

DRIVERS OF ORGANIZATIONAL INNOVATIONS

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Resumen— Existe un sólido consenso sobre la necesidad de mejorar la innovación en la empresa. A pesar del hecho de evidentes mejoras siguen produciéndose ineficiencias en la gestión empresarial y falta una mejor comprensión de cómo superar dichas ineficiencias a través de la innovación. La presente investigación se centra en las innovaciones organizacionales estrechamente relacionadas con la gestión del conocimiento. Según el Manual de Oslo, las innovaciones organizacionales pueden implicar la implantación de cambios significativos en las prácticas de gestión del conocimiento. Concretamente se analizan los objetivos y la adopción de innovaciones organizacionales en una muestra de 10796 empresas españolas. Las medidas están basadas en las definiciones proporcionadas por el Manual de Oslo. Los tests estadísticos revelan un comportamiento dinámico, el 41.5% de las empresas han desarrollado un innovación organizacional en el periodo de 2007-2009. Los nuevos métodos organizaciones en prácticas de negocios han sido adoptadas por 34.3% de las empresas siendo, así, la innovación más común. Los principales objetivos perseguidos se relacionan con el incremento de calidad y la reducción del tiempo de respuesta. Los resultados muestran una estrecha relación entre los objetivos y la adopción de innovaciones, la mejora de las habilidades innovadoras es la innovación organizacional más influyente.

Palabras clave— prácticas de negocio, relaciones externas, gestión del conocimiento, innovación organizacional, organización del trabajo.

Abstract— There is a solid consensus in the need to improve innovation in organizations. Despite the fact that there has been significant improvement, inefficiency still exists and little accomplished in understanding how to overcome those inefficiencies using innovation. Present research focuses on organizational innovations closely related to knowledge management. According to Oslo Manual, organizational innovations may involve the implementation of significant changes in practices for knowledge management. More precisely we analyze organizational innovations' objectives and adoption. Analysis is based on a sample of 10796 Spanish businesses. Measures of organizational innovations and objectives of innovation are based on Oslo

Manual. Statistical tests find a dynamic behavior in organizations, since 41.5% have developed an organizational innovation in 2007-2009 period. New organizational methods in business practices are adopted by 34,3% of companies. Main objectives pursued are related to increasing quality of products and reducing response time to customers or providers needs. Results reveal a close relationship between objectives and organizational adoption, improving innovation skills is the most influential organizational innovation objective.

Keywords— business practices, external relation, knowledge management, organizational innovation, workplace organization

I. INTRODUCTION

Within advanced economies, production and consumption have shifted away from mere physical objects towards information and services, turning the services sector into a key driver in the creation of competitiveness, employment and economic growth. Innovation is an important contributor to productivity and economic performance for service firms and in recent years, scholarship on innovation has started to cover services under its research scope [1]. Value is now created by productivity and innovation, and knowledge has become the most valuable resource [2].

An organizational innovation is the implementation of a new organizational method in the firm's business practices, workplace organization or external relations [3]. Organizational innovation is a critical output for companies [4], a source of value creation [2] and an indicator for the intrafirm diffusion of different organizational practices [5]. Enterprises may engage in innovation activity for a number of reasons, namely, to increase a firm's performance by reducing administrative costs or transaction costs, improving workplace satisfaction (and thus labor productivity), gaining access to non-tradable assets (such as non-codified external knowledge) or reducing costs of supplies. Identifying enterprises' motives for innovating and their importance is helpful when examining the forces that drive innovation activity, such as competition and opportunities for entering new markets [3].

