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**KNOWLEDGE MANAGEMENT AND ORGANIZATIONAL CULTURE IN A  
SOFTWARE DEVELOPMENT ENTERPRISE****Vicente Prado-Gascó**

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**ABSTRACT**

*The aim of this study was to analysis knowledge management and organizational culture at a Spanish software development enterprise. For this purpose, two different tasks were performed: first, analysis of knowledge management levels and organizational culture; and second, analysis of the relationship between organizational culture and knowledge management. The sample consisted of 196 employees between 21 and 45 years old, with 119 (61.3%) men. To achieve the objectives, adaptations of the Organizational Knowledge Practices (OKP) questionnaire (Cortijo, & Quintanilla, 2004) and the “Organizational Culture Inventory” (OCI) were used (Cooke & Lafferty, 1987). Based on the results, it appears that the company is oriented towards a constructive organizational culture. It also seems that the company emphasizes efficient knowledge management practices, especially in regard to teamwork. Finally, the link between organizational culture and knowledge management seems to be proven. As hypothesized, constructive culture is positively related to knowledge management performance, while Passive–Defensive and Aggressive–Defensive cultures are negatively related. All these results are particularly interesting considering that in the scientific literature such relationships have been proposed from a theoretical perspective, but only a few studies have explored these questions at the empirical level.*

**Keywords:** knowledge management; OKP, Organizational Knowledge Practices; Organizational Culture, OCI; software development enterprise

## INTRODUCTION

In today's knowledge-based society, knowledge is a key factor in economic systems (Audretsch, 2014; Bordeianu, 2015; Leydesdorff, 2012; Nonaka, Kodama, Hirose, & Kohlbacher, 2014).

Knowledge has become an axis on which much of the policies and decisions currently being taken in both public and private sectors hinge on. (for a comprehensive development of this subject can be found, among others, the following references: Chang, Choi, & Lee, 2004; Ju, Li, & Lee 2006; Paraponaris, 2003; Quintanilla, 2003).

Consequently, knowledge and its creation, capture, storage, dissemination and use, will be increasingly necessary in the society towards which we advance (Bell, 1976). Erecting a knowledge management system is the most appropriate strategy to streamline the flow of knowledge in organizations.

In this context, efficient knowledge management has become a competitive advantage and a core condition of performance (Alves, 2014; Al-Hakim & Hassan, 2016; Al-Qudah & Altaher, 2016; Bordeianu, 2015; Birasnav, 2014; Chang & Chuang, 2011; Chua & Heng, 2010; Grant, 1996; King & Zeithaml, 2001; Massa & Testa, 2009; Ramírez, & Morales, 2011; Rodríguez, 2013; Sedziuviene & Vveinhardt, 2010; Thoene & Buszko, 2014; Zhuge, 2002; Zieba & Zieba, 2014). It can also increase innovation, promote staff motivation and involvement, improve customer service, reduce drop-out rates and staff rotation, and improve an organization's adaptation to its environment (Carnerio, 2000; Choi & Lee, 2003; Chua & Heng, 2010; King & Zeithaml, 2003; Massa & Testa, 2009; Yang & Wan, 2004). Overall, the benefits of knowledge

management appear to create greater productivity and efficiency, reduce costs and increase revenue by providing faster and more efficient ways of solving problems, reduce some of the errors or defects in products or processes themselves, and provide more efficient ways to achieve a set of objectives (Romero, 2004).

Despite its importance, there seems no single definition or referential framework to study knowledge and its management. On the contrary, the standard pattern has been the proliferation of both definitions and conceptual perspectives (Zapata, 2004). With regard to their relationship with organizations we can find, to name just a few examples, the perspective of strategic management, based on the resources and capabilities of the company, which considers knowledge as one of those resources on which support the competitive advantage (Zapata, 2004). On the other hand, from the evolutionary theory in business management perspective it is believed that the evolution of the company is based on the accumulation of knowledge (Nelson & Winter, 1982). Another example would be the perspective of Knowledge management. From all these theoretical and methodological perspectives on organizational performance, knowledge is recognized as a key element in the operation of a business (Grant, 1996).

