistics in different industries is pronounced. From the client, the new type of service requires partnering and outsourcing skills ( $C'$ ).

Both equipment-related services and solution services provide direct and indirect utilities ( $(Y_d)$  ( $Y_i$ )). In equipment-related services, repair and rental are functions that benefit the client 'here and now', whereas preventive maintenance and advice linked to it provide benefits that can be perceived only in the longer term. In solution services, direct utilities include carelessness regarding equipment and personnel, and lightened administration. Yet, the biggest change occurs in long-term utilities, which our interviewees reported being the main topic in discussions with important partners. The question is about the development of the client's business, which is made more effective through improvements in warehousing and logistics.

**Table 4: A characteristics-based analysis of equipment-related services and of solution-based services in manufacturing**

Equipment-related industrial services

|          |   |       |  |  |
|----------|---|-------|--|--|
| $X_{BO}$ | organisational resources for repair and rental; administrative and maintenance software; service manuals                | $Y_d$ | the client's organisation that is in charge of the equipment; software for administrative purposes | $X'_{BO}$  |
| $X_{FO}$ | organisation (the 'unit' of mechanics); rented equipment; maintenance and repair tools; maintenance agreements          |       | problems linked to equipment are removed   | organisational resources (the mid-management level); repair and maintenance tools of clients       |
| $Z_{BO}$ | receiving, confirming and invoicing the assignments; training the maintenance men                                       | $Y_i$ | 'here and now'   | $Z'_{BO}$  |
| $Z_{FO}$ | focus on maintenance and repair processes; marketing at a general level; surveys on client satisfaction                 |       | equipment is kept well-working via maintenance services  | the client negotiates an agreement and orders acute and preventive services according to its needs |
| $C_{BO}$ | competences focused on administrative skills in the office work and on client service skills in the reception of orders |       | some equipment-specific know-how is needed for the evaluation of service needs                     | $C'_{BO}$  |
| $C_{FO}$ | equipment-related competences central; growing awareness of the importance of interactive and initiative abilities      |       | ability to evaluate the quality of the service; interactive skills at the grass root level         | $C'_{FO}$  |

Solution-based industrial services

|          |  |   |   |           |
|----------|--|---|---|-----------|
| $X_{BO}$ | organisational resources include top management, a service department and sub-contractors; a clear service concept | $Y_d$   | decisions concerning service outsourcing are made at the top management level     | $X'_{BO}$ |
| $X_{FO}$ | long-term agreements; process descriptions; advanced IT-tools (e.g. for the monitoring of equipment)               | carelessness regarding equipment and personnel; | resources needed for everyday interaction with the provider's personnel are minor | $X'_{FO}$ |
|          |  |   |   |           |

|                 |   |  |  |                  |
|-----------------|---|--|--|------------------|
| Z <sub>BO</sub> | overall responsibility for administrative processes; cost analyses, quality reporting etc.                              | lightened administration<br><br>Y <sub>i</sub><br><br>increased efficiency<br><br>in the client's business | the client decides to outsource its equipment maintenance and selects a service provider                     | Z' <sub>BO</sub> |
| Z <sub>FO</sub> | securing the availability of well-working equipment and skilled personnel; active services marketing                    |  | the client discusses 'big lines' with the provider and takes a stand on the provider's proposals             | Z' <sub>FO</sub> |
| C <sub>BO</sub> | ability to take comprehensive responsibility; theoretical knowledge is needed besides practical know-how                |  | outsourcing abilities: carefulness in the selection of the partner and in the definition of responsibilities | C' <sub>BO</sub> |
| C <sub>FO</sub> | ability to understand the business of clients in different sectors; interactive and initiative abilities are pronounced |  | ability to manage and evaluate the partner relationship  | C' <sub>FO</sub> |

Innovations in solution services include addition, substitution, improvement and formalisation. *Innovation by addition* plays an important role: new utilities are achieved via additions in technical characteristics (e.g. the mobilisation of new parts of organisations - top management) and competence characteristics (e.g. understanding the specifics of business in client industries). In processes, innovation means the *substitution* of old processes with new ones. Our interviewees emphasised that this change is much more challenging than adding new technologies or skills to an old basis. Thus, the inclusion of innovation by addition and innovation by substitution in the same category, as Gallouj and Weinstein did in their original model, should possibly be re-evaluated. In addition to these innovation types, we can recognise in our second case *innovations by improvement*, the increased rapidity in repairs due to the continuous monitoring of equipment serving as an example. Finally, *innovation by formalisation* is manifested in the clear service concept, which makes visible the relationship of technical, process and competence characteristics to utilities.

