

STRATEGIES FOR MANAGING ORGANIZATIONAL KNOWLEDGE: EVIDENCES FROM SPANISH FIRMS

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Abstract: From the resource-based view of the firm to the knowledge-based view of the firm it is clear that a particular intangible resource has become the cornerstone of sustainable competitive advantage (Barney, 1986; Conner, 1991; Foss, 1996; Lippman and Rumelt, 1982; Penrose, 1959). This resource is organizational knowledge. According to Peteraf's framework (1993) "four conditions must be met for a firm to enjoy sustained above-normal returns. Resource heterogeneity creates Ricardian or monopoly rents. *Ex post* limits to competition prevent the rents from being competed away. Imperfect factor mobility ensures that valuable factors remain with the firm and that the rents are shared. *Ex ante* limits to competition keep costs from offsetting the rents" (p. 186). Undoubtedly organizational knowledge qualifies as "the key resource" in today's competitive environment.

Organizational knowledge can adopt two forms: stocks and flows. Organizational learning provides a means to understand how the stocks and flows interact (Crossan and Hulland, 1997). In this sense, Cohen and Levinthal (1990) proposes that knowledge stocks and flows are interrelated because organizations that have a higher knowledge absorptive capacity will also have a higher propensity to utilize and circulate it. Knowledge management is the process by which organizational stocks of knowledge change (Bontis, Crossan and Hulland, 2001). It includes the management of strategic knowledge and its associated processes of creation, organization, diffusion, use and exploitation (Nonaka y Takeuchi, 1995; Skyrme, 2001).

With the contributions of the resource-based view of the firm, knowledge-based view of the firm, knowledge management and organizational learning literature, we conduct the following study. The purpose of this study is to analyze knowledge management in the Spanish manufacturing industry. Firstly we analyze to what extent firms are involved in knowledge management: investment in knowledge management, number of knowledge management projects, stage of the knowledge management process and so. Later we identify generic knowledge strategies in the Spanish manufacturing industry. By focusing on the resource-based view of the firm, the knowledge-based view of the firm and the organizational learning literature, and following Bierly and Chakrabarty (1996)'s pioneering study on generic knowledge strategies, we analyze the state-of-the-art in Spain. We quantitatively determined the existence of different organizational strategies in the way firms acquire, create, apply, distribute and transfer their knowledge, that is, different organizational knowledge strategies. The empirical results show that knowledge strategies influence organizational performance. So the configuration of these knowledge strategies become a strategic element in the organizational performance puzzle.

Keywords *Knowledge management, Organizational learning, Spanish manufacturing industry, Survey.*

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Introduction

Among the changes that have swept through the strategic management field during the last decades, knowledge management and intellectual capital measuring and reporting have probably made the most outstanding impact. Associated with this has been the advent of the Knowledge Economy (Grant, 2000). Several characteristics define the Knowledge Economy: 1) it is focused on intangible resources rather than tangible resources, 2) it has a hypercompetitive business environment, 3) it is digital, 4) it is virtual and 5) it is networked.

Firstly we will analyze the main strategic implications from the resource-based view (RBV) of the firm. This theory explains how and why firms achieve a sustained competitive advantage. The underlying idea is considering a firm as an accumulation of unique resources with diverse nature (Barney, 1991).

Organizational resources have been defined as diverse nature resources that prepare firms to conceive and implement strategies that improve their efficacy and efficiency, thus generating and increase in their competitiveness (Amit and Schoemaker, 1993; Grant, 1991). Peteraf suggests the route to achieve a sustained competitive advantage is an active and skill management process, comprising the following phases: 1) identification of these activities and skills that are strategically relevant, 2) selection of those that are important for the future needs of the market, and 3) implementation of programs which will develop, enhance and/or protect these resources.

Itami and Roehl (1987) consider that a central element of strategy is the management of invisible assets (know-how, reputation, etc.). They suggest that every turn of the business cycle should add value to the know-how base of the firm in the areas of core competencies; this leads to the view that an organization needs to make strategic decisions regarding which know-how areas it wishes to enhance (Hall, 1992).