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We develop a model to understand the reasons and objectives for implementing different types of organizational innovations. The present paper aims at predicting the adoption of organizational innovations by analyzing the impact of diverse drivers. The remaining manuscript is structured as follows. Next, salient literature on organizational innovation and the determinants of adopting them is reviewed. In the third section, the method to collect data from 10.796 Spanish organizations is explained. After presenting the data analyses used, the results are discussed. The overall canonical correlation analysis provided an overview of the relationship between the goals variables and the process innovation variables. Finally, conclusions are summarized and managerial implications are presented

II. LITERATURE REVIEW

A. Organizational Innovation

According to Oslo Manual [3], an innovation is the implementation of a new or significantly improved product (good or service), or process, a new marketing method, or a new organizational method. This broad definition of an innovation encompasses a wide range of possible innovations. Past research has argued that different types of innovation are necessary for understanding and identifying in organizations [4]. However, in practice, most innovative organizational concepts address different types of innovations at the same time [5].

An organizational innovation is the implementation of a new organizational method in the firm's business practices, workplace organization or external relations [3]. Literature states that organizational innovation is a critical output for companies [4], a source of value creation [2] and an indicator for the intrafirm diffusion of different organizational practices [5]. The distinguishing features of an organizational innovation compared to other organizational changes in a firm is the implementation of an organizational method (in business practices, workplace organization or external relations) that has not been used before in the firm and is the result of strategic decisions taken by management.

Distinguishing between process and organizational innovations is challenging sometimes since both types of innovation attempt – among other things – to decrease costs through new and more efficient concepts of production, delivery and internal organization. Many innovations thus contain

aspects of both types of innovation. For example, the introduction of new processes may also involve the first use of new organizational methods such as group working [3]. A starting point for distinguishing process and/or organizational innovations is the type of activity: process innovations deal mainly with the implementation of new equipment, software and specific techniques or procedures, while organizational innovations deal primarily with people and the organization of work, thus being often called structural organizational innovations. They consist of changing responsibilities, accountability, command lines and information flows as well as the number of hierarchical levels or the divisional structure of functions.

Organizational innovation can be further differentiated along an intra-organizational and inter-organizational dimension. While intra-organizational innovations occur within an organization (such as implementation of teamwork, quality circles, continuous improvement processes or the certification of a company under ISO 9000, thus affecting departments and functions within the company), inter-organizational innovations include new organizational structures or procedures beyond a company's boundaries [5], like new organizational structures in an organization's environment (suppliers, customers, or competitors). Following OECD [3] definition of organizational innovation, the focus here is on the implementation of a new organizational method in the firm's business practices, workplace organization or external relations. Therefore, we analyze intra-organizational innovations as well as the inter-organizational dimension.

B. Innovation Objectives

Enterprises may engage in innovation activity for a number of reasons, which should be identified via its economic objectives [6]. Their objectives may relate to products, markets, efficiency, quality or the ability to learn and to implement changes [3]. How the firm rates a number of goals that innovation (in its diverse versions) can bring within its reach relates to all its innovation activities, and should therefore be measured [6]. Organizational innovations can be intended to increase a firm's performance by reducing administrative costs or transaction costs, improving workplace satisfaction (and thus labor productivity), gaining access to non-tradable assets (such as non-codified external knowledge) or reducing costs of supplies. Identifying enterprises' motives for innovating and their importance is

helpful when examining the forces that drive innovation activity, such as competition and opportunities for entering new markets [3].

Literature on innovation objectives suggests that different types of firms may have different primary innovation objectives [7] due to variations in innovation patterns and the operating environment. Specifically, a recent study by Guan et al. [6] shows significant differences in the importance of innovation objectives based on status (high-tech companies versus general), ownership (State-owned enterprises (SOEs) versus non-SOEs), resources for innovation (has R&D department versus no R&D department) and size (SMEs versus large enterprises).

Since the maintenance, acquisition and evolution of an enterprise's capabilities depend on its innovation objectives and the resultant innovation strategy [8], innovation objectives may determine innovation activities and performance. For instance, Wang and Chien [9] present a forecasting model for predicting innovation performance using technical informational resources (such as external seminar resource, external nonprofit resource, company resource and patent disclosers) and clear innovation objectives (such as improve production flexibility, reduce costs and consumption, or open up new market).