In this research, we adopt the latter perspective; which converges different research areas or schools of thought and whose objective is to determine the most effective ways to manage knowledge.

However, what is knowledge management? In recent years there has been a considerable interest in the knowledge management both from the academic and business point of view. They have proliferated different analytical perspectives, methodologies and practices of business management, both theoretical and

applied (Ju, Li & Lee 2006; Zapata, 2004). The knowledge management has become today a fundamental concept in the business world, becoming in a large number of companies, one of the pillars on which to develop various strategies and corporate policies. Nevertheless, following a review of the concept, we have been able to conclude that far from having a commonly accepted single definition in the literature, it has been defined or addressed from different perspectives. It seems that almost all lines of thought or theoretical contributions of the knowledge management find a meeting point in trying to analysis the organizations being based on the study of knowledge (Nonaka & Takeuchi, 1995). However, there are for each nuances and differences that need to be clarified.

One of the first definitions appeared in the literature of management information systems in 1983. This concept, by Marchand (1983), was proposed as an alternative to the concept of strategic information management, and it was considered as the last phase in the evolution of the role of information management. In the early 90s, the term reappears in the literature, more akin to their current account (Hedlund, 1994; Hedlund & Nonaka, 1993) so well Skyrme (1999) considers the knowledge management as a systematic management of vital knowledge, in which processes of creation, organization, diffusion, use and exploitation thereof occur.

Conversely, Brooking's (1997) definition emphasizes the intangible nature of resources that must be managed from the knowledge management and its relationship with people. While Wiig (1997) considers the knowledge management as a process that includes both tactical and operational guidance, and focuses on managing knowledge related activities

(generation, encoding, transfer and use of knowledge).

In 1998, O'Dell and Grayson, defining the knowledge management introduced a new element, the person-knowledge adequacy determining that the knowledge management is a conscious strategy not only to disseminate knowledge throughout the organization, but to assure that the right knowledge gets to the right people, and helps people to share it and use it in ways to improve organizational performance. Whereas, Andreu and Sieber (1999) emphasize the importance of knowledge to improve the ability of companies to solve problems and contribute therefore to maintain their competitive advantage. Current perspectives tend to consider knowledge management as a business structured and integrated process aims to link person and knowledge through technology in order to produce a competitive advantage.

Regarding the different stages or dimensions considered within the knowledge management there is no agreement. Some authors consider processes of creation, organization, diffusion, use and exploitation thereof (Skyrme, 1999). Meanwhile, Davenport and Prusak (2000) modify the phases or elements Skyrme enunciated by considering the knowledge management as a process of capture, distribution and effective use of knowledge. Wiig (1997) considers that the knowledge management encompasses generation, encoding, transfer and use of knowledge), while others speak of generation, coding, refinement and transmission of knowledge (Wensley & Verwijk-O'Sullivan, 2000), on the other hand, some authors emphasize different phases within generation (external acquisition of knowledge and the internal creation of it) and application (identification,

measurement, storage and transfer of such knowledge) (Grant, 1996). In 2000, Davenport and Prusak reformulate stages and include coordination, so that argue that in the knowledge management the following steps are included: generation, coding, coordination and transfer of knowledge.

Summarizing the ideas appeared in the different definitions, we could establish that knowledge management is a structured and systematic process consisting of different phases (capture, creation, organization, storage, distribution and effective use of knowledge) in relation to knowledge (not merely information), which does not necessarily follow a chronological linearity. In this process, one should consider three key components (people, knowledge and technologies), try to find the best fit between people and knowledge (i.e., not just match any type of knowledge to anyone), use technology (ICT) as a means of managing more effective procedures, and act differently during the different phases of knowledge management. Thus, it involves a key element of strategy and business management by providing a means of gaining competitive advantage and maintaining it over time (Prado-Gascó, 2012). There is a considerable amount of literature that seems to support, in addition to the importance of knowledge management, the importance of organizational culture to the internal and external operations of enterprises, namely their productivity and performance, (e.g., Corbett & Rastrick 2000; Denison, 1990; Denison, Haaland & Goelzer 2003; Denison & Mishra, 1995; Fey & Denison 2003).