The proceeding of the innovation process deviates in this case quite clearly from the process of 'workplace design'. According to the interviews, the clients' desires stimulated the development of competences at the first stage; the development occurred simultaneously in the 'front and back office' (C<sub>FO</sub> + C<sub>BO</sub>). The adoption of new information technology in the 'front office' (X<sub>FO</sub>) (equipment monitoring) and soon thereafter in the 'back office' (X<sub>BO</sub>) (electronic invoicing and ERP) was the next step. At the same time the

company found it necessary to make organisational rearrangements and formulate an explicit service concept - other elements belonging to technical characteristics ( $X_{BO}$ ). As mentioned above, changes in processes ( $Z_{FO}$ ) ( $Z_{BO}$ ) were considered most difficult, and this work was still under way during the interviews. In particular the company's internal processes were unaccomplished ('front office' processes were developing out of necessity). The following sequence of stages  $C_{FO} + C_{BO} \dots X_{FO} \dots X_{BO} \dots Z_{FO} \dots Z_{BO}$  summarises the innovation process in our second case.

#### *4.3. Case 3: 'Fifty plus' services provided by insurance companies*

Since the 1990s, both researchers and practitioners have paid attention to the growing senior market - adults who are over 50 or 55 years old. The reason for this attention lies in changing demographic trends: in all Western countries, people being retired or approaching the age of retirement form a much bigger proportion of the total population than in earlier decades. Correspondingly the youth market, to which service providers in many sectors are used to directing their efforts, is shrinking. The development of services that are functional and attractive to mature consumers is a challenge, but also an opportunity. It is topical not only in healthcare, but also in sectors like travel and leisure, retail, sports, and financial services. An important point that service providers often forget is that the 'greyhairs' are not a homogenous group. The lengthening of life expectancy means that the group includes people in very different lifestages, and this leads to a considerable variety of service needs (Carrigan, 1998)

Some studies indicate that the opportunities of the 'grey market' have been recognised in financial services (banking and insurance) more slowly than in other sectors. Officials in financial services typically do not discuss concretely and comprehensively the changes that retirement causes in clients' economic circumstances. Attitudes are also a problem: stereotypes concerning ageing are common, particularly among young service personnel. If the official and the client are of approximately the same age, mutual understanding is usually easier to achieve. Changing attitudes is also possible but it requires intensive training, which includes abundant facts. (Kennett et al., 1995)

It is difficult to find detailed descriptions of 'grey market' insurance services in literature. Thus, the following analysis relies more on our own empirical material than the analyses of the two other cases. We have gathered this material from a Finnish company

which has integrated insurance and banking businesses. We focus particularly on a new service which aims to map the service needs of those clients who have recently retired or are going to retire in the near future. The service is carried out as one hour face-to-face discussion with the client, and it is planned to cover the most important issues which may influence the economic security of the client in his/her new stage of life. These issues include, for instance, how to organise health service when occupational health service ends, and how to get by on one's pension if there are loans to be paid. The service is free of charge and it does not put the client under the responsibility of purchasing new insurance products, increasing savings etc. However, the discussion often reveals gaps or overlaps in the client's insurances, deposits or loans, and in this way leads to seeking solutions which may benefit the service provider.

Some needs mapping service has been available in our case company for years, but it has been general in nature, i.e. it has not taken into account the differences between age groups. According to the interviews, the new 'fifty plus' service is actually the first one where the needs linked to specific lifecycle stages form the starting point, and it may lead later to the adoption of corresponding services for other age groups. The development of the mapping service goes hand in hand with the development of insurance products for 'fifty plus' clients. The interviewees told that the lack of suitable products has been one reason which has delayed the launch of the new service. Applying the general mapping service for specific client groups has been difficult because of its unsystematic nature. As the organisation has lacked a clear division of work, the mapping service has belonged to the service repertoire of all officials, who have carried it out in their own ways - the time used has varied from five minutes to one and half hours. Well versed employees have actually provided very good service based on intuition and tacit knowledge, but more inexperienced employees have been confined to those issues that the clients have explicitly asked or desired. Thus, the mapping service for seniors goes hand in hand, not only with product development, but also with the development of the division of work. Short service encounters have now been clearly separated from longer sessions that are based on appointments. The former answer the client's acute problems and the latter are intended for more profound analysis of the client's situation. Officials providing profound service are qualified financial advisors.

Using our modified characteristics model, we can describe the general mapping service as follows (see Table 5). The service process starts from the initiative of the client or the

official. The client may have seen an advertisement for the mapping service in the internet and makes an appointment, or the official suggests an appointment as a part of some campaign; he/she may also offer the service as a continuation for the treatment of some acute issue of the client ( $Z_{FO}$ ). In the case of an appointment, both the official and the client prepare themselves for the session by gathering available documents and other information ( $(Z_{BO}) (Z'_{BO})$ ). The session takes place in a separate, peaceful room, because the topics of discussion are often intimate. A specific tool is used for calculations concerning the client's social security (e.g. the amount of future pension or sickness benefits). Based on these calculations, the client can make financial plans and solutions regarding insurances and savings, either in the same session or after familiarisation with the report that the official prints out ( $Z'_{FO}$ ). The calculation can also be made as a self-service in the internet. The officials get many types of support for their work - there are guidebooks, initiation, and intranet material for continuous learning ( $X_{BO}$ ). Discussions to be carried out in client sessions have been modelled, and question techniques and the direction of conversations have been practised ( $X_{FO}$ ). However, all this has focused on general knowledge concerning insurance products and client interaction; issues linked to specific groups of clients have not been included.

In the new age-specific service (see Table 5), the activity is based on a service model, which has been designed for 'fifty plus' clients. *The stages of the process and the tasks of the client remain mostly as before, but the content of the discussion changes, which implies changes in technical characteristics and particularly in competences.* A clear service concept ( $X_{BO}$ ), which is also expressed in the form of a service promise, is a big change. The service focuses clearly on the issues that are typically linked with ageing (e.g. ending of some types of insurance). The existing calculation tool has been developed to take into account these specific issues. A check list of essential questions facilitates the official's work during the session and guarantees service of uniform quality ( $X_{FO}$ ). The service is appointment-based and the time allocated for it is fixed (one hour). In its present form, the service relies on face-to-face interaction, but self-service via the internet is under consideration. The information that the client gets as the result of the service session is more versatile and more topical than before. The new competences required from the service personnel concern both attitudes and facts ( $C_{BO}) (C_{FO})$ . The development of competences is supported in many ways: there are new directions, new courses, and new learning material in the intranet. According to the interviewees, it is particularly important

to avoid stereotypes and show flexibility when serving seniors of different age and background. Factual knowledge concerns matters that clients have to take up before and after retirement and in the years following it. Factual knowledge about suitable service products is also needed. The interviewees told that the company puts much effort into the development of insurance products that cover the clients' whole lifecycle, including the oldest years. Marketing the new 'fifty plus' service is very active too.

In the utilities, the biggest difference compared to the earlier situation is the emphasis of a long-term perspective ( $Y_i$ ). Before the age-specific mapping service, seniors received help with their 'here and now' problems in the first place. If longer-term matters were discussed, the discussion took place at a general level. In the new service, acute and immediate service needs are answered too, but in addition the securing of the client's personal economy during the coming years is examined in a comprehensive and detailed manner. When the clients become aware of the details in their social security and other financial issues, they can better prepare themselves for different stages in their mature years.

**Table 5: A characteristics-based analysis of the services mapping clients' insurance needs: a comparison between general service and age-specific 'fifty plus' service**

General needs mapping service

|          |  |       |  |           |
|----------|--|-------|--|-----------|
| $X_B$    | guidebooks and intranet material for learning (these include e.g. interaction models and question techniques)            | $Y_d$ | the client gets information about the mapping service in internet, where also self service is possible | $X'_{BO}$ |
| $X_{FO}$ | a tool for the calculation of the client's social security; printed report and product brochures for the client          |       | the client can use internet for making an appointment  | $X'_{FO}$ |
| $Z_{BO}$ | the official prepares the service session and takes care of tasks resulting from it                                      | $Y_i$ | the client gathers relevant documents with him/her; solutions are often made after the session         | $Z'_{BO}$ |
| $Z_{FO}$ | the process may start on the official's initiative; the actual interaction highly dependent on the official's experience |       | the client consults the official about his/her situation, and may make some immediate decisions        | $Z'_{FO}$ |



|          |   |  |   |           |
|----------|---|--|---|-----------|
| $C_{BO}$ | general knowledge about social security, consumer economy and the company's insurance products      | general information of longer term issues that the client should be aware of | initiative, planning and decision making abilities in the issues of personal or household economy | $C'_{BO}$ |
| $C_{FO}$ | general interaction skills; ability to apply one's knowledge in the situation of individual clients |  | ability to compare alternatives and receive new information during the service session            | $C'_{FO}$ |

### Needs mapping service for 'fifty plus' clients

|          |  |   |   |           |
|----------|--|---|---|-----------|
| $X_{BO}$ | a clear service concept; learning material and check lists of 'fifty plus' issues; specific organisational resources | $Y_d$<br><br>'here and now' issues are answered as before<br><br>(separate from the mapping)                | no change; internet is the only technology needed by the client                                     | $X'_{BO}$ |
| $X_{FO}$ | the calculation tool and report focus on age-specific issues; a specific group of advisors devoted to this service   |   | no change; internet is the only technology needed by the client                                     | $X'_{FO}$ |
| $Z_{BO}$ | steps of preparation and after-care remain as before; training in 'fifty plus' services is active                    | $Y_i$<br><br>detailed information of issues linked to senior years supports the client in his/her solutions | preparing and making solutions take place as before   | $Z'_{BO}$ |
| $Z_{FO}$ | steps of the process do not change, but the service quality is more uniform and discussion more focused              |   | consultation takes place as before, but the client gets more detailed and comprehensive information | $Z'_{FO}$ |
| $C_{BO}$ | focus on specific know-how regarding the development of senior services and the treatment of age-specific issues     |   | readiness to take an active stance to the planning of one's future also at an advanced age          | $C'_{BO}$ |
| $C_{FO}$ | avoiding stereotypes and showing factual knowledge about the issues relevant for 'fifty plus' clients                |   | readiness to receive information and tackle issues that one has not thought about before            | $C'_{FO}$ |

When identifying innovation types in the 'fifty plus' mapping service, we find primarily improvement and formalisation. *Innovation by improvement* is linked to the service provider's competence characteristics in particular: officials have acquired deeper knowledge of the issues linked to senior years. Improved utilities have also been achieved via changes in technical characteristics. The calculation tool and the material that supports

the service encounter have been modified so that they take into account the specific needs of older age groups (e.g. the need to compensate the loss of work-related benefits). Even more apparent in the service provider's technical characteristics is, however, *innovation by formalisation*. A clear concept shows how the utilities are achieved. Also several smaller aspects in the service have been formalised; the fixed length of service sessions and check lists of essential questions are illustrative examples. Further, there seem to be opportunities for *innovation by recombination* when the new age-specific insurance products become elaborated enough. The mapping service for seniors could then be broadened into a 'fifty plus' package which contains many types of services for ageing people.

Stimuli for the innovation process in our case company were both external and internal. Clients' needs gave a push to changes that already had been recognised as necessary in the in-house strategy work, on the basis of on-going population trends. The development started from competences linked to understanding the 'grey market' ( $C_{BO}$ ). Much background work was done before the development of the service was initiated in practice. This background work included familiarisation with the literature, and the utilisation of the company's own market surveys. As the next step, the service was conceptualised and modelled ( $X_{BO}$ ), and the tools needed in the interaction with senior clients ( $X_{FO}$ ) were specified. Based on the 'back-office' competences, and on the technical characteristics which concern both 'back and front office', the company then judged itself to be ready to train the competences that the officials need in the 'front office', i.e. in the actual interaction with clients ( $C_{FO}$ ). The following sequence of stages  $C_{BO} \dots X_{BO} \dots X_{FO} \dots C_{FO} \dots (Z_{FO} + Z_{BO})$  summarises the innovation process in our third case. We have put the process characteristics in brackets, because the changes here were very small according to the interviewees. This innovation process is similar to what Gadrey and Gallouj (1998) call 'new expertise field innovation', which consists of detecting an emergent field of knowledge and providing consultancy in this field on the basis of the accumulation of knowledge and the codification of methods and processes.