An understanding of the factors that drive companies to become IT innovators [10] or innovators in general, remains an important phenomenon of interest. We focus on enablers of organizational innovations related to knowledge management implemented by organizations. To date, few studies have been, however, devoted to understanding the drivers for the adoption of organizational innovations.

To understand the relationship between innovation objectives and innovation adoption we investigate two major questions:

1. What organizational innovation objectives do organizations pursue?
2. What innovation objectives influence the different types of organizational innovation adopted?

III. METHODOLOGY

A. Data and Variables

Our dataset comes from a survey of innovating Spanish firms (Panel de Innovación Tecnológica, PITEC) for 2009. This survey follows the methodological guidelines defined in Oslo Manual by OECD [3] and is conducted by the Spanish

National Statistics Institute having a mandatory nature. Questionnaires are sent via ordinary mail to a selected and representative sample of companies in terms of size and activity. There is a deadline of 15 days to fulfill the survey and each company is required to provide true information. Answer rate rises to 91.8% and there is no information of respondents' position. Questions concern innovation activity for 2007-2009 period. For this research a sample of 10796 companies from different sectors (Table I) and a minimum size of 10 employees has been extracted.

Next a description of variables included in the analysis is given.

TABLE I
ACTIVITY SECTOR

Sector	n
Agriculture, forestry and fishing	137
Mining and quarrying	57
Manufacturing	548
Electricity, gas, steam and air conditioning supply	8
Water supply; sewerage, waste management and remediation activities	76
Construction	92
Wholesale and retail trade	448
Transportation and storage	860
Accommodation and food service activities	240
Information and communication	189
Financial and insurance activities	929
Real estate activities	229
Professional, scientific and technical activities	60
Administrative and support service activities	105
Education	9
	471
	54

Organizational innovations. Implementation of an organizational method (in business practices, workplace organization or external relations) that has not been used before in the firm and is the result of strategic decisions taken by management [3].

- Organizational innovations in business practices involve the implementation of new methods for organizing routines and procedures for the conduct of work. These include, for example, the implementation of new practices to improve learning and knowledge sharing within the firm.
- Innovations in workplace organization involve the implementation of new methods for distributing responsibilities and decision making among employees for the division of work within and between firm activities (and organizational

units), as well as new concepts for the structuring of activities, such as the integration of different business activities.

- New organizational methods in a firm’s external relations involve the implementation of new ways of organizing relations with other firms or public institutions, such as the establishment of new types of collaborations with research organizations or customers, new methods of integration with suppliers, and the outsourcing or subcontracting for the first time of business activities in production, procuring, distribution, recruiting and ancillary services

During 2007-2009, 41.5% of companies have implemented a new organizational method (Table II). Most common organizational innovation is on business practices (34.3%) followed by workplace organization (32.9%). Table III shows information of the distribution of companies according to types of organizational innovations adopted. Only 29.6% adopt one organizational innovation, the most common practice is adopting a combination of them, especially on innovation in external relations whereas 94.1% of cases are in this situation and just 5.9% of firms adopting that innovation made it alone.

TABLE II
ORGANIZATIONAL INNOVATIONS ADOPTION

Organizational Innovation	Yes
Business practices (OI1)	34.3%
Workplace organization (OI2)	32.9%
External Relations (OI3)	15.4%
Any	41.5%

TABLE III
COMBINATIONS OF ORGANIZATIONAL INNOVATIONS ADOPTION

Organizational Innovation	Yes
OI1	15.5%
OI2	11.9%
OI3	2.2%
OI1 + OI3	3.0%
OI2 + OI3	3.3%
OI1 + OI2	35.4%
OI1 + OI2 + OI3	28.7%

Organizational innovations objectives. Items based on a Likert scale from 1 to 4 following Oslo Manual [3] recommendations.