Organizational culture produces a pattern of shared values that derive certain norms that manifest themselves in certain forms of conduct (Bonavía & Quintanilla, 1996), all of

which can have an important influence on business performance. In addition, it is worth noting the proposal of Schein (1992) and Rousseau (1990), among others, of the existence of different levels or layers in an organizational culture; we may thus focus our analysis on observable layers such as the "Rules of Conduct" or "behavior patterns" according to the typology of Rousseau (1990). Organizational culture affects performance, organizational effectiveness, decision-making, and the socialization of the members of the organization. It facilitates the adaptation of the company to its environment (Schein, 1992); reduces turnover; increases the implementation of new technologies and innovations; increases the motivation, involvement and satisfaction of members; and may be crucial to attracting and retaining valuable workers (Harper & Utley, 2001; Sheridan, 1992).

Likewise, as many authors suggest, the organizational culture prevailing in an organization may, among its other attributes, constitute one of the most important facilitators of or barriers to knowledge management (Hong, Shu, & Koo, 2011; Jofreh, & Shirzad, 2015; Mason & Pauleen, 2003; McManus & Loughridge, 2002; Thoben, Weber, & Wunram, 2002). In general terms, it is believed that organizational culture can both promote and prevent knowledge creation, sharing and use (Janz & Prasarnphanich, 2003).

It is therefore common to find examples that connect constructs (organizational culture and knowledge management) to other variables related to performance or satisfaction. There are also studies that have associated the two concepts (e.g., Alavi, Kayworth, & Leidner, 2006; Al-Alawi, Al-Marzooqi, & Mohammed, 2007; Alrubaiee, Alzubi, Hanandeh, & Al Ali,

2015; Balthazard & Cooke, 2004; De Long & Fahey, 2000; Donate, & Guadamillas, 2010; Gold, Malhotra & Segars, 2001; Nguyen & Mohamed, 2011; Palanisamy, 2007; Park, Ribiere, & Schulte, 2004).

From this perspective, it is quite clear that knowledge management and organizational culture offer important benefits to an organization; but what types of cultures are most suitable for efficient knowledge management? In general, it seems that the cultures that best promote efficient knowledge management offer collaborative environments, have a focus on teamwork, and are more constructive than defensive (Bordeianu, 2015; Chen & Huang, 2007; Cooke & Lafferty, 1987; Denison & Neale, 2000; Janz & Prasarnphanich, 2003).

Despite the importance of both constructs and their clear relationship, at least from a theoretical perspective, this is not a subject with a long history of scholarship, and much of the literature has been based more on theoretical than empirical approaches (Chen & Chen, 2006).

Therefore, there is a clear need for the study presented here, in which the aim was to analysis knowledge management and organizational culture in a Spanish software development enterprise. For this purpose, two different tasks were performed: first, analysis of the enterprise's levels of knowledge management and its organizational culture; and second, analysis of the relationship between organizational culture and knowledge management.

To achieve these objectives, this study uses the Organizational Culture Inventory (OCI) because of its widespread use in the discipline (e.g., Boglarsky, 2005; Cooke & Szumal,

2000; Corbett, & Rastrick, 2000; Kwantes & Boglarsky, 2004; Yauch & Steudel, 2003), and the process followed for validation (sample of 3939 people from different organizations and countries). On the other hand, to measure knowledge management, this study uses an adaptation of an instrument called the *Organizational Knowledge Practices questionnaire* (OKP) (Cortijo & Quintanilla, 2004).

## METHODS

*Participants.* A total of 195 employees (out of 270) from a software development enterprise participated, aged between 21 and 45, ( $M=30.5$ ,  $SD=4.87$ ), including 119 (61.3%) men. Most workers had university education (160), a small group had secondary school studies (19) and another small group (16) had postgraduate studies (Master, PhD).

*Instrument.* An adaptation of the *Organizational Knowledge Practices (OKP)* questionnaire was used (Cortijo & Quintanilla, 2004). This is a questionnaire of 28 items grouped on four factors: "Team Work"; "Information flow"; "Vertical communication", and "knowledge management Influence on job". The questionnaire uses a Likert response scale with five response options from strongly disagree (1) to strongly agree (5). This instrument has adequate psychometric properties ( $KMO= .844$ ; Bartlett test of sphericity  $p < .001$ ; four factors that explain 46.85%;  $\alpha=.89$ ; Team Work  $\alpha= .82$ ; Information flow  $\alpha= .77$ ; Vertical communication  $\alpha =.78$ ; knowledge management Influence on job  $=.50$ )

*The "Organizational Culture Inventory" (OCI)* of Cooke and Lafferty (1987) is an instrument designed to evaluate the culture of

organizations in terms of behavioral norms and expectations related to the shared beliefs and values held by organizational members. It consists of 120 items (grouped into 12 culture styles) and three second-order factors, which may influence the thinking and behavior, motivation and performance, and satisfaction and stress of the organization's members. It uses a five-point Likert-scale (1 = strongly disagree to 5 = Strongly Agree). Cronbach's alpha coefficients support the internal consistency of each of the scales, ranging from .65 to .95 (Cooke & Szumal, 1993).

*Procedure.* The questionnaire was administered to the sample at the organization by the same researcher during 5 sessions in January 2014.

*Data analysis.* The statistical analysis was conducted using SPSS 22. First, psychometric

properties were evaluated. Thereafter, descriptive statistics of OKP and organizational culture were analysed, and finally, the relations between knowledge management and dimensions of organizational culture were examined.

## RESULTS

### *Organizational culture and knowledge management descriptive results*

Based on the results, scores on the 12 dimensions of organizational culture range between medium-low and medium-high. The predominant cultures in the company, although they have only medium-high values, appear to be the Affiliative, Dependent, Self-actualizing and Achievement values, while less frequent (average scores low) are the Power, Oppositional, Competitive and

Table 1  
*Descriptive Results for Organizational Culture (OCI).*

	Mean	Standard deviation
<b>Constructive</b>	3.15	.45
Achievement	3.14	.56
Self actualizing	3.14	.52
Humanistic	3.05	.63
Affiliative	3.26	.62
<b>Passive - Defensive</b>	2.90	.44
Approval	2.89	.59
Conventional	3.07	.57
Dependent	3.17	.53
Avoidance	2.48	.70
<b>Aggressive -Defensive</b>	2.76	.49
Oppositional	2.65	.49
Power	2.74	.63
Competitive	2.58	.77
Perfectionistic	3.07	.57

Avoidance values. Additionally, considering the three cultural styles, or second-order factors, the prevailing culture seems to be constructive followed by passive or defensive, with aggressive-defensive being the least prevalent.

Furthermore, regarding Knowledge Management (Table 2) in general, higher average scores were observed in all dimensions except vertical communication. Team Work and knowledge management influence on job had the highest values.

Table 2  
*Descriptive Results for Knowledge Management (OKP)*

	Team Work	Information flow	Vertical communication	Knowledge management Influence on job
Mean	3.36	3.21	2.93	3.28
SD	.57	.67	.65	.65

*Relationship between Organizational culture and Knowledge Management*

The final objective pursued in this study was to test the empirical relationship between knowledge management and organizational

culture. Table 3 presents Pearson correlations between “OCI” dimensions (organizational culture measures) and the four dimensions of OKP (knowledge management measures).