## **5. Concluding discussion**

In this paper we have developed further the service model developed by Gallouj and Weinstein (1997) for the analysis of different types of innovation in services. We have focused on the issue of how to make the service process more visible in this model.

According to our observation, the solution of bundling technical and process characteristics in the original model has made it difficult to apply the model in detailed studies of individual services. The model is too general for the illustration of changes that take place in the steps or content of the service process as a result innovation. This is problematic because many service innovations concern process characteristics of individual services. The invisibility of the service process is problematic also from the theoretical viewpoint as most scholars define services as an act, an activity or a process (e.g. Gadrey, 1996; Hill, 1977).

In our modified model, we start from the idea that the client interface and the ‘front office - back office’ discrimination can be used to illustrate the service process and the separation of process characteristics from technical characteristics. We divide technical, process and competence characteristics into those actually mobilised in the client interaction and those preparing for or being based on this interaction. The process characteristics include the acts carried out in the actual production and in the design and marketing of the service. The core of these characteristics is in the ‘front office’ - in the contact between the producer and the customer. The technical characteristics consist of the service concept, the prototype of the process, and concrete results in those cases where the result is separable from the utility. Also the ‘enablers’ of the process belong to this group: the technology, methods, models, the organisation and the physical environment used in the service production. Here, ‘front office’ characteristics are often mobilised expressions of the corresponding ‘back office’ characteristics. As regards competence characteristics, we include both individual competences implemented directly in service transactions and the organisation-level competences (which Gallouj and Weinstein located within technical characteristics). The latter are typical back-office characteristics.

In their original model, Gallouj and Weinstein took into account the role of clients by including the client’s competences as an additional characteristics group. Later de Vries (2006) has supplemented the model with the client’s technical characteristics, arguing that clients increasingly use their own technology when contacting the provider or more generally interacting with him. We have adopted these views in our model and go two steps further: we also examine the client’s process and apply the ‘front office - back office’ division to all characteristics groups of the client - it is reasonable to suppose that the client’s technology, activities and competences are only partially visible to the provider. The last component in our model is final characteristics (utilities), which we interpret

similarly to the original model, but divide the group into direct and indirect final characteristics (cf. Gadrey, 1996). The former refer to utilities that manifest themselves immediately after the service process or even during the process, whereas the latter are utilities that manifest themselves in the longer term.

Our model clearly depicts the difference between goods and services. In services a product, a production process and a consumption process coincide, whereas in goods a production process precedes the existence of a product, which is usually consumed later. This difference implies that we could not use the simple solution of interpreting the ‘front office’ as the technical characteristics and the ‘back office’ as the process characteristics. This solution presented (but not applied) by Gallouj and Weinstein would allow a nice parallel with Saviotti’s and Metcalfe’s (1984) analysis of the characteristics of a good, but it would lead to the strange conclusion that process characteristics in a service are the parts outside the client interaction. Another solution where our model is clearly distinct from the analysis of Saviotti and Metcalfe is the interpretation concerning the ‘enablers’ (technology in the narrow sense, methods, models, organisation etc.). In the case of goods, it is natural to see the ‘enablers’ belonging to the production process, but in services - where the process forms the core of the product - this solution does not work. Thus, we have included the ‘enablers’ in the category of technical characteristics. Despite these differences, we want to emphasise that our model makes it possible to analyse services within a conceptual framework whose main lines are common with the characteristics model of goods. We believe that a synthesis view of innovation in goods and services is most fruitful, but it should realistically take into account that goods and services also differ in some respects.

We have applied our modified model in three innovative services: ‘workplace design’ provided by architects’ offices, solution services provided by equipment manufacturers, and ‘fifty plus’ services provided by insurance companies. We have described each of these services before and after innovation, identified the characteristics that have changed, and examined the types of innovations. The results indicate that *a distinction between process characteristics and technical characteristics is possible to render in practice* when we use the specifications included in our model. The model enables *a detailed description of services and the identification of innovations occurred in them*. In our cases, the most common innovation type was innovation by formalisation: a clear service concept was developed in all of them to clarify the way in which utilities were achieved on the basis of

technical, process and competence characteristics. Innovation by addition was, however, the dominant innovation type in the first and second case: a great part of the novelty had been achieved by adding new elements to an existing service. Innovation by substitution was linked to innovation by addition, but seemed to be a more challenging change. Thus, deviating from the suggestion of Gallouj and Weinstein, we probably should consider innovation by addition and innovation by substitution as two separate innovation types. Innovation by improvement could be identified in the second and third cases: the former included, for instance, an increased rapidity in repairs due to the continuous monitoring of equipment; the latter resulted in a deeper understanding of customers' insurance needs based on an age-specific approach.

The inclusion of the client's characteristics and the 'back office - front office' division *illustrates the co-production relationship and the changes occurring in this relationship as the result of innovation*. A comparison between our first and second case shows that an innovation may cause either an increase or a decrease in the client's tasks, and correspondingly mean either a strengthening or a weakening of the coproduction phenomenon. In the 'workplace design' service (the first case), the innovation resulted in the increase of front-office tasks among both the provider and the client, and in the general activation of the client's role. In the solution services provided by the equipment manufacturer (the second case), the innovation was targeted to diminish the client's responsibilities by transferring them to the provider. This meant that both 'front-office' and 'back-office' tasks of the provider increased significantly.

Our empirical cases also showed some features that conform to the general trends identified in services. In all cases, innovation has meant *the emphasis of long-term utilities* in addition to the fulfillment of the client's immediate needs. This finding reflects the generalisation of life cycle thinking - a phenomenon to which several researchers have paid attention. The providers aim to develop longer-term customerships - in business-to-business services often strategic partnerships - as opposed to selling services as one-off products (Bessant and Rush, 1995; Howells, 2000). Another feature that we perceived in all cases was *the increase of consultancy-type services, including a deeper 'diagnosis' of the client's situation*. This finding indicates that service innovations are often linked to the trend of 'kibsification': KIBS are no more the only companies that provide expert-based consultancy - also manufacturing companies and companies in consumer services are moving to this direction (Hales, 2000; Miles et al., 1995). At the same time, KIBS firms

themselves increasingly emphasise their consultancy activities - as our example from the architectural sector shows.

In the present paper we have focused on the analysis of individual services and of the changes that occur in them as a result of innovation. We have also briefly touched the issue of *the innovation process* from the viewpoint of the service provider. This topic could be examined in more detail in further studies. Our short summaries at the end of each case reveal interesting differences in the innovation process within the service company: changes in technical, process and competence characteristics in the 'front office' and 'back office' may start and proceed in very many ways. The inclusion also of the client's activities in further studies would enable the modelling of different process types identified in service studies: for instance, innovation following a stage-gate approach (Cooper and Edgett, 1996) and innovation favouring rapid application (Toivonen et al., 2007).

Our model can also be used in *managerial and policy-oriented service research*. As regards the former, the model helps to describe systematically how the different technical, process and competence characteristics of a service contribute to the emergence of the direct and indirect utilities that the service is supposed to produce. When the service is developed and innovatively renewed, the model helps to take into account the interdependences of changes. From the policy viewpoint, our model takes one step further in the development of service innovation models that can be applied both in service and manufacturing sectors. We selected one of our cases from a manufacturing company in order to secure that the model is applicable also in this context. We hope that this example encourages research into innovation in industrial services - until now service innovation studies and studies on industrial services have developed mostly apart from each other. Further, we have not restricted our striving for a synthesis approach within services studies, but have created a model whose conceptual apparatus is common to both goods and services.

Our framework and our case studies illustrate the composite and multifaceted nature of innovation both in services and goods separately, and in hybrid products and packages. The various revisions of the OECD Oslo and Frascati Manuals have allowed important progress in taking into account some of these characteristics. However, there is still much to be done, for example as regards organisational engineering, some types of non-technological innovation such as social innovation, and innovative activities in hybrid products or industrial services (Djellal et al., 2003). Our integrative framework of

innovation also militates in favour of an integrative innovation policy, which supports the development of both goods and services - not only R&D-based technological innovation (as it is still often the case), but also non- technological innovation involving new methods, new concepts, new organisations, new modes of relationships and new competences (Rubalcaba, 2006; den Hertog and Rubalcaba, 2009).

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