

Innovation and production decisions: Strategic adjustment in service firms

Abstract:

The aim of this research was to investigate the impact that consistent decisions have on performance. In this paper, we analyse the adjustment between innovative and productive strategy in service firms. By using the adjustment concept as an integrated archetype, we identify patterns of adjustment between the two dimensions analysed. The sample consists of 167 Spanish firms belonging to different branches of the service industry. Results indicate that successful firms are consistent in their decision making, while the less successful firms do not make decisions in a consistent way, which can be deduced from significant differences obtained from statistical analyses.

1. INTRODUCTION

The main focus of this paper is the impact that a series of consistent decisions has on a firm's performance. Although different strategies are formulated and implemented in a firm, we have decided to centre this study on productive strategy and their adjustment with innovation strategy. These two strategies have been chosen due to the attention they have received by researchers over recent years.

The economic literature in the last forty years that has been centred on the study of sources of economic growth, and many theoretical and empiric studies in the Economy and Business Management fields, have coincided in highlighting that innovation is a key factor in promoting economic development (Highfield and Smiley, 1987; Mansfield, 1988; Geroski, 1989; Acs and Audretsch, 1989; Lichtenberg, 1992). Innovation has become one of the most important investigation topics in recent decades basically due to its influence on companies' competitiveness and, therefore, in the whole economic system.

In this sense innovation developed by service firms contributes decisively to increment the effectiveness and quality of production of the whole economic system (Barras, 1986; Gadrey, Gallouj and Weinstein, 1997; Boden and Miles, 2000; Metcalfe and Miles, 2000). However, in spite of the increment experienced by the service sector and their strategic significance in developed countries, the innovation process that develops these firms has been a topic scarcely treated in the literature. Nevertheless, in recent

decades numerous studies focused on this theme and nowadays innovation in services is considered an important field of investigation (Miles, 1996; Gallouj, 1997; Amable and Palombarini, 1998; Evangelista, 2000; Sundbo and Gallouj, 2000; Daniels and Bryson, 2002; Sundbo 2002; Cainelli, Evangelista and Savona, 2004; Miles, 2004).

In this paper, we analyse the consistency between innovation decisions made by service firms and decisions on production process or generation of service from a configurational perspective. This way, the main objectives consist in identifying the differences between the adjusted patterns of integrated decisions and those without internal consistency. The adjustment notion derives of the supposition that there are decisions about innovation which are more suitable according to concrete decisions of production. This is reflected in optimum combinations of decisions which provide the firm with a bigger efficacy level. In this analysis we generate two kinds of archetypes integrated or gestalts, according to the division of sample in two groups, the variable criteria used to divide the sample was the firms' performance. The configurational methodology allows us to evaluate the best relationship between two considered dimensions in a multidimensional way.

This paper is divided into several parts, the following section sets out to provide a brief outline of theoretical groundwork about strategic adjustment from the perspective of integrated archetypes, by explaining their conceptualization and statistical contrast. In addition we describe the relationship that exists between the dimensions implied in this strategic fit: the productive strategy -using the Sundbo (2002) model which is focused on service firms-, and innovation strategy. In part 3 we address the methodological questions about data collection, variables measure and generation of constructs, as well as the statistical analyses carried out to achieve the objectives. Finally we expose the results obtained and we will discuss the main conclusions.

2. THEORETICAL CONSIDERATIONS

This work is not a specific study on innovation in services but rather it consists of an investigation which treats the adjustment between the innovation decisions and other decisions which are made in the organization, for this reason the theoretical arguments are based on strategic adjustment literature, in the field of Strategic Management.

Strategic adjustment

Traditionally the problem of strategic adjustment has been considered a question related to the fit between two different dimensions, yet related to each other: internal - organization- and external -environment-, and their resolution provide the necessary effectiveness for the survival of a company. Without neglecting this approach which is still applicable, this investigation is focused on the adjustment reached between decisions made relative to two internal dimensions: innovation and production strategies.

Many investigations centred on determination and analysis of adjustment have been focused on studying the coherence between the organizational decisions and the environment in which firms operate. Other investigations have examined the compatibility between the characteristics of organizational structure and environment, also the features of management and the environment. The majority of investigations have made reference to external adjustment so they have contributed to the diffusion of argument of Contingent Theory (Venkatraman, 1989). Contrary to previous studies, in this investigation, we examine the consistency between strategies of different nature: productive strategy and innovation strategy.

Venkatraman and Camillus (1984) established a classification of investigations on the strategic adjustment. These authors identified six different approaches according to two dimensions: domain of fit –external, internal and integrated-, and fit concept –content and process-. In accordance with typology of strategic fit schools, this paper is classified among those that have an internal domain, since internal variables are analysed, and with a concept of adjustment based on content. As such, the organizational strategy is treated like a system of adjusted elements.

In order to frame our evaluation, we have introduced a third dimension: representation-conceptualisation of fit. This dimension includes studies which represent the adjustment between elements using univariate or multivariate perspective (Venkatraman, 1989).

The statistic contrast of adjustment is outlined according to its definition of the

configurational perspective, due to the necessity of including variables with multiple dimensions in the study. The more production strategy in service firms the more innovation strategy, as it's a complete specification and is required to consider multiple variables, for this reason we have chosen an approach multivariable¹: the adjustment perspective as an integrated archetype.

Production and innovation strategies

The service sector is very heterogeneous in that it embraces numerous and very diverse activities. The general recognition of this heterogeneity has been manifested in literature with a number of studies that have tried to identify homogeneous groups of services in this sector (Silvestron, Fitzgerald, Johnston and Grant, 1992; Jong, 1994; Miles, 1996; Sundbo, 2002; Howells and Tether, 2004). The service industry is especially heterogeneous in its productive strategy; this diversity, in terms of production, appears within each activity branch, since firms with different productive strategies can coexist in a branch. Many studies carried in this field have used the description of production patterns, considering that these patterns are generalised by activity branches. Although we consider that such determinism does not exist, we recognize that it has helped to improve the understanding of productive strategy of service firms and, as a result, we support the argument portrayed in this literature, (Sundbo and Gallouj, 2000; Hipp, Tether and Miles, 2000; Sundbo, 2002), to define the productive practices developed by service firms according to the decisions made about the degree of standardisation or customisation of service and, as well the intensity of use of technology in the production process².

In relation to content of innovation strategy, after a revision of literature we detect an important bias in innovation definition towards a definition of innovation with special technological character. This is due mainly to that the investigation field traditionally has been the industrial sector.

¹ In Venkatraman' (1989) work, two alternative modes of concept and representation multivariables are pointed out: adjustment as deviation to ideal profile and covariation pattern.

² In previous investigations we observe that differences in output generated by service firms does not have correspondence with the branches of economic activity; therefore, belonging to a concrete sector does not determine the company's productive strategy.