Table 3  
*Relations between Knowledge Management and Organizational Culture.*

	TW	IF	VC	KI
<b>Constructive</b>	.55**	.33**	.46**	.33**
Achievement	.29**	.23**	.21**	.13
Self Actualizing	.56**	.31**	.38**	.39**
Humanistic	.55**	.34**	.51**	.38**
Affiliative	.39**	.19**	.38**	.17*
<b>Passive - Defensive</b>	-.10	-.01	-.15*	-.25**
Approval	.03	.05	.01	-.12
Conventional	-.13	-.02	-.17*	-.24**
Dependent	.06	.01	-.05	-.11
Avoidance	-.23**	-.07	-.22**	-.26**
<b>Aggressive - Defensive</b>	-.08	.05	-.12	-.16*
Oppositional	-.00	.10	-.05	.04
Power	-.16*	.00	-.19**	-.25**
Competitive	-.08	.06	-.07	-.12
Perfectionistic	.03	-.00	-.08	-.15*

\*TW: Team Work, IF: Information flow, VC: Vertical communication, KI: knowledge management Influence on job.



Significant positive correlations ( $p < .01$ ) were observed between all dimensions of constructive styles and knowledge management dimensions, with the exception of KI and Achievement. Considering the dimensions of passive-defensive styles, negative significant ( $p < .01$  and  $p < .05$ ) correlations were observed between Passive-defensive culture, and Conventional and Avoidance with VC and KI; negative significant ( $p < .01$ ) correlations were also observed between Avoidance and TW. Finally, regarding Aggressive – Defensive styles, negative significant correlations were observed among Aggressive – Defensive styles, perfectionist, Power and KI. There was also a negative significant correlation between Power and TW, VC.

### CONCLUSION

Organizational culture and knowledge management are basic elements of organizational performance and/or efficiency, both internal and external (Barney, 1991; Carnerio, 2000; Chang & Chuang, 2011; Massa & Testa, 2009; Nonaka & Takeuchi, 1995; Yang & Wan, 2004). In addition, the literature suggests a link between knowledge management and organizational culture, although there are just a few studies that move from a theoretical point of view to analysis this link empirically (Janz & Prasarnphanich, 2003; McManus & Loughridge, 2002; Mason & Pauleen, 2003).

Considering the importance of both organizational culture and knowledge management on organizational performance, as well as the lack of studies that analysis this link empirically, there is a clear need for the study presented here, the aim of which was to analysis knowledge management and organizational culture at a Spanish software

development enterprise and to study the links between them.

Based on the results obtained, in general it appears that the company is moving towards an organizational culture of the constructive type. Companies that are oriented towards this type of culture are characterized by encouraging members to interact with others and to perform their duties in a way that helps them meet their higher order needs (Cooke & Lafferty, 1987; Cooke & Szumal, 1993). In these businesses, communication, cooperation and support prevail, and these elements promote an adequate climate of knowledge management (Janz & Prasarnphanich, 2003). Moreover, the company emphasizes efficient knowledge management practices, especially in regards to teamwork.

Finally, the link between organizational culture and knowledge management seems proven. As hypothesized, constructive culture is positively related to knowledge management performance, while Passive–Defensive and Aggressive–Defensive cultures are negatively related. According to the literature, and as discussed previously, cultures that demonstrate better knowledge management are those that foster collaborative environments with an orientation toward teamwork (Janz & Prasarnphanich, 2003), cultures of the constructive type more than defensive cultures (Cooke & Lafferty, 1987), and cultures where knowledge management is a prime commitment (Denison & Neale, 2000), as these types of cultures foster environments of trust and support that promote social interaction and enable access to information and resources. Perhaps most importantly, they promote the efficient dissemination and use of knowledge (Chen & Huang, 2007).



All these results are especially interesting considering that in the scientific literature such relationships have been proposed from a theoretical perspective, but few studies have evaluated these questions at the empirical level.

Although knowledge management is currently a discipline experiencing considerable growth (Chua & Heng, 2010), research from an empirical perspective is important to gain greater insight into organizational performance. Some of the limitations of this study relate to the sampling method; future studies must extend this research by considering other organizations. It would also be very interesting to empirically demonstrate the relation of organizational culture and knowledge management to other organizational performance variables. Future research should address this topic.

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