Due to the importance of having, identifying and exploiting strategic resources in order to develop an strategy that allows to compete on this base of resources, firms are really interested in identifying, knowing and analyzing their resources and capacities in order to uncover those which are considered superior or distinctive.

From the resource-based view of the firm, Peteraf (1993) proposes the conditions that underline the competitive advantage are the following: resources heterogeneity, imperfect resource mobility, ex ante limits to competence and ex post limits to competence. These conditions are not independent but interrelated.

Organizational learning conceptual framework

The organizational learning (OL) field receives contributions from different disciplines. Now we briefly analyze the current situation of this field as well as the main contributions to the study of organizational learning.

One of the main features of organizational learning literature is its level of fragmentation. The building of a conceptual framework for the organizational learning process is central if we wish to clarify concepts and understand the strategic importance of organizational learning.

Back in 1965, Cangelosi and Hill (1965) stated more empirical work was required in order to advance the field. Two decades later, Fiol and Lyles (1985) recognizes the fact that this challenge have not been met yet. The field has been slow to evolve and even now there is a tremendous scarcity of empirical research in this field. However, Crossan *et al.*, (1995) propose a conceptual organizational learning framework that paves the way for enriching empirical research.

Now we turn to examine the basic structure of organizational learning process proposed by Crossan *et al.*, (1995). The main backbone of their framework involves analyzing the following issues: 1) unit of analysis –individual, group, organizational, and interorganizational; 2) cognitive-behavioral focus; and 3) the learning-performance relationship. These are the primary areas of conflict within this field.

Researchers have suggested different learning processes, including radical learning, incremental learning, single-loop learning, and double-loop learning (Argyris and Schön, 1978). There has been much contention about the nature of incremental and transformational learning (March, 1989). Differences emerge on the basis of observed patterns of organizational behavior. While incremental learning is manifested in small changes in the observed pattern of behavior, radical learning is manifested in radical changes of behavior. Regarding to the nature of the change itself, we could distinguish between single-loop learning and double-loop learning. While single-loop learning involves cognitive and behavioral changes within the existing strategic paradigm, double-loop learning is manifested by breaking out the existing paradigm.

Firms must take decisions that involve a trade-off between exploration and exploitation of knowledge. Both exploration and exploitation are essential for organizations, but they compete for scarce resources. As a result, organizations make explicit and implicit choices between the two (March, 1989). Exploration includes things captured by terms such as search, variation, risk taking, experimentation, play, flexibility, discovery, and innovation. Exploitation includes such things as refinement, choice, production, efficiency, selection, implementation, and execution. Maintaining an appropriate balance between exploration and exploitation is a primary factor of survival and prosperity (March, 1989).

Firms also need to decide the level of internal learning and external learning. In order to build and reinforce their competitive advantage, firms need to devote resources to one type of knowledge. However both knowledge from internal learning –investment in R&D, for example- or external learning –learning from an alliance partner, competitor, etc.- has become a strategic process that contributes to the acquisition and deployment of the organizational knowledge stock and flow.

Extramural knowledge is vital to the innovative performance of firms (Johnston and Gibbons, 1975). The capacity to “exploit” outside knowledge is comprised of the set of closely related abilities to evaluate the technological and commercial potential of knowledge in a particular domain, assimilate it, and apply it to commercial ends. These abilities collectively constitute firm’s “absorptive capacity” (Cohen and Levinthal, 1989a, 1989b, 1990). Absorptive capacity may be developed in a variety of ways. For example as a byproduct of firm’s research and development activities. The absorptive capacity is a key capability for knowledge acquisition. This capability may be nurture through previous organizational learning process.

In addition, another two important issues is the speed of organizational learning and the breath of the organizational knowledge base. Both issues demand decisions that influence the organizational knowledge strategy and thus, the organizational sustained competitive advantage.