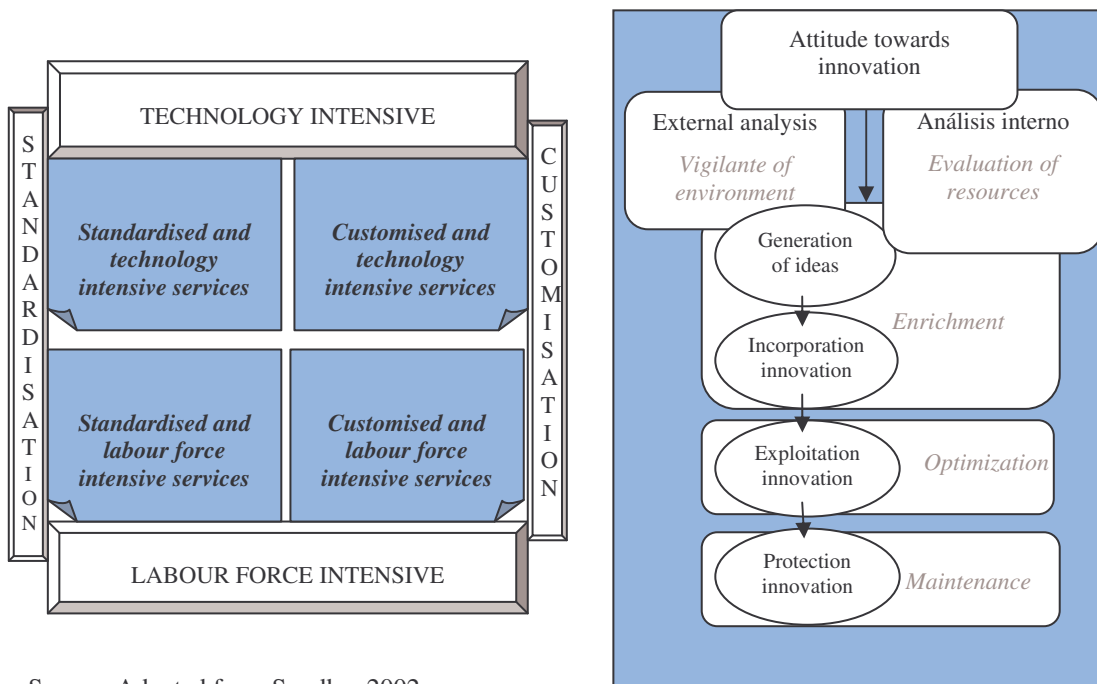
We have taken as reference the vision provided by Schumpeter (1934) in which innovation is considered from a wide perspective, as introduction in market of a new product, a new process or management method, this way, innovation concept is not limited to the innovation exclusively technological. We consider that this wide approach is more appropriate when the study is centred on firms whose main activity consists of production and delivery services.

On the other hand, previous studies on innovation strategy do not provide a conclusive definition of its content; they only offer combinations of decisions about innovation which contribute to establish typologies and classifications based on the attitude of firms in innovation. None of the previous classifications incorporate a complete view of innovation strategy content, thus we outline a model of innovation strategy that includes the decisions relative to efficient management of innovation, enclosing the study of development and its incorporation, the system of exploitation and protection of innovation. In addition, a firm's attitude toward innovation is considered as an approximation of the main objective which the organization wishes to achieve.

The dimensions that form productive and innovation strategies and their parallelisms with the functions of innovation management above outlined are represented in figure 1.

The relationship between production strategy and innovation strategy has been analysed only in manufacturing companies and, as well considering some specific characteristics of productive process and systems of fabrication. It is difficult to find research that centres its main area of study on service firms, analysing the relationships between innovation and production strategies developed by these firms. For this reason, the present study consists of an exploration of relationships that can be established between both dimensions, as well of consequences that different combinations can have on a firm's performance.

Figure 1. Production and innovation strategies



Source: Adapted from Sundbo 2002

Source: Own elaboration

3. DESIGN OF INVESTIGATION

The sample

The unit of analysis in this study is the firm, as an individual and independent entity of decision-making. The selection of sample was carried out in an aleatory mode among Spanish service firms; they are corporations with more than 10 employees. With these criterions of selection the population included a great number of firms, which were identified by means of two databases: Camerdata³ and SABI⁴.

The criteria of search were, firstly, Spanish companies of services whose main activity was included in the following codes NACE: 5, 6, 7, 8 and 9. Subsequently, we select among corporations those, whose employment force consist of more than 10 employees;

³ Camerdata is a company that picks up the existent information in the Chamber of Commerce, Industry and Sailing of Spain.

⁴ SABI is a database of financial analyses of Spanish and Portuguese companies. This base obtains its data of Mercantile Registration.

taking out, this way, the smallest companies and individual managers. Then we carried out a simple random sampling that allowed us to select 2,031 firms. In table 1 a summary of population is presented in order to show the population's structure.

Table 1. Population and sample selection

CRITERIA	SEARCH	RESULTS
1°	Service firms (NACE: 5, 6, 7, 8, 9)	1.636.543
2°	Corporations	722.131
3°	More than 10 employees	67.719
4°	Simple random sampling	2.031

Data collection

The collection of information was carried out through a postal questionnaire that was sent to the 2.031 companies selected by aleatory sampling. The survey was mailed to manager since he/she is directly involved in decision makings of organization, as well as in strategies formulation and development of company's politics, thus this person is considered suitable to answer the questionnaire. These questionnaires were sent by post in October 2003. This operation was repeated two months later and subsequently a phone control was fulfilled. After that process they were obtained 167 valid questionnaires. In table 2, where technical data of field study are shown, one can observe the answer index and sampling error. Since the answer index was low, we determine the non-existence of non-answer bias by means of the comparison of firms that responded quickly (20%) and the remaining ones that answered later (20%). This procedure is based on the fact that those firms that provided a late response are considered more similar to general population (Armstrong y Overton, 1977). This comparison was carried out through test-T of means difference, the results obtained show there are not significant differences between groups of variables analysed.

Table 2. Technique file

Sphere of action	Spain
Population	1.636.543
Sample	Legal status: corporation
	Size: more than 10 employees
	Main activity: NACE 5, 6, 7, 8 and 9
Information collection	Postal survey (manager)
Sampling	Simple random sampling
Questionnaires sent	2.031
Questionnaires received	167
Answer index	8,2%
Sampling error	+/- 7,4% if p=q and confidence level of 95%
Date	October–December 2003

The final sample description is presented in table 3; its distribution is presented in size order (employees' number) and main activity.

Table 3. Description of sample

<i>Industry</i>	NACE	% population	% sample
Trade and repair of motor-vehicles	50	46,1	37,7
Wholesale trade	51		
Retail trade	52		
Hotels and restaurants	55		
Transport	60, 61, 62	11,8	21,6
Supporting and auxiliary transport activities and activities of travel agencies	63		
Post activities	64.1		
Telecommunications services	64.2		
Financial services: banking, insurance, active. Auxiliary to financial intermediation	66, 67	30,6	32,9
Real estate activities	70		
Renting of machinery and equipment	71		
Other business activities	74		
Research and development	73	11,6	7,8
Health and social work	85		
Other community, social and personal service activities	92,93		

<i>Size: number of employees⁵</i>		
from 10 to 19	56,5	27,0
20-49	29,3	30,2
50-99	7,3	12,6
100-199	3,8	12,0
200-499	2,1	3,1
500 or more	1,0	15,1
Descriptive statistics : min=10; max=28.150; Mean=559,32 ; Mode=20; Dt= 2.488,86		

The questionnaire, scales measures and constructs

The survey contains some open questions about general company information. However, most of the questions are closed with multiple answers, using a Likert scale of seven points according to Cox (1980). We asked about very precise subjects in relation to analysis, such as, production and innovation, as well as relative questions to firm's performance.

The definition of variables was fulfilled according to the literature. On the one hand, productive strategy of service firms was measured following the method of Sundbo (2002). According to this model two dimensions describe productive strategy of service firms; they are customisation of service product and the relative importance of technology relating to other production factors, in consonance, we define standardization and customisation of output generated by service firms (it was measured through two items, the answer values the degree of customisation or standardization in comparison with their competitors, using a scale Likert of seven points), and the technological intensity, as an approximation of the second dimension of productive strategy (three items adapted from (Huerta and Lazarra, 2001).

The main source to measure the innovation activity carried out by the companies was the Oslo Manual (1997). The scales used allow us to measure different dimensions of innovation strategy which are important for this analysis: the firm's attitude towards innovation (10 items), generation of ideas (16 items), incorporation of innovations (12

⁵ Sample used in this investigation consists of a large proportion of companies with a high dimension in comparison with the population.

items), the system used to exploit innovations (8 items) as well as the method utilised to protect the innovations generated (7 items). As well as variables relative to the nature of innovation are included to assess the technological nature of innovation and its non-technological character (6 items). The details of each dimension and their measure scales are presented in the appendix.

The validation of scales was carried out, firstly, examining their underlying dimensions for that which we apply a factor analysis of main components. This analysis reveals the number of factors that configure each concept and the load of each variable in the factor. In each analysis we confirmed the unique dimension of constructs generated, since all items show factorial loads superior to 0,5 and the variance explained with a factor that was superior to 50%.

After identifying underlying dimensions in each group of variables, we carried out the study of reliability which shows the degree of internal consistency among the variables that configure the scale. This way it represents the degree in which the indicator of the scale measures the concept. The Cronbach alpha test presents in all constructs values above 0,7 which indicates therefore an appropriate level of reliability (Nunnally, 1978) –see table 4-.

Table 4. Reliability of scales

	No. items	Cronbach Alfa
Personalisation	1	-
Technological intensity	3	0,746
Proactivity	9	0,893
Internal ideas	6	0,808
Competitive core ideas	5	0,733
Ideas from institutions	5	0,911
Internal incorporation	4	0,764
External incorporation	2	0,722
In cooperation incorporation	6	0,793
Internal exploitation	2	0,838
External exploitation	5	0,829
In cooperation exploitation	1	-
Formal protection	2	0,911

Informal protection	5	0,788
Innovation result	6	0,782
Firm performance	10	0,919

Once validated constructs, they were used later in statistical analyses instead of the original variables. Subsequently, we expose the relative questions to statistical treatments carried out with the data.

Concept of adjustment as integrated archetype and statistical treatments

After an exploratory analysis of data and the corroboration of scales we carried out statistical analyses to check the existence of adjustment between the two dimensions analyzed in service firms -productive and innovation strategies-. Consistent with the arguments above, the concept of adjustment applied in this study was integrated archetype or gestalt. This adjustment perspective is multidimensional and it is based on the generation of profiles which represent a group of relationships in temporary balance (Miller and Friesen, 1977). The determination of patterns will provide information about equally efficient configurations. The advantage of this vision is that it allows us, on the one hand, to observe how decisions of different nature work in combination and, on the other hand, to find a set of strategic attributes which are compatible and that generate better performance.

The methodology used consists of the establishment of groups which combine the two dimensions analysed: productive strategy and innovation strategy; using the performance variable as a reference.

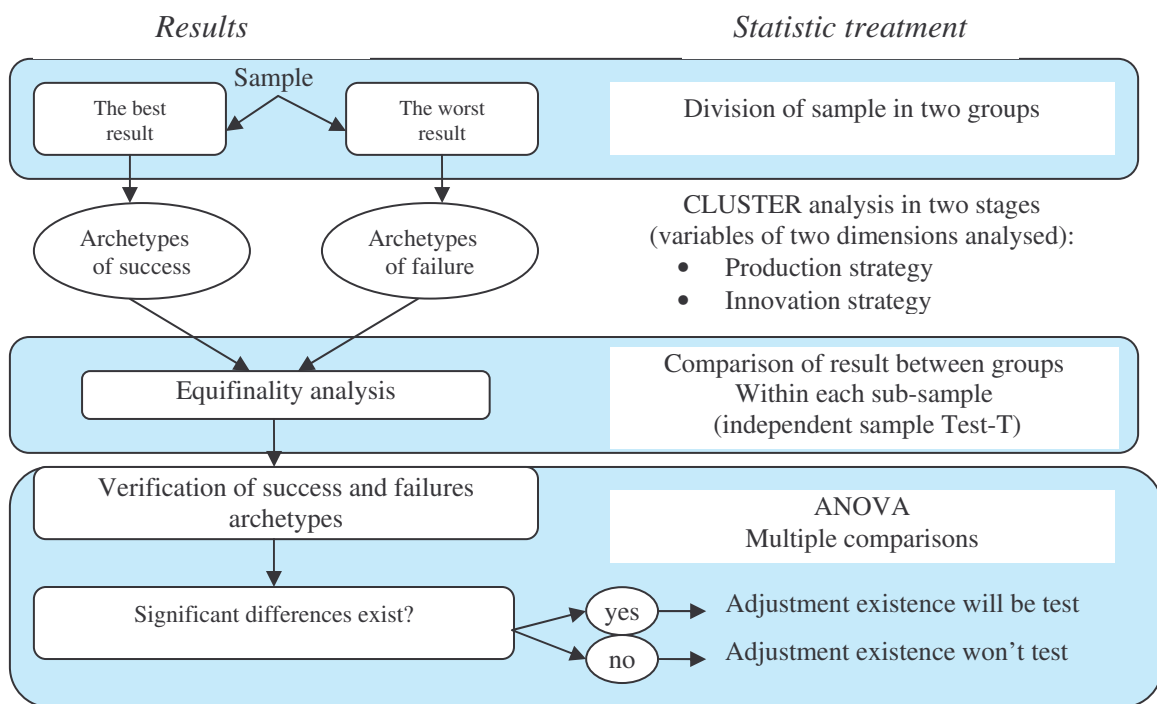
With this objective, we divided the sample in two groups: "the best result" and "the worst result"; using the median of performance construct as limit. This way the firms with performance superior to median were included in the group "the best result" and the others with inferior performance to the median were enclosed in the group "the worst result".

Once the sample was divided we made two cluster analyses with stages method (Punj

and Stewart, 1983), one for each firms group, using the most representative variables of both dimensions. This method was used by Hambrick (1983) in an **exploratory** analysis of adjustment patterns in two samples - success and failure - companies.

The purpose in data treatment phase is to obtain behaviour patterns of success and failure and, as well to observe if differences exist between both. Therefore, after grouping the firms in two samples, we carried out a variance analysis (ANOVA) which allowed us to examine the multiple comparisons between groups in order to check if the patterns were significantly different. Figure 2 outlines a summary of statistical treatments used in this study.

Figure 2. Statistical treatments for the adjustment contrast



4. RESULTS

Integrated archetypes of “success” and “failure”

The impact of adjustment on a firm’s performance was considered when using the

median value of performance construct to divide the sample in two parts. This partition allowed us to generate two types of gestalts or integrated configurations: one of “good result”, and therefore with adjustment or internal consistency (firm’s performance higher than 3,18); and another of “bad result”, non-adjusted configurations between both types of strategic decisions (firm’s performance lower than 3,18).

The results obtained from cluster analysis with the firms’ sample of "success" are shown in table 5 and the results obtained from the firms’ sample of "failure" are in table 6.

Table 5. Archetypes integrated "firm of success"

<i>Construt</i>	<i>Archetype 1 (40)</i>	<i>Archetype 2 (20)</i>	<i>F/t</i>
Orientation towards personalization	1,60	6,03	154,401*
Technological intensity	6,10	5,70	2,625
Proactivity	5,62	4,68	11,035*
Internal ideas	5,17	4,78	1,806
Competitive core ideas	4,89	4,42	2,339
Ideas from institutions	3,92	2,70	10,211*
Internal incorporation	3,63	4,90	5,045*
External incorporation	3,95	2,18	18,246*
In cooperation incorporation	2,43	2,10	1,285
Internal exploitation	6,15	6,33	0,273
External exploitation	2,25	1,76	2,059
In cooperation exploitation	4,00	2,00	16,331*
Formal protection	2,98	1,25	15,067*
Informal protection	4,88	4,79	0,062
Firm performance	3,98	3,89	0,497 (test-T)

* significant at 0,99

The cluster analysis carried out with firms of success provided two archetypes: archetype 1, with 40 firms and archetype 2 with 20 firms. Since these firms belong to a good result sample it implies that the patterns obtained are adjusted, this is to say that there exists internal consistency between strategic decisions. Thus, the description of these patterns indicates that combinations of decisions in relation to productive strategy

and innovation strategy are more appropriate to achieve a superior performance.

- Archetype of success 1: The firms in this group provide standardized services and they develop a strategy of innovation proactive, setting very ambitious innovation objectives, mainly of technological nature. These firms prove a lot of importance on the fact of being at the vanguard and being a pioneer in the introduction of innovations as much in the market as in the organization. The development of new ideas does not have origin in a single source, but rather these firms choose a combination of internal and external sources. This multidimensional system of obtaining ideas is also used in the incorporation and exploitation of innovations. These firms do not demonstrate preferences for single method, so they combine the internal, external and cooperative system of incorporating their innovations; in relation to the exploitation method, it highlights the internal and in cooperation exploitation. Relative to the system of protection of the generated knowledge, although these firms use both methods, formal or legal and informal; they highlight in relation to other archetype more use of industrial and intellectual property system to protect from imitators.
- Archetype of success 2: The firm belonging to this group presents a clear orientation of its productive strategy toward customisation and the innovation strategy is focused on internal methods of incorporation and exploitation. This can be deduced from low punctuations in cooperation and external sources of incorporation, as well as in systems of exploitation. The search for new ideas of innovation takes place in the organization and its competitive environment - clients, suppliers and competitors-. However these firms do not have many relationships with universities or investigation institutes. In relation to protection mechanisms, they opt for the informal protection, as secret or innovation complexity, in order to maintain their knowledge in the organization.

The two archetypes obtained from the companies that achieve the of best results present combinations different of production and innovation decisions (table 6 are shows the value of test F and the significance of the differences). In addition, we assess the equifinality of configurations which shows that between both archetypes no significant differences exist in the performance variable; thus we can assert that both configurations

are equally efficient. This test was carried out through the comparison of means, using performance variable of adjusted archetypes with a test-T for independent samples.

Table 6. Archetypes integrated "firm of worse result"

<i>Construct</i>	<i>Archetype 1</i> (35)	<i>Archetype 2</i> (31)	F/t
Orientation towards personalisation	2,45	2,43	0,003
technological intensity	5,10	5,71	5,616**
Proactivity	4,35	5,63	27,487*
Internal ideas	4,22	5,52	33,352*
Competitive core ideas	4,09	5,28	33,033*
Ideas from institutions	2,30	4,44	59,256*
Internal incorporation	3,09	3,81	2,658
External incorporation	2,31	3,90	16,892*
In cooperation incorporation	2,00	2,65	6,338**
Internal exploitation	5,13	5,95	7,247*
External exploitation	1,58	2,70	16,455*
In cooperation exploitation	2,00	5,00	55,509*
Formal protection	1,79	3,84	24,254*
Informal protection	3,13	4,98	36,470*
Firm performance	2,26	2,46	-1,229 (Test-t)
* significant at 0,99; ** significant at 0,95			

The cluster analysis carried out with firms of the worst result provides two groups of companies: archetypes of failure 1 (35 firms) and archetype of failure 2 (31 firms). Below, we describe their behaviour relative to productive strategy and innovation strategy:

- Archetype of failure 1: It is a group of firms with productive strategy focused on standardization, with scarce proactivity in innovation strategy, with low punctuations in external, internal and cooperative incorporation of innovation that indicates their scarce commitment to innovation and their low activity in this field. As a consequence the punctuations in all the modes of innovation exploitation are low, as happened with the two protection mechanisms of generated knowledge.

- Archetype of failure 2: These firms like those above archetype also manifest an orientation of their productive strategy toward the standardization of output, but these show a higher technological intensity than firms of archetype 1. The innovation strategy is proactive, looking for ideas in an internal way, competitive core and investigation institutions. On the other hand, these companies prefer the external incorporation instead of internal or in cooperation. However, the method of exploitation for which they opt is the cooperation with other companies. The protection of innovations is carried out by means of formal and informal mechanisms, although with prevalence to the latter.

In table 7 the results of ANOVA analysis and multiple comparisons between the archetypes obtained are shown.

***Table 7. Comparison of archetypes of "success" and "failure":
Differences of means***

Construct	Failure	Archetype 1	Archetype 2
	Success		
Orientation towards personalisation	Archetype 1	-0,849	-0,823
	Archetype 2	3,578**	3,604**
Technological intensity	Archetype 1	0,999**	0,394
	Archetype 2	0,595	-0,009
Proactivity	Archetype 1	1,267**	-0,014
	Archetype 2	0,325	-0,955**
Internal ideas	Archetype 1	0,948**	-0,351
	Archetype 2	0,563	-0,736
Competitive core ideas	Archetype 1	0,797**	-0,395
	Archetype 2	0,328	-0,863*
Ideas from institutions	Archetype 1	1,618**	-0,516
	Archetype 2	0,400	-1,735**
Internal incorporation	Archetype 1	0,539	-0,181
	Archetype 2	1,814**	1,093
External incorporation	Archetype 1	1,635**	0,046
	Archetype 2	-0,139	-1,728**
In cooperation corporation	Archetype 1	0,425	-0,220

	Archetype 2	1,814**	-0,545
Internal exploitation	Archetype 1	1,021**	0,198
	Archetype 2	1,196**	0,373
External exploitation	Archetype 1	0,662	-0,458
	Archetype 2	0,177	-0,943
In cooperation exploitation	Archetype 1	1,982**	-0,488
	Archetype 2	-0,043	-2,513**
Formal protection	Archetype 1	1,189*	-0,863
	Archetype 2	-0,535	-2,588**
Informal protection	Archetype 1	1,747**	-0,108
	Archetype 2	1,662**	-0,193
Service innovation	Archetype 1	0,750	-0,292**
	Archetype 2	0,300	-0,670
Process innovation	Archetype 1	0,900	-0,108
	Archetype 2	0,650	-0,033
Marketing innovation	Archetype 1	0,306	-0,033
	Archetype 2	0,306	-0,033
Innovation in interact consumer	Archetype 1	0,313	-0,075
	Archetype 2	0,388	0,000
Management innovation	Archetype 1	0,150	-0,183
	Archetype 2	0,300	-0,033
Strategic innovation	Archetype 1	0,229	-0,226
	Archetype 2	0,438	-0,017

** significant at 0,99% * significant at 0,95

The following figures (2, 3, 4, 5, and 6) show the positioning of each one of the archetypes -success and failure- in the different dimensions considered.

Figure 2. Production strategy and proactivity

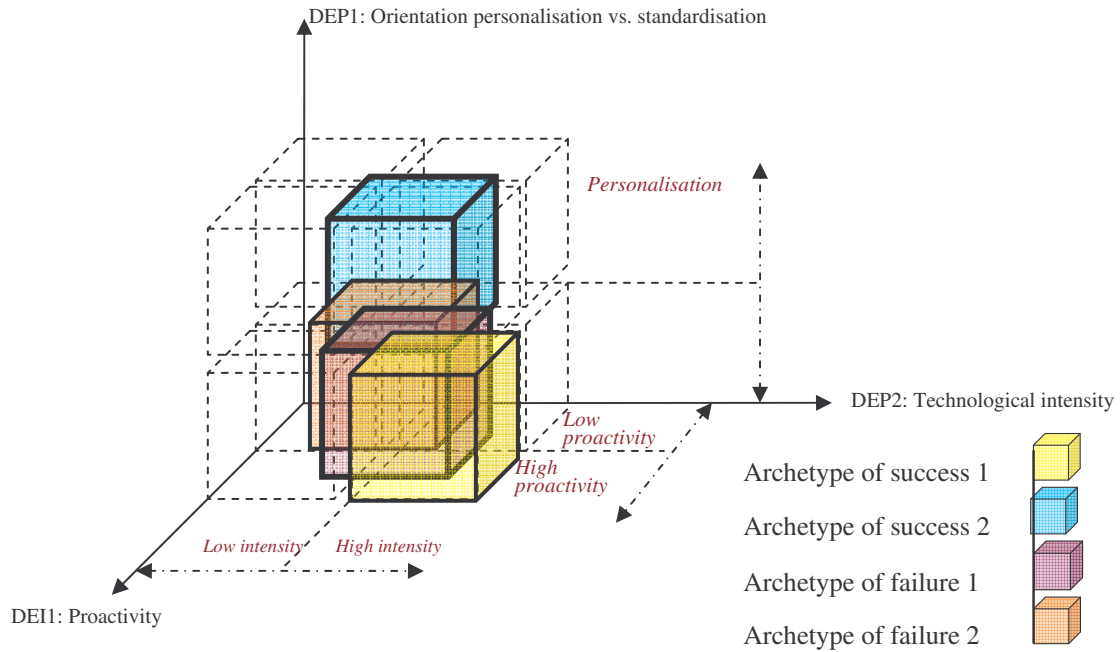


Figure 3. Production strategy and sources of ideas

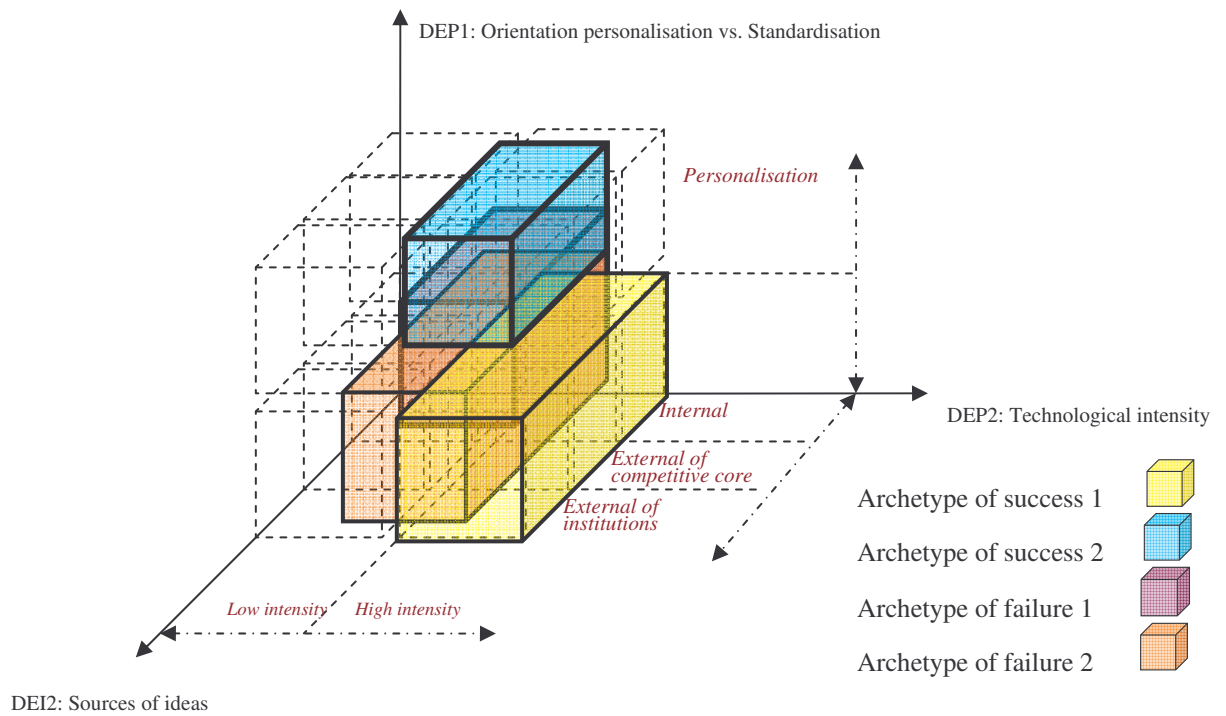


Figure 4. Production strategy and incorporation systems

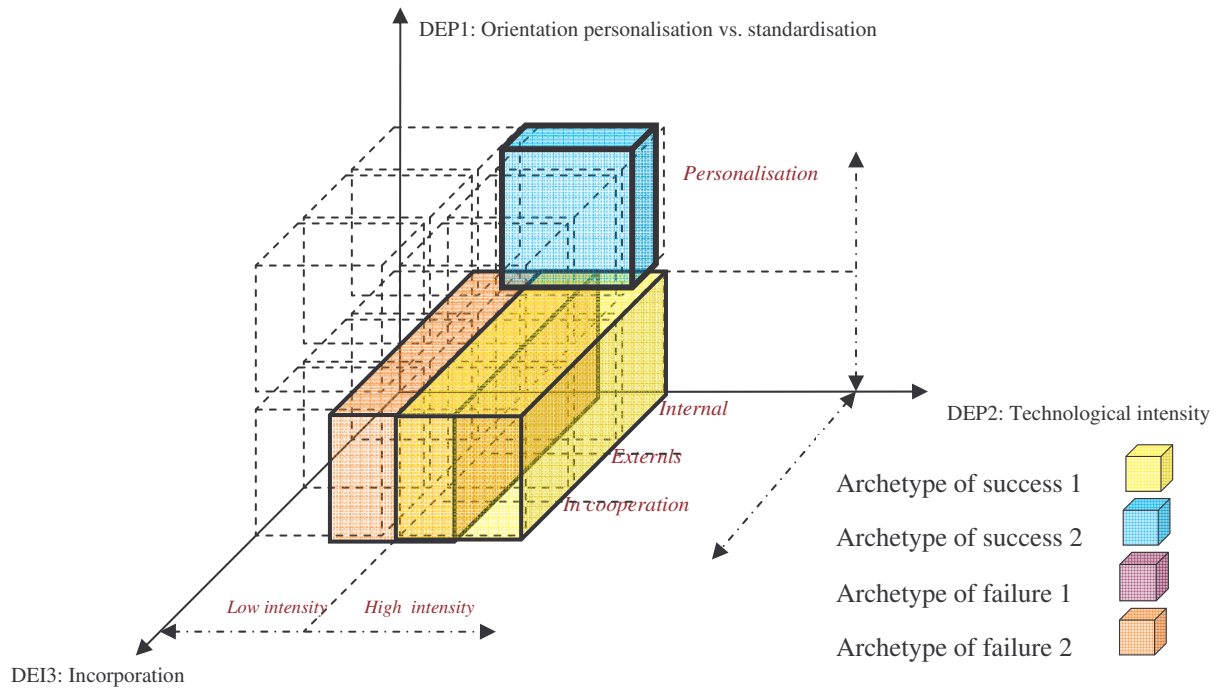


Figure 5. Production strategy and exploitation methods

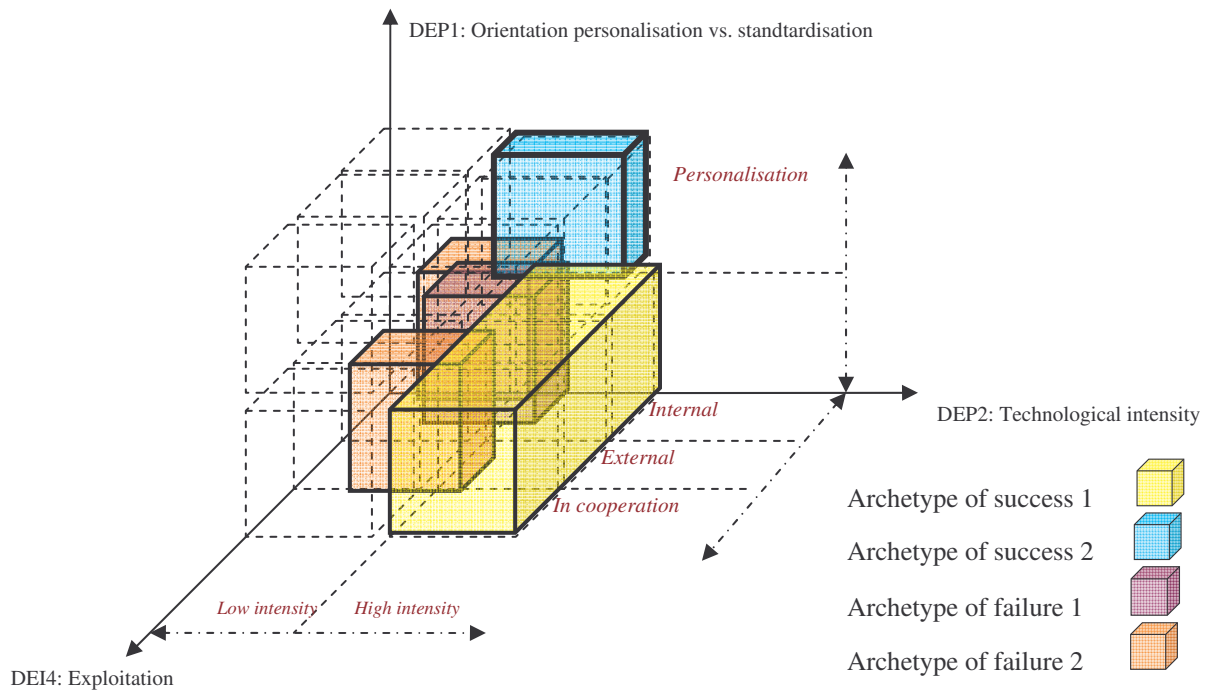
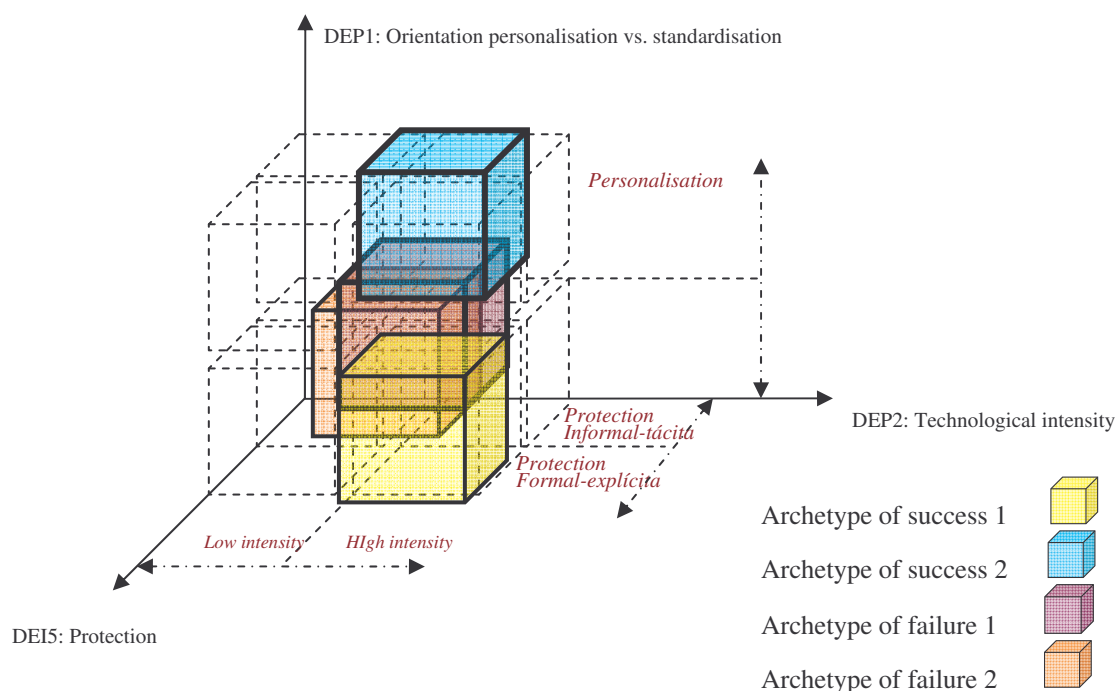


Figure 6. Production strategy and protection systems



5. CONCLUSIONS

Considerable differences

In view of the fact that in the patterns obtained the two productive strategies considered are verified (archetype 1 is standardized and archetype 2 is personalized) we can deduce that within service firms there do not only one productive orientation that is efficient, but rather as much standardization as the customisation can lead to service firms to obtain satisfactory results. Nevertheless, since there are not any failures patterns with productive strategy of personalisation, this orientation towards customisation of output appears as strategy efficient for service firms, independently of innovation decisions.

The four patterns obtained have similar values in technological intensity although the highest is relative to standardized archetype of success. Thus, we can not conclude anything about the adjustment with this dimension of productive strategy.

According to differences observed between two productive strategies in companies of success -in innovation variables-, these differences indicate the innovation decisions that are better adjusted to each one of the productive orientations. In this way, the innovation strategy that is better adjusted to standardisation is that which looks for to convert the firm in a pioneer of their sector, the new ideas are generated by personnel of company –directives of different functions and employees-, as well as the agents with those that interact in the competitive game such as -suppliers, clients and competitors –, as well as of the relationships with investigation institutions. The incorporation of innovations is carried out combining different methods: in cooperation, internal and external. What is more, these firms will hardly opt for external exploitation. The results of innovation activity are protected by patent -formal mechanism- and by non-explicit systems. On the other hand, the innovation strategy that is adjusted to personalisation of service presents a clear preference for the development, incorporation and exploitation in the internal way, the innovations are not protected using intellectual property systems but rather they choose to exploit the ambiguity perceived by the competitors due to the complexity of innovations.

The most important differences have arisen, mainly, in the mode of developing, to incorporate and to exploit the innovations, against what happens with the archetype standardised of success, the archetypes personalized present certain inclinations towards a single source or mechanism of incorporation and exploitation instead of combining several systems. This can be due to the fact that customisation of service allows the installation of a differentiation strategy based on idiosyncratic resources and capacities which allows them to generate innovations based on critical resources on those that do not want to transfer knowledge. This behaviour so closed in relation to innovation strategy is justified by the necessity to maintain the advantages generated by innovations protected for a longer period of time from imitators, not depending on the ideas provided by other agents outside of the organization, neither from decisions made by other partners organizations. This idea is reinforced with its behaviour in the way of protecting the innovations, since they do not use patents or other legal systems using more informal systems such as managerial secrets or the complexity of processes.

Adjusted decisions

From the multiple comparisons of the four patterns (two of success and two of failure), it is possible to highlight those derived from the archetypes with productive strategy standardized. By maintaining this consistent dimension we can extract conclusions about innovation decisions that fit with this orientation of service production.

Firstly, we observe that innovation strategy in the first archetype of failure 1 differs from the standardized pattern of success 1 because it is not related to the investigation institutions, ignoring them as source of ideas for innovation. Also it presents low punctuation in all innovation incorporation mechanisms that show its scarce commitment to innovative activity. It is worth highlighting that these firms carry out low cooperation agreement, which could be a good option mainly if they develop a customised productive strategy. This also occurs in relation to system exploitation, except in internal exploitation, the punctuations are very low in comparison to the gestalt of success, which is used as a reference. In addition, they do not use formal or informal mechanisms of protection, due to bad results in innovation.

The comparison of conglomerate of success 1 standardised with archetype of failure 2 allows us to observe that less technological intensity exists in its production strategy, a degree proactive in its innovation strategy, but these firms show a higher orientation towards systems of cooperation in the incorporation and mainly in the exploitation, which could be due to the necessity of sharing risks and investments. This way to act allows them to obtain more innovations in services than the archetype of success, but these innovations have little impact on the economic result. Consequently, we can affirm that the cooperation is a good decision for strategy of production standardized, whenever this is not the prevalent one and appear to be combined with other sources of internal exploitation.

The archetype of failure 2 shows, in comparison with the successful standardized, a higher value in the two protection mechanisms, opting as much formal as informal method. These differences between the archetype of success standardized and the archetype of failure 2 are not significant statistically, except for the number of innovations in services. Therefore, we can conclude that both archetypes show similar

patterns: standardized, with high technological intensity, proactive, with methods of development, incorporation, exploitation and protection very close. However, the low variations that in an uni-dimensional manner are not significant, providing configurations rather different when considering multiple dimensions.

In summary, from combinations examined in the integrated patterns of success we can assert the following propositions which could be the evidence of decisions coupled between the two dimensions:

P1: The orientation of production strategy towards customisation or standardization does not determine differences in economic results achieved by service firms.

P2: Those firms which develop production strategy focused on customisation can obtain better economic result, if they take innovation decisions with exclusive internal participation.

P3: Firms that carry out productive strategy standardized will obtain better economic result if they demonstrate ...

P31: ... higher technological intensity.

P32: ... a balanced combination in methods of innovation incorporation.

P33: ... an internal orientation in decisions of innovation exploitation.

The present study with an exploratory character has allowed us to discover the potential relationships between a group of decisions of different nature and firm's performance, at the same time, we are able to describe the patterns of success as adjusted archetypes of decisions between the two dimensions analysed here: production strategy and innovation strategy, since the patterns of success and failure have revealed significant differences.

REFERENCES

ACS, Z.J.; AUDRETSCH, D.B. (1989): "Small-firm entry in US manufacturing".

- Economica*, vol. 56, págs. 211-221.
- AMABLE, B. and S. PALOMBARINI (1998) Technical change and incorporated R&D in the service sector, *Research Policy*, 27, pp.655-675.
- AMSTRONG, J.S.; OVERTON, T. (1977): “Estimating non response bias in mail surveys”, *Journal of Marketing Research*, 14, pp. 396-402.
- ANDERSEN, B., J. HOWELLS, R. HULL, I. MILES and J. ROBERTS (2000) *Knowledge and Innovation in the New Service Economy*. Edward Elgar, UK and US.
- BARRAS, R. (1986) Towards a theory of innovation in services, *Research Policy*, 15, pp.161-173.
- BODEN, M. and I. MILES (2000) *Services and the Knowledge-Based Economy*. London.
- CAINELLI, G., R. EVANGELISTA and M. SAVONA (2004) The impact of Innovation on economic performance in services, *The Service Industry Journal*, 24(1), pp.116-130.
- COX, E. P. (1980): “The optimal number of response alternatives for scale: A review”. *Journal of Marketing Research*, vol. 17, págs. 407-422.
- DANIELS, P.W. and J.R. BRYSON (2002) Manufacturing services and servicing manufacturing: Knowledge-based cities and changing forms of production. *Urban Studies*, 39(5-6), pp.977-991.
- De JONG, M.W. 1994. Core competencies and chain relations in service industries. In *Management of Services: A Multidisciplinary Approach*. IEA, Institut d'Administration des Entreprises. Universite de' Aix-Marseille III.
- EVANGELISTA, R. (2000) Sectoral patterns of technological change in services, *Economics of Innovation and New Technology*, 9, pp.183-221.
- EVANGELISTA, R.; SAVONA, M. (1998): “Patterns of innovation in services. The results of the Italian innovation survey”. *Paper in VIII Annual RESER Conference*. Berlin, 9-10 October.
- GALLOUJ, F. (1997) Toward a Neoschumpetian theory of innovation in services, *Science an Public Policy*, 24(6).
- GADREY, J.; GALLOUJ, F.; WEINSTEIN, O. (1997): “New modes of innovation. How services benefit industry”. *International Journal of Service Industry Management*, vol. 6, n° 3, pág. 4-16.
- GEROSKI, P.A. (1989): “The choice between scale and diversity” en Davis, E. (Ed.):

- Myths and realities. London: Centre for Business Strategy. London, Business School, págs. 29-45
- HIGHFIELD, R.; SMILEY, R. (1987): “New business starts and economics activity. An empirical investigación”. *International Journal of Industrial Organization*, vol. 5, págs. 51-66.
- HIPP, C.; TETHER, B.; MILES, I. (2000): “The incidence and effects of innovation in services: Evidence from Germany”. *International Journal of Innovation Management*, vol. 4, nº 4, págs. 417-454.
- HUERTA, E.; LARRAZA, K. (2001): “Tecnologías de la información e innovación organizativa en la empresa española”. *Economía Industrial*, nº 340, págs. 51-60.
- LICHTENBERG, F.R. (1992): “Industrial De-Diversification and its consequences for productivity”. *Journal of Economic Behaviour and Organization*, vol. 18, págs. 427-438.
- MANSFIELD, E. (1988): “The speed and cost of industrial innovation in Japan and the United States: External vs. Internal technology”. *Management Science*, vol. 34, nº 10, págs. 1157-1168.
- METCALFE, S. and I. MILES (2000) *Innovation Systems in the Service Economy. Measurement and Case Study Analysis*, Kluwer, Boston.
- MILES, I. (1996) Innovation in services, in DODGSON, M. and R. ROTHWELL (eds.) *The Handbook of Industrial Innovation*, pp.243-256.
- OECD-EUROSTAT (1997): Proposed Guidelines for Collecting and Interpreting Technological Innovation Data: Oslo Manual, OECD, Paris. PUNJ, G.; STEWART, D. (1983): “Cluster analysis in marketing research: Review and suggestions for application”. *Journal of Marketing Research*, vol. 20, págs. 134-148.
- SCHUMPETER, J.A. (1934): *The Theory of Economic Development*. Harvard University Press, Mass., Cambridge.
- SILVESTROU, R., FITZGERALD, L., JOHNSTON, R., & GRANT, C. 1992. Toward a classification of service processes. *International Journal of Service Industry Management*, 3(3): 62-75.
- SUNDBO, J. (1997) Management of innovation in services, *The Service Industries Journal*, 17(3), pp.432-455.
- SUNDBO, J. (2002) The service economy: Standardisation or customisation?, *The Service Industries Journal*, 22(4), pp.93-116.

- SUNDBO, J. and F. GALLOUJ (2000) Innovation as a loosely coupled system in services, *International Journal of Services Technology and Management*, 1(1), pp.15-37.
- VENKATRAMAN, N. (1989) “The concept the fit in strategy research: toward verbal and statistical correspondence”, *Academy of Management Review*, vol. 14, n° 3, pp. 423-444.
- VENKATRAMAN, N. and J. C. CAMILLUS (1984) Exploring the concepts of fit in strategic management, *Academy of Management Review*, 9, pp.513-525.

Appendix 1. Table measure scales

SCALES	MEASURE	SOURCES		
Personalisation of service				
Services more personalised than competitors	Seven-points Likert scale (degree of customisation)	Adapted from Sundbo (2002)		
Services more standardised than competitors				
Use of technology in productive process				
Use of technology in front-office activities	Seven-points Likert scale (degree of use)	Huerta y Larraza (2001)		
Use of technology in back-office activities				
Use of technology in general production process				
Firm's attitude towards innovation				
To prove technologies before competitors	Seven-points Likert scale (degree of importance granted by firm)	Oslo Manual (1997)		
To be pioneers introducing innovations				
To research in vanguard technology				
To develop new forms of producing services				
To fulfil improvement in productive process				
To fulfil improvement in existent services				
To introduce more quantity of services than competitor				
To invest in internal development of technology				
To have a internal I+D department				
Sources of ideas to innovation				
Internal				
Management of firm	Seven-points Likert scale (degree of importance granted by firm)	Oslo Manual (1997)		
Employees				
Production and distribution departments				
Marketing department				
I+D activities				
External (competitive core)				
Suppliers	Seven-points Likert scale (degree of importance granted by firm)	Oslo Manual (1997)		
Competitors				
Consumers				
Consultancies				
Fair and exhibitions				
External (institutions)				
Universities	Seven-points Likert scale (degree of importance granted by firm)	Oslo Manual (1997)		
Public research institutes				
Private research institutes				
Patents and licences system				
Incorporation of innovation in firm				
Internal individually	Dicotómica (likert 7 puntos)	Oslo Manual (1997)		
In cooperation				
External				
Exploitation of innovación				
Exploitation internal				
To exploit individually new services generated	Seven-points Likert scale (agreement degree in the statements)	González (2002)		
To incorporate their innovations in production process				
Exploitation external				
Transferir innovaciones a otras empresas				
Transferir derechos de explotación de la innovación mediante licencias				
Prestar servicios de I+D a otras empresas				
Transferir innovaciones mediante la venta de una parte de la empresa				
Transferir la innovación mediante la venta de equipos				
Exploitation in cooperation				
Protection of innovation				
Formal-Explicit				
Patents	Seven-points Likert scale (agreement degree in the statements)	Adaptada Manual de Oslo (1997)		
Registration of product designs				
Informal-Tacit				
Protection of commercial secrets				
Complexity of service production				
Difficulty to transmit knowledge about innovation				
Improvements of services in continuous way				
Retention of employees in firm				
Innovation results				
Service innovation	Dichotomist	Bildeerbeek, Hertog,		
Process innovation				
Marketing innovation				

Interaction with consumer innovation		Marklund y Miles (1998)
Management innovation		
Strategic innovation		
Firm performance		
ROI in relation to competitors	3 items in each variable (scale seven-point Likert)	Gupta y Govindarajan (1984)
Sale grow in relation to competitors		
Net profit in relation to competitors		
Share market in relation to competitors		
General performance in relation to competitors		