

Influence of Critical Success Factors of Knowledge Management on the Innovation Performance of Colombian Organizations¹

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ABSTRACT

This study focuses on the influence of Knowledge Management (KM) approached from the perspective of its Critical Success Factors (CSF) on the Innovation Performance with regard to Colombian companies. In doing so, the article builds on the different approaches exposed by several authors, and setting afterwards a single CSF model for KM implementation, considering eight factors within the model, as a result of the integration of the different factors identified in the literature review. Moreover, this paper provides preliminary findings of the existing empirical evidence so far, presenting a preliminary qualitative analysis that supports the hypotheses formulated in the research.

Keywords: Knowledge Management, Critical Success Factors, Innovation Performance

1. INTRODUCTION

The existing literature on strategic management recognizes innovation as a facilitator for firms to create value and sustain competitive advantage in the increasingly complex and rapidly changing environment (Madhavan and Grover, 1998; Subramaniam and Youndt, 2005). Likewise, perspectives based in organizational knowledge become another area of interest for strategic management, finding a theoretical reason why the knowledge-based in resources play an important role when talking about the sustainable increase of competitiveness of a company (B. Choi and H. Lee, 2003).

Considering what was mentioned above and according to different studies, the acquisition of knowledge has a positive relationship with the innovation performance of a company. Ruggles (1998) and Scarbrough (2003), quoted by Chen and Huang (2007, p.107), consider that organizations that effectively manage and leverage the knowledge and expertise embedded in individual minds will be able to create more value and achieve superior competitive advantage. For this reason, an organization's innovativeness is closely tied to its ability to utilize its knowledge resources (Subramaniam and Youndt, 2005), quoted as well by Chen et al. (2007, p.107).

Assuming then, that organizations are more aware that innovation in closed relation to knowledge management can be an important way to generate better performance within them, and therefore remain on the market, it is clearly observed in this context that for Colombian companies, this is not an unknown scenario, considering the interest and need of these companies in being placed not only at a local and national level but also at an international one.

Therefore, the following study focuses on validating the different hypotheses proposed behind the theories and models that point out the importance of Knowledge Management in the companies and its influence on the innovation performance in a sample of Colombian firms. The rest of the article is set out as follows. The next section considers the theoretical background in a thorough review of the existing literature, developing theoretical and conceptual tools that help to identify which are the characteristics and/or critical factors of Knowledge

¹ This work has been supported by the Deutscher Akademischer Austausch Dienst (DAAD), Referat 416, Kennziffer A/07/72487

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Management that influence on the innovation performance of the organizations. Following that are the conceptual model and hypotheses of the study. Then, the article presents the methodology that is being used to prove the hypotheses, and finally the article discusses some preliminary findings and highlights future research directions.

2. THEORETICAL BACKGROUND

In the following section different approaches, concepts and models found in the literature review will be considered as part of the theoretical framework of this research, enabling afterwards the construction of the conceptual framework of the study.

First, the reader will find the conception of *Knowledge Management*, where different definitions and models will be stated. After that, and according to several theorists, Critical Success Factors of Knowledge Management are analyzed and discussed, arguing on how this Knowledge Management supports and enhances innovation performance in the companies.

2.1 KNOWLEDGE MANAGEMENT (KM): CONCEPTS AND MODELS

Since KM is a relatively new discipline, and object of study of many researches, this research focuses the attention in the different approaches and models given to the topic. To be considered appropriate and relevant by the author of this research, initially will be taken the contribution of Jennex and Zakharova (2005), who introduce the topic of KM, making a compilation from other sources and studies regarding the subject. Subsequently other findings in the literature will be also posted.

For Jennex (2005) KM is the practice of selectively applying knowledge from previous experiences of decision making to current and future decision making activities with the express purpose of improving the organization's effectiveness. He also considers a Knowledge Management System (KMS) as that system which is created to facilitate the capture, storage, retrieval and reuse of knowledge. KM and KMS holistically combine organizational and technical solutions to achieve the goals of knowledge retention and reuse to ultimately improve organizational and individual decision making (Jennex and Zakharova, 2005).

Jennex et al. (2005) consider that none of the definitions of KM are purely technical in nature; they all include Information System (IS) support, but also organizational considerations and have an impact on organizational productivity and effectiveness. Jennex and Olfman (2002) argue that for a better understanding of KM, it is necessary to define and introduce two concepts which are related among them and have an impact on organizational effectiveness. These concepts are: Organizational Memory (OM) and Organizational Learning (OL). Figure 1 illustrates the model with the relationship between the different concepts.