Regarding organizational learning and organizational performance several issues emerge. Firstly, Crossan *et al.*, (1995) state that unlearning should be considered as a subdimension of organizational performance, equating unlearning with connotations of maladaptation and unwanted outcomes (p. 353). Hedberg (1981) suggests that “understanding involves both learning new knowledge and discarding obsolete and misleading knowledge. In fact, it seems as if slow unlearning is a crucial weakness of many organizations” (p. 3).

Secondly, good performance is not necessarily a sign that learning has occurred. Other factors, which are external to the organization –such as the failure of a competitor to service customers, changing government regulations which may favor one company over another, or changes in the cost of producing or delivering a product or a service as a result of favorable macro-economic shifts –may enhance performance (Crossan *et al.*, 1995).

Although the relationship between learning and performance is complex, it can be actively managed in order to increase the probability of improved performance (Crossan *et al.*, 1995).

Knowledge-based view of the firm

Transaction-costs theory has paid scant attention to the question of knowledge. Yet knowledge is arguably the most important resource that firms possess, a strategic source of both Ricardian and monopoly rents (Penrose, 1959; Winter, 1987).

The knowledge-based view of the firm suggests that the primary rationale for the firm is the creation and application of knowledge (Shoemaker and Amit, 1994; Grant, 1991). Bierly and Chakrabarty (1996) conclude that organizational performance differences between firms are a result of their different knowledge bases and differing capabilities in developing and deploying knowledge. Thus the management of organizational knowledge could be thought of as the preeminent dynamic capability of the firm and the main driver of all other competencies and capabilities.

Nonaka (1998) states that the knowledge-based view of the firm postulates that knowledge is the only resource that provides sustainable competitive advantage, and

therefore, the firm's attention and decision making should focus primarily on knowledge and the competitive capabilities derived from it.

Knowledge Management

In recent years knowledge management in the firm has been paid increasingly more attention. The different ways of generating and transferring knowledge across different levels has been widely analyzed (Bueno, 1998; Nonaka and Takeuchi, 1995).

Knowledge management is the process of capturing firm's knowledge and using it to foster innovation through a spiral of organizational learning (Nonaka, 1991, 1994; Ordóñez de Pablos, 2001). Organizational knowledge creation may be defined as a process across two major dimensions: ontological dimension and epistemological dimension. The first dimension involves learning at individual, group, and organizational level. The second dimension considers there are two types of knowledge: explicit and tacit knowledge (Polanyi, 1966).

Starting at individual level the spiral of knowledge creation moves up toward the group and organizational level at the same time the process of conversion from tacit to explicit knowledge and viceversa occurs. The mobilized tacit knowledge is "organizationally" amplified through these modes of knowledge conversion and finally crystallized at higher ontological levels. Several knowledge conversions occur in the spiral of organizational knowledge creation: combination, socialization, externalization and internalization. This conversion involves explicit knowledge and tacit knowledge (Polanyi, 1966).

Empirical study

Methodology and data collection

This empirical study is focused on the Spanish manufacturing industry from 1995 to 1999. The Knowledge Management and Organizational Learning questionnaire was developed by the author of this paper and administered to 2,136 Spanish industrial firms. Finally we received 123 valid survey questionnaires.

The questionnaire was designed in an easy to read booklet format with contained questions covering different areas -knowledge management strategy, organizational learning and organizational performance. Many of the TDM (total design method) recommendations suggested by Dillman (1978) were adopted. The questionnaire was three pages in length and was accompanied by a covering letter where the purpose of the survey was fully explained.

During the pre-test administration, respondents were highly encouraged to ask questions about the purpose of our research and to make sure that the meanings of the questions included in the questionnaire were absolutely clear. All such questions were answered via face-to-face interviews and email or fax. Very few doubts were reported during the pre-test and survey administration.

Now let's discuss in more detail some concerns regarding the sample of firms. It could be argued that many Spanish firms did not take part in the study. However

external validity and internal validity conditions are met so the selected sample is useful to analyze knowledge management and organizational learning in the Spanish manufacturing industry.

External validity condition demands that the sample must be representative of the population. Table I shows technical data of the research.

Table I. Technical data of the study

UNIVERSE	Firms with 100 or more employees from the Spanish manufacturing industry
GEOGRAPHIC FIELD	National
DATA COLLECTION METHOD	Postal survey
SAMPLE UNIT	Human resources directors, knowledge Management directors and managing directors.
POPULATION CENSUS	2,136
SAMPLE SIZE	123
SAMPLE ERROR	8.33%
CONFIDENCE LEVEL	95% Z= 1.96 p=q=0.5
SAMPLE PROCEDURE	The survey questionnaire was sent to the total firm census
TIME OF DATA COLLECTION	Survey questionnaires were sent late May and early June 2000. Questionnaires were received in June, July, August and September 2000.

Internal validity condition demands appropriate sources of information. In this sense, the co-operation of human resource directors, knowledge management officers or managing directors was requested in the covering letter of the survey questionnaire. We got responses from 69 human resource directors, 19 chief knowledge officers and 35 managing directors. All of them are supposed to have adequate knowledge to answer the questionnaire.

In order to test the hypothesis, initially we perform a cluster analysis –a methodology that allows us to extract case typologies with features and behaviors homogeneous inside the cluster but different among clusters. The cluster analysis was carried out using the SPSS for Windows (97) package. In particular, the Ward’s hierarchical technique of clustering using squared Euclidean distances was selected. We decided to standardize all variables by using the Z-scores so that variables with large units would not be overemphasized.

Focusing on Bierly and Chakrabarty’s study of 21 U.S. pharmaceutical firms, we analyzed organizational learning in terms of: 1) internal and external learning, 2) incremental versus radical or transformational learning, 3) speed of learning and 4) breadth of organizational learning. The cluster analysis identified several different knowledge strategies among the manufacturing firms. The knowledge strategies for

each of the knowledge clusters based on five independent variables are displayed on Table II.

Table II. Knowledge management strategy for 1995-1999 period

Variable	Variation Range	Mean	Typical Deviation
INTERNAL	(1-5)	3.27	0.94
EXTERNAL	(1-5)	3.22	0.96
RADICAL	(1-5)	2.70	1.08
SPEED	(1-5)	3.17	1.09
FOCALIZATION	(1-5)	3	1.02
N= 123			

In order to determine the validity of the application of this technique to the study of the relationship among used variables in the analysis, various indicators that justify the adaptation of the application were calculated (See Table III).

The Bartlett sphericity test shows the adequacy of using factorial analysis. The Kaiser-Meyer-Olkin (KMO) index compares correlation coefficients with partial correlation coefficients. It takes a 0.686 value. All calculated indicators justify the application of the cluster analysis.

Table III. Values of indicators

Matrix correlation determinant among variables
Bartlett sphericity test = 113.356
Significance level = 0.0000
We reject the null hypothesis meaning that the correlation coefficient matrix among items is the identity matrix
KMO = 0.686

Sample partition into four conglomerates

According to the proposed criteria, four clusters emerge. We labeled them as explorators, innovators, loners and exploiters. The next step is analyzing the main features of each cluster.

Table IV. Conglomerate description (number of cases, cluster mean variable values)

NUMBER OF CASES				
Segment 1	Segment 2	Segment 3	Segment 4	
55	17	36	15	

MEAN VALUES [†]				
Variable	Segment 1	Segment 2	Segment 3	Segment 4
INTERNAL*	3.62	3.06	2.67	3.60
EXTERNAL*	3.13	3.94	2.89	3.47
RADICAL*	3.18	4.00	1.81	1.80
SPEED*	3.67	4.00	2.00	3.27
FOCALIZATION*	3.36	1.94	3.44	2.00

Notes:

† Mean values of variables in each conglomerate

*Cluster differences are significant at $p < 0.01$

The first cluster –called explorators- is formed by 55 firms, figure that represents 44.71% of the sample. This label illustrates that radical learning level is very high and at the same time all other variable values are very close to the industry mean values. So this type of firm balances internal and external learning –the same way innovator firms do (Cluster 2) – but they are less aggressive than the innovator cluster.

Seventeen firms form the second cluster, that is to say, 13.82% of the total firm sample. They are called innovators because they combine efficiently internal and external knowledge, its level of internal learning is higher that the level of firms from the other clusters, its level if external and radical learning is high as well as its learning speed. In this sense, we called them innovators because in addition to following an aggressive strategy, they keep the necessary trade-off to be an innovator with long term success.

The third cluster is formed by 36 firms (29.26% of the sample). This segment - called loners- includes firms that are less learning efficient or they are just in isolation. Even if their internal learning investment is higher than industry mean, these firms achieve values in other variables that are clearly indicators of problem areas. Its level of external learning is much lower than the rest of the segments. This underlines that firms from this cluster are very isolated from the rest of the firms. Furthermore, its learning speed is significantly lower than the other segment's, showing the slowness of these firms in the application of new knowledge. Finally other feature of this segment is its high level of focalization, showing its difficulty or inability to integrate different types of organizational knowledge.

Finally we have the fourth cluster. The exploiter segment is formed by 15 firms, figure that represents 12.19% of the firms. Its label underlines its main features: low level of internal learning investment, high level of external investment and low level knowledge focalization. In addition, exploiters are far more focused on incremental learning rather than on radical learning.

Knowledge strategy and organizational performance

In this section we turn to determine to what extent organizational knowledge strategy help to establish differences among firm's global results. With this aim, the ROA variable was used as an indicator of the firm's behavior.

With this variable, we performed a cluster analysis in order to determine if the ROA or return on assets variable differs significantly among the clusters. As shown in Table V, the results are not significant at an acceptable confidence level, so that if organizational performance is measured using the ROA variable, we should reject the hypothesis that suggest that firms differ in their organizational performance according to the adopted knowledge strategy.

Table V. Different indicators

Function	Eigenvalue	% of variance	% accumulated	Canonical correlation
1	0.045	100	100	0.207

Function's contrast	Wilks's Lambda	Chi-square value	df	Significance
1	0.957	5.035	3	0.169

However, the use of the ROA as an exclusive indicator of the organizational performance could represent a limitation. In this sense, the global result would be measured as function of multiple variables, such as return on investment, market share, profit increase, etc. so that to the extent we increase the number of used variables to measure organizational performance, we could get a clearer and more accurate picture of the reality we want to measure. So we use an organizational performance indicator comprised of ten variables (leadership in the Spanish manufacturing industry, future perspectives, profits, increase in profits, increase in sells, ROA, financial return, global response to competitors, new product launch success rate, global success). The results shown in Table VI are significant at an acceptable level of confidence, and therefore, the measurement of organizational performance using multiple variables, allow us to accept the hypothesis that firms differ in their level of organizational performance according to their adopted knowledge strategy.

Table VI. Different indicators

Function	Eigenvalue	% of variance	% accumulated	Canonical correlation
1	0.112	100	100	0.318

Function's contrast	Wilks 'Lambda	Chi-square value	df	Significance
1	0.899	12.486	3	0.006

Conclusions

The following conclusions may be drawn from the foregoing:

- ◆ Knowledge has become the “key” organizational resource in today’s hypercompetitive environment. Its properties make of it a source of sustained competitive advantage: causal ambiguity, social complexity, path dependence and tacit nature.
- ◆ Firms make a series of decisions regarding the balance between internal and external learning, incremental or radical learning, organizational learning speed, and the breath of their organizational knowledge base. So these strategic decisions configure firm’s knowledge strategy and thus, influence its sustained competitive advantage.
- ◆ Focusing on one industry, the Spanish manufacturing industry, we quantitatively determined the existence of different organizational strategies in the way firms acquire, create, apply, distribute and transfer their knowledge, that is, different organizational knowledge strategies.
- ◆ Four types of knowledge strategies were identified: explorators, exploiters, innovators and loners.
- ◆ The empirical results show that knowledge strategy influence organizational performance. So the configuration of the knowledge strategy becomes a strategic element in the organizational performance puzzle.
- ◆ Knowledge strategy must be integrated into organizational strategy if it want to make sense. It has no sense to design a knowledge strategy that does not meet organizational strategy.

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