- Reduced time to respond to customer or provider needs (Response time)

- Improve skills to develop new products or processes (Innovation skills)
- Increase quality of goods and services (Quality)
- Reduce unit labor costs (Cost)
- Improve information or communication sharing inside your firm or with other organizations or institutions (Knowledge sharing).

Information related to objectives pursued by companies adopting any organizational innovation is shown in Table IV. Main objective is improving quality (3.32) followed by reducieng response time (3.27).

Correlations among variables in this research are highly correlated especially organizational innovations among them.

TABLE IV
IMPORTANCE OF THE OBJECTIVES OF ORGANIZATIONAL INNOVATIONS ADOPTED DURING 2007-2009

Objectives	Mean (1 to 4)
Response time	3.27
Innovation skills	3.09
Quality	3.32
Cost	2.96
Knowledge sharing	3.11

B. Analyses

This work pursues analyzing relationship between a set of independent variables (Organizational Innovations Objectives) and a set of dependent variables (Organizational Innovations Adoption) (Figure 1). Canonical analysis is a multivariate statistical technique for studying the interrelationships among sets of multiple dependent or criterion variables and multiple independent or predictor variables [11]. By so doing, it is likely to control for moderator effects that may exist among various dependent variables.

A between subject multivariate analysis of variance was performed on the set of variables that constitute the Objectives construct, which was the independent variable, and Adoption construct, which was the dependent or criterion variable. The maximum number of canonical correlations (functions) between these sets of variables is the number of variables in the smaller set [12]. In our study, there were five predictor variables and three criterion variables. Therefore, the number of canonical functions extracted from the analysis is three, the smallest set.

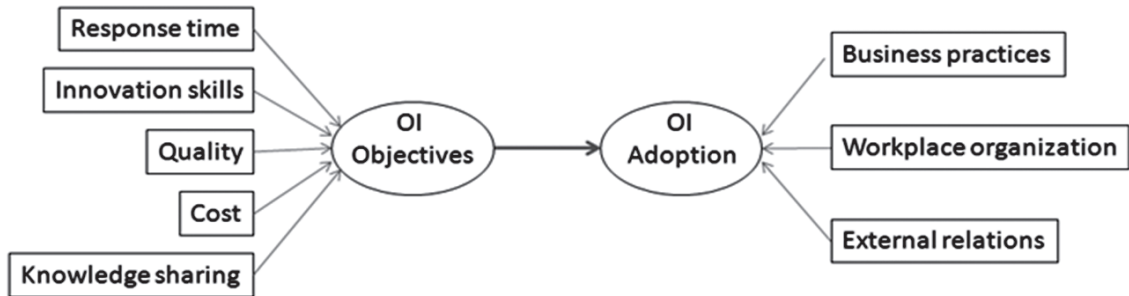


Fig. 1. Research Model

In order to provide further knowledge concerning the influence of objectives on each organizational innovation a logit regression analysis is performed. Since the dependent variable is dichotomous, a binary logit model is developed for each organizational innovation. Logit regression tests whether coefficients are non-zero; significant and positive coefficients imply adoption facilitators, while significant and negative coefficients imply inhibitors. However, note that 'the parameters of the logit model, like those of any nonlinear regression model, are not necessarily the marginal effects we are accustomed to analyzing' [12]. Actually, the marginal effect - incremental change of the adoption probability due to unit increase of the regressor – is informed by the Odds-ratio ($\text{Exp}(\beta)$).

Goodness-of-fit is assessed in three ways. First, a likelihood ratio (LR) test, analogous to the F-test in multiple linear regressions, was conducted to examine the joint explanation power of independent variables. Second, the Hosmer - Lemeshow test was used to compare the proposed model with a perfect model that can classify respondents into their respective groups correctly, by comparing fitted expected values to the actual values. Third, Nagelkerke's pseudo- R^2 is calculated to measure the proportion of data variation explained [13]. The logit model was also assessed in terms of the discriminating power. Based on the observation-prediction table, the rate of correct prediction by the logit model and by random guess may be computed. If the former is greater, we conclude that the logit model has a better discriminating power.

IV. RESULTS

Following the guidelines suggested by Hair et al. [11], we tested the significance of the canonical functions and the overall model fit. The overall

multivariate test of significance showed that the canonical functions were statistically significant. Wilks' Lambda test is significant ($F=37.190$, $p=0.000$). Table V shows the overall model fit. Three canonical functions were obtained and all of them were significant. The canonical R^2 values support this conclusion. In the first canonical function, the independent variables explain over 9.4 per cent of the variance in the dependent variables. The second canonical function explains 1.9 per cent, and the third one explains 0.5 per cent.

The relative importance of a variable in each set of variables is indicated by the canonical weight and the canonical loading extracted for the variable. The canonical weight indicates how much a variable in the predictor or criterion set contributes to the canonical function. Variables whose weights are larger contribute more to the function. The canonical loading measures the simple linear correlation between an original observed variable in the predictor or criterion set and the set's linear composite and is interpreted like a factor loading [11]. Table VI shows canonical coefficients and loadings for each variable. Given the .03 cut-off rule [11], it is reasonable to conclude that first and second function are more relevant. The first function reveals a high correlation among all organizational innovations (Business practices, Workplace organization and External relations) and every organizational objective especially improving innovation skills. Companies especially worried about improving skills to develop new products or processes have implemented organizational innovations. The second function underlines some particularities of innovation in workplace organization, companies adopting this innovation are more concerned in reducing costs and less on innovation skills. The third function reveals

differences in objectives between business practices and external relations. Improving information or communication sharing is more relevant in the latter and increasing quality in the former.

Logistic regressions (Table VII) confirm and specify aforementioned relationships. Improving skills to innovate in product or process is a significant predictor in every organizational

innovation. New methods in workplace organization is the function with a better fit, except quality the rest of innovation objectives are relevant being the only organizational innovation where response time and cost are significant predictors. Main difference between external relations and business practices is in the importance of the role of knowledge sharing to adopt new organizational methods in external relations.

TABLE VI
STANDARD CANONICAL COEFFICIENTS AND CANONICAL LOADINGS

Variables	Canonical loading			Canonical weight		
	F1	F2	F3	F1	F2	F3
OI Adoption						
Business practices	0.53	0.49	-0.69	0.56	0.39	-0.73
Workplace organization	0.64	-0.76	0.08	0.63	-0.79	-0.08
External Relations	0.61	0.41	0.68	0.50	0.49	0.73
OI Objectives						
Response time	0.67	-0.37	-0.32	0.26	-0.57	-0.37
Innovation skills	0.79	0.43	0.055	0.49	0.64	0.29
Quality	0.61	0.32	-0.52	0.17	0.54	-0.61
Cost	0.64	-0.50	-0.15	0.30	-0.68	0.00
Knowledge sharing	0.49	-0.08	0.68	0.28	-0.06	0.80

TABLE VII
STANDARD CANONICAL COEFFICIENTS AND CANONICAL LOADINGS

Variables	Business Practices		Workplace Organization			External Relations			
	β	Exp(β)	β	Exp(β)		β	Exp(β)		
Response time	0.060	1.061	0.278	1.321	***	-0.001	0.999		
Innovation skills	0.304	1.356	***	0.085	1.089	*	0.356	1.427	***
Quality	0.264	1.303	***	-0.071	0.931		0.095	1.100	**
Cost	0.011	1.011		0.329	1.389	***	0.042	1.043	
Knowledge sharing	0.017	1.017		0.186	1.205	***	0.224	1.251	***
Constant	-0.477	0.621	**	-1.071	0.343	***	-2.786	0.062	***
Chi-squared		138.559	***		211.045	***		187.460	***
Likelihood ratio (LR)		3977.39			4356.305			5724.726	
Hosmer-Lemeshow		5.978			10.686			6.951	
R ² Nagelkerke		5.1%			7.2%			5.6%	
% correct model		82.6%			79.5%			63.2%	
% correct random		71.3%			67.2%			53.3%	

Logistic regressions (Table VII) confirm and specify aforementioned relationships. Improving skills to innovate in product or process is a significant predictor in every organizational innovation. New methods in workplace organization

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in the importance of the role of knowledge sharing to adopt new organizational methods in external relations.

V. DISCUSSION AND CONCLUSIONS

Present study proposes two questions concerning the knowledge about situation and reasons to adopt organizational innovations. Based on recommendations of Oslo Manual [3], empirical analysis brings information related to those topics from a representative sample of 10796 Spanish companies.

41.5% of them have accomplished any organizational innovation during 2007-2009 period. Most common organizational innovation is on business practices (34.3%) followed by workplace organization (32.9%). Only 29.6% adopt one organizational innovation, the most common practice is adopting a combination of them, especially on innovation in external relations whereas 94.1% of cases are in this situation and just 5.9% of firms adopting that innovation made it alone.

Correlation analysis confirms the influence of organizational innovation objectives on organizational innovations adoptions. Nevertheless, this research goes further identifying more precisely relations between innovations and objectives. Although increasing quality is the more important objective to innovate results reveal other objectives to be more influential. Specifically, improving innovation skills appear as the more relevant objective, i.e. companies especially worried about improving skills to develop new products or processes have implemented organizational innovations. Two objectives are closely related to innovations in workplace organization, they are reducing response time and cost. Precisely these objectives may be labeled as tangibles. Thus, organizational innovations in workplace organization are featured by tangible objectives. Improving innovation skills and knowledge sharing are more intangible objectives. They are pursued also by workplace organization innovations, but are main predictors in external relations innovations. So, this organizational innovation is due to intangible objectives. The adoption of new business practices (the most common one) is mainly explained by innovation skills and quality.

This study sheds light on the actual innovation behavior by identifying the true contribution of organizational innovations objectives. Enterprises

are stated to engage in innovation activity for a number of reasons [6]-[3]. Extant literature on innovation objectives suggests that different types of firms may have different primary innovation objectives [8]-[9]-[7]. Results presented here provide evidence regarding what innovation objectives pursue and what innovation objectives influence the different types of innovation adopted. Desires to improve innovation skills and knowledge sharing are capital objectives to develop new organizational methods in business practices, workplace organization and external relations. These results show a greater influence of intangible capabilities (innovation and knowledge sharing) on adopting organizational innovations than more tangible results (cost, time and quality). That finding highlights the importance of knowledge management (KM) in a firm's innovating profile. Organizational interest in KM is stimulated by the possibility of resultant benefits, such as increased creativity and innovation in products and services [14]. That is why innovation is seen as the area of greatest payoff from KM [15]. Indeed, the definition of organizational innovations provided in the Oslo Manual [3] considers the introduction of new KM systems as a form of organizational innovations [5]. Prior research has shown that KM is an important mechanism for companies to be more innovative [16], no matter the specific type of organizational innovations. These results would help organizations to understand the role of a clear business model based on an effective organizational configuration closely related to knowledge in successful product and process innovations.

Finally, this study has some obvious limitations, which will be addressed in future research. First, although we used survey data, we did not have directly developed the questionnaire. Second, this research was conducted using a sample of Spanish firms. In this sense, findings may be extrapolated to other countries, since economic and technological development in Spain is similar to other OECD member countries. However, in future research, a sampling frame that combines firms from different countries could be used in order to provide a more international perspective on the subject. Finally, it would be interesting to see in a future study whether differences in organizational innovation objectives and adoption exist between different sectors, for instance manufacturing or service companies or low-tech versus high-tech firms by conducting a post hoc analysis and comparing different groups of organizations

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