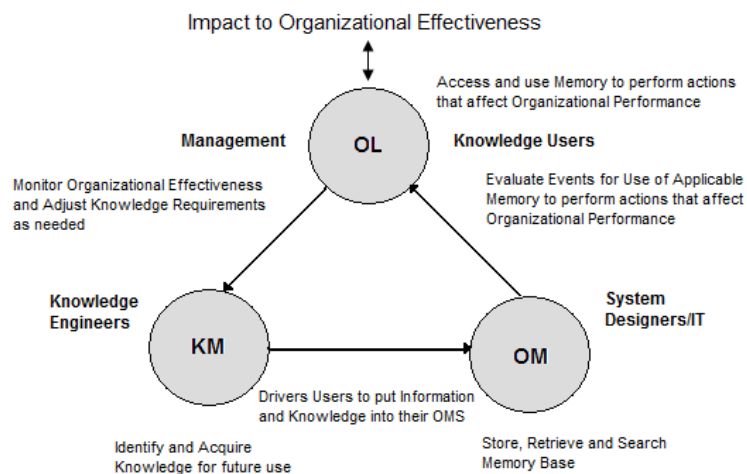


Figure 1: The KM/OM/OL Model (Source: Jennex and Olfman, 2002)

On the other hand, other literature found such as Gold et al. (2001), Ruggles (1998), Scarbrough (2003), quoted by Chen and Huang (2007, p.108), consider that KM is an approach of more actively leveraging the knowledge and expertise resided in individual minds to create value and enhance organizational effectiveness, supporting as well the concepts given by Jennex (2005).

Another exposure of KM is the one that argues that, KM is the process of creating value from an organization's intangible assets; it is the amalgamation of concepts from the applied artificial intelligence, software engineering, business process reengineering, organizational behavior, and information technology fields (Liebowitz, in press). With the population "graying" and organizations facing potential knowledge drains, the advent and importance of KM and strategic human capital management play critical roles for society. KM deals with creating a process for generating value from an organization's intangible assets, stated Liebowitz (2006, p.16) in his book "Strategic Intelligence: Business Intelligence, Competitive Intelligence and Knowledge Management". According to modern approaches, KM is already considered as a key factor in the organization's performance, because it deals with different resources that can aid decision makers in many ways (Keen, 1991).

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2.2 CRITICAL SUCCESS FACTORS (CSF) OF KNOWLEDGE MANAGEMENT

The different concepts and models of KM that have been presented in the last section, allow addressing another point of interest for several theorist and researches in the field, and it is about the need for studying which are the Critical Success Factors (CSF) at the moment of implementing a KM initiative. Jennex and Zakharova (2005) consider that, knowing the CSF is useful as it provides researchers and practitioners with the basic requirements for implementing a successful KM initiative and building a successful KMS.

CSF can be defined as "areas in which results, if they are satisfactory, will ensure successful competitive performance for the organization", (Rockart, 1979). Saraph et al. (1989) viewed them as those critical areas of managerial planning and action that must be practiced in order to achieve effectiveness. In terms of KM, they can be viewed as those activities and practices that should be addressed in order to ensure its successful implementation. These practices would either need to be nurtured if they already existed or be developed if they were still not in place. Based on this definition, Wong (2005) treated CSF as those internal factors which are controllable by an organization.

Liebowitz (1999) described six essential ingredients in order for KM to have a chance of succeeding in an organization. He considers that, by paying close attention to these critical elements, KM will be a key competitive strategy to the organization in the future; basing his argument in the experience he has had and learned from different companies.

The key ingredients stated by Liebowitz are shown as follow:

- A Knowledge Management Strategy with support from senior leadership
- A Chief Knowledge Officer (CKO) or equivalent and a knowledge management infrastructure within the organization
- Knowledge ontologies and knowledge repositories to serve as organizational / corporate memories in core competencies
- Knowledge management systems and knowledge management tools
- Incentives to motivate employees to share knowledge
- A supportive culture for knowledge management

Holsapple and Joshi (2000) through a descriptive framework introduced the different factors that influence the success of KM. They conducted a Delphi study, comprising an international panel of 31 recognized KM researches and practitioners to further explore and evaluate the factors that they had developed earlier. In the analysis, the study identified three main classes of influencing factors; *managerial*, *resource*, and *environmental*. Figure 2 shows the three major kinds of forces that conspire to influence the KM, and the identified factors involved in each influence category.

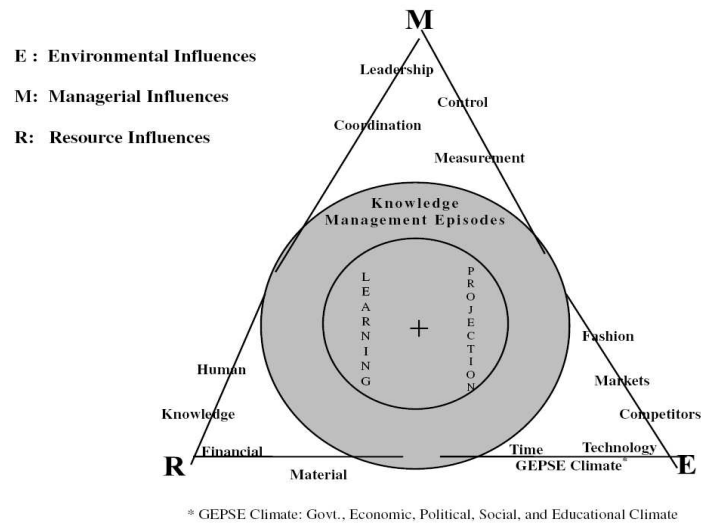


Figure 2: Influences on the Management of Knowledge (Source: Holsapple et al., 2000)

They found leadership and top management commitment/support to be crucial. Resource influences such as having sufficient financial support, skill level of employees, and identified knowledge sources are also important. However, it was reported in the evaluation of their Delphi study that there was a lack of detailed inclusion of technology and culture as critical factors. Certain factors were also perceived to be missing such as knowledge infrastructure, communication, training, education, organizational planning, strategy setting, and reward issues. Nevertheless, the researchers considered that the developed framework provides a platform for organizing and discussing varying perspectives.

Davenport et al. (1997) identified eight characteristics that were found in an exploratory study conducted on 31 KM projects in 24 companies; where eighteen projects were determined to be successful, five were considered failures, and eight were too new to be rated. These factors are the following:

- Link to economic performance or industry value
- Technical and organizational infrastructure
- Standard, flexible knowledge structures
- A knowledge-friendly culture
- Clarity of purpose and language
- Different motivational practices
- Multiple channels for knowledge transfer
- Senior management appreciation and support

A study was conducted by Akhavan and Hosnavi (2009) in order to explore the essential issues of KM in some Iranian academic research centers, considering as a first step the important role that knowledge plays in those research institutions. Through literature review critical factors and issues of KM adoption were distinguished and adopted, and applying Factor Analysis in the research methodology, the researchers were able to extract and identify several key factors and then determine the extent to which each variable is explained by each factor. They concluded that five factors should be considered in the adoption of KM. These factors were: Human Resource Management and Flexible Structures, KM Architecture and Readiness, Knowledge Storage, Benchmarking, and Chief Knowledge Officer (CKO)

Skyrme and Amidon (1997) highlighted seven key success factors that need to be considered for those organizations that are formalizing KM or transforming themselves into true knowledge-based enterprises. These factors include a strong link to a business imperative, a compelling vision and architecture, knowledge leadership, a knowledge creating and sharing culture, continuous learning, a well-developed technology infrastructure and systematic organizational knowledge processes.

According to Chourides et al. (2009), the identification of emerging factors for KM implementation is located in five organizational functional areas, which are: *Strategy*, *Human Resource Management (HRM)*, *Information Technology (IT)*, *Total Quality Management (TQM)*, and *Marketing*. They conducted a study with 100 Financial Time Stock Exchange (FTSE) companies to get key responses related to the KM approach, and as a result, a set of different aspects were presented in the five functional areas.

In accordance with Hasanali (2002), CSF can be categorized into five primary categories: *Leadership*; *Culture*; *Structures, Roles and Responsibilities*; *Information Technology Infrastructure*; and *Measurement*. This author considered that an elementary success factor of KM is to have first a common understanding of the terms “Knowledge Management” and “Knowledge Sharing”, and how to apply them in certain situations and needs.

Sage and Rouse (1999) based their study concerning the issues of innovation and technology, and identified the following features:

- Modeling processes to identify knowledge needs and sources.
- KMS strategy for the identification of knowledge to capture and use and who will use it.
- Provide incentives and motivation to use the KMS.
- Infrastructure for capturing, searching, retrieving, and displaying knowledge.
- An understood enterprise knowledge structure.
- Clear goals for the KMS.
- Measuring and evaluating the effectiveness of the KMS.

An interesting research was developed by Wong (2005) were most of the literature review here stated was also done by this author, but with the particularity, that this study was especially to identify the CSF needed for the implementation of KM in Small and Medium-sized Enterprises (SMEs). Wong considered that existing studies have derived their CSFs from large companies' perspectives and have not considered the needs of smaller businesses, and as a result 11 factors were proposed for being crucial for SMEs. These factors are:

- Management Leadership and Support
- Culture
- IT
- Strategy and Purpose
- Measurement
- Organisational Infrastructure
- Processes and Activities
- Motivational Aids
- Resources
- Training and Education
- HRM

Alavi and Leidner (1999) examined an executive development program with respect to what was needed for a successful KMS, and through a survey, they found that organizational and cultural issues are associated with user motivation to share and use knowledge to be the most significant. They also found it important to measure the benefits of the KMS and to have an integrated and integrative technology architecture that supports database, communication, and search and retrieval functions.

Jennex et al. (2005) analyze key words and concepts from different theorists and combine them into generic Critical Success Factors. They rank the generic CSF based on the number of articles the base success factors appeared in; however using the number of studies mentioning a critical success factor is an imperfect ranking methodology, they remarked.

Table 1 lists the final set of success factors.

Table 1: KMS Success Factor Summary (Source: Jennex and Zakharova, 2005)

ID	Success Factor
SF1	Integrated Technical Infrastructure including networks, databases/repositories, computers, software, KMS experts
SF2	A Knowledge Strategy that identifies users, user experience level needs, sources, processes, storage strategy, knowledge and links to knowledge for the KMS
SF3	A common enterprise wide knowledge structure that is clearly articulated and easily understood
SF4	Motivation and Commitment of users including incentives and training
SF5	An organizational culture that supports learning and the sharing and use of knowledge
SF6	Senior Management support including allocation of resources, leadership, and providing training
SF7	Measures are established to assess the impacts of the KMS and the use of knowledge as well as verifying that the right knowledge is being captured
SF8	There is a clear goal and purpose for the KMS
SF9	Learning Organization
SF10	The search, retrieval, and visualization functions of the KMS support easy knowledge use
SF11	Work processes are designed that incorporate knowledge capture and use
SF12	Security/protection of knowledge

3. CONCEPTUAL FRAMEWORK AND HYPOTHESES

Once revised the concepts and theories above, giving an overview of different definitions and models stated by several authors of diverse disciplines, then it is possible to identify the key notions and elements for the construction of a conceptual framework for this research and the definition of the hypotheses.

3.1 CONCEPTUAL FRAMEWORK

By integrating the different factors identified in the literature review, and taking in consideration that most of these factors have been acknowledged through qualitative research (Jennex and Zakharova, 2005), the author of this study consolidates the mentioned factors into a single CSF Model for KM implementation, considering eight factors within the model.

The CSF model classifies the factors in two functional dimensions: *Managerial* and *Technical* dimension. An environmental dimension with regard to external factors is not taken into account since organizations have little control over them when implementing KM (Wong, 2005). The factors belonging to the managerial dimension will be called *Managerial Success Factors (MSF)*, and the ones belonging to the technical dimension are named *Technical Success Factors (TSF)*. The critical success factors stated are described as follows and illustrated in figure 3:

3.1.1 MANAGERIAL SUCCESS FACTORS (MSF)

- *Knowledge Management Strategy*, which identifies the users and their experiences, the level of needs, different sources of knowledge, processes, etc.
- *Senior Management*, related to leadership and support given by the organization, and the different aspects regarding the organizational learning, training, and the definition of KM objectives.
- *Organizational Culture*, which supports the process of knowledge creation, sharing, and its application. It implies building a supportive culture while developing or implementing KM.
- *Motivational Aids*, related to the incentives and rewards given to employees to stimulate and reinforce the knowledge culture.
- *Organizational Infrastructure*, which guarantees the correct implementation of KM in the organization. The equivalent according the literature is a Chief knowledge Officer (CKO).
- *Measurement*, needed in the KM process to give a feedback assessing the impacts of the adequate implementation of KM initiatives.

3.1.2 TECHNICAL SUCCESS FACTORS (TSF)

- *Integrated Technical Infrastructure*, with is related mostly with IT, including networks, databases, computers, software, etc.
- *Knowledge Transfer Channels*, which consider the way in which knowledge is transferred and shared (i.e. Internet, Intranet, Manuals, documents, face to face, etc.).

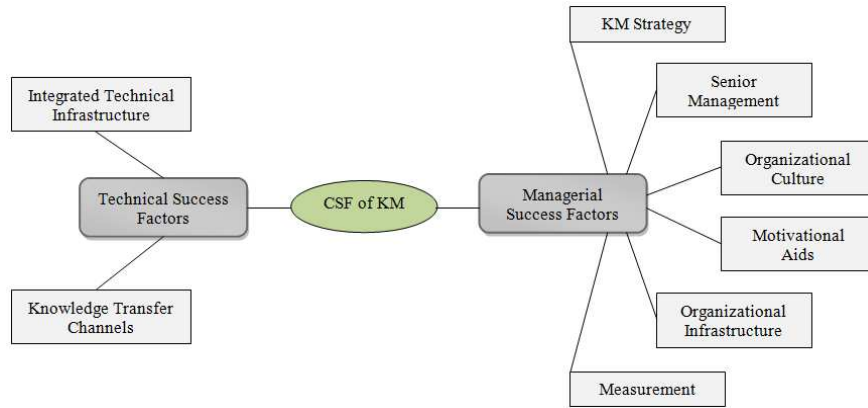


Figure 3: Critical Success Factor Model of Knowledge Management

3.2 HYPOTHESES

As noted, various scholars have postulated the importance of managing knowledge in the organizations, hence implying that KM aimed at its implementation would enhance innovation performance. In addition, scholars propose several key factors necessary in the KM approach, finding in the literature a number of contributions. However, authors such as Jennex et al. (2005), for instance, argue that only a few of the source analyses were able to conduct any kind of statistical analysis or hypothesis testing leaving a qualitative analysis basis for most of these success factors. This On this basis, several hypotheses are formulated in order to validate the CSF model proposed in this research. Figure 4 shows the conceptual research model.

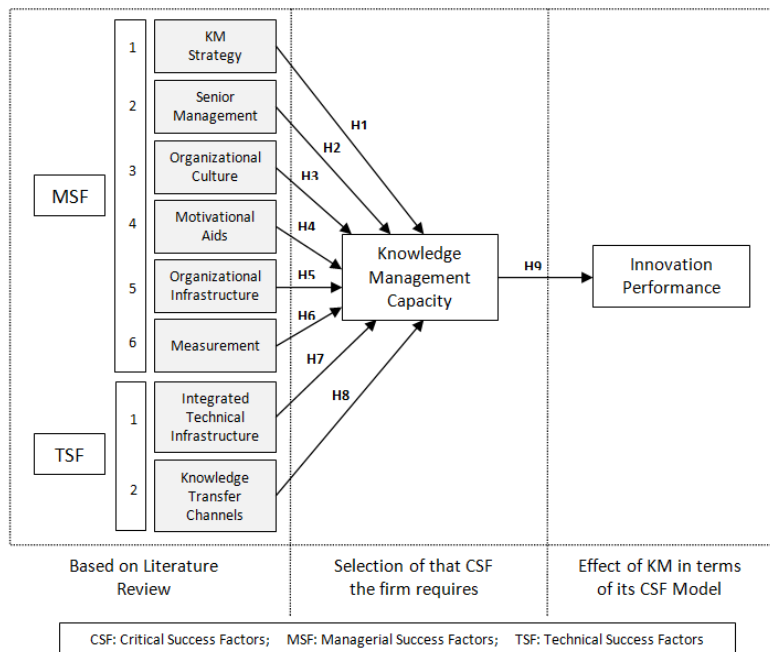


Figure 4: Conceptual Research Model

In sake of better operability of the variables, the following general statement presented is subdivided in the necessary hypotheses.

General Statement: The desired configuration of Critical Success Factors will influence the Knowledge Management Capacity of the organizations, which at the same time will influence the innovation performance the firms achieve.

The study pretends to examine the role of KM in two ways. First, the research examines the suggestion that Knowledge Management Capacity is supported by the CSF stated (Managerial and Technical), and second, the study examines the direct contribution of KM in terms of its CSF on the innovation performance. Therefore:

- **H1:** A Knowledge Management Strategy relates positively to knowledge management capacity
- **H2:** Senior Management relates positively to knowledge management capacity
- **H3:** An Organizational Culture relates positively to knowledge management capacity
- **H4:** Motivational aids relate positively to knowledge management capacity
- **H5:** An Organizational Infrastructure relates positively to knowledge management capacity
- **H6:** Measurement relates positively to knowledge management capacity
- **H7:** An Integrated Technical Infrastructure relates positively to knowledge management capacity
- **H8:** Knowledge Transfer Channels relates positively to knowledge management capacity
- **H9:** Through effective Knowledge Management capacity in terms of its Critical Success Factors, firms would enhance Innovation Performance

4. METHOD

4.1 DATA COLLECTION AND SAMPLE

The present study employs a questionnaire survey approach to collect data for testing the validity of the model and research hypotheses. Variables in the questionnaire include background information, knowledge management capacity, and innovation performance. A seven-point Likert scale ranging from “strongly disagree” to “strongly agree” is used to get the responses. Interviews are held with people in charge and responsible of top processes in the company (i.e. Presidents, Directors, General Managers, or Supervisors) that are familiar with the topic of this study. In some cases information was taken from employees. The target group of the research was focused on those enterprises which encompass innovation processes within them, limiting the study to the organizations that at least involve innovation practices inside. Hence, 80 firms were selected to be part of the sample.

4.2 VARIABLES

4.2.1 DEPENDENT VARIABLE

The dependent variables are considered in the determinant of Innovation Performance. Following the distinction of previous researches (e.g., Damanpour, 1991; Ibarra, 1993, Chen and Huang, 2007), the present study adopts the dimension of technical innovation when measuring Innovation Performance.

4.2.2 INDEPENDENT VARIABLES

The independent variables will correspond to the determinants of Knowledge Management Capacity and the Critical Success Factors of KM. Knowledge Management capacity consists of eight items to indicate the extent of KM capacity of the firm, based on the study conducted by Chen and Huang (2007).

4.2.3 CONTROL VARIABLES

Some general firm’s characteristics such as size and age may influence innovation performance because different size and age may exhibit different organizational characteristics and resource deployment. Also, firms in different industries may behave differently in innovation. Therefore, these control variables can measure potential effects.

5. ANALYSIS OF PRELIMINARY RESULTS

As noted previously, 80 firms were invited to take part in the study, from 45 out of the total sample have been interviewed so far (a 54% response rate). The first general finding is that the context of countries such as Colombia and its regions itself is determined to tackle this type of research proposals, which ultimately tend to the provision of tangible results aimed at improving the organizations. This study also provides an opportunity to analyze and explain the relationship between two variables of interest, such as "Knowledge and Innovation", returning to the conception that knowledge embedded in human capital enables firms to enhance distinctive competencies and discover innovation opportunities (Hansen, 1999; Grant, 1996; Wright et al., 2001).

From the perceptions, consistencies and trends found in the companies when being interviewed, most of them pointed out that within the whole innovation process is essential to consider knowledge as a valuable intangible asset in the organization, where the support and participation of every worker is essential to the progress of the company in achieving its objectives. It was also observed that an essential element is the involvement of institutions such as universities and public and governmental entities, when it comes to taking forward major innovation projects. In this particular, the respondents placed great emphasis on the fact that intellectual inputs can be provided by the universities from an academic perspective, while the public institutions can help in the provision of financial support among other resources in order to carry forward the different processes held by the companies; all this based on the principle expressed by the entrepreneurs themselves who consider that any positive results in organizations as a result of innovative ideas will be reflected on the development of a whole region in terms of innovation and development.

6. CONCLUSIONS AND FUTURE RESEARCH DIRECTIONS

As viewed, the research framework is based on "factor analysis" and is concentrated on the extraction and the identification of critical factors affecting the adoption of KM and its influence on innovation performance. With *factor analysis*, future and further studies can take place in using the data, first to identify the separate factors of the structure, and then to determine the extent to which each variable is explained by each factor. Once these factors and the explanation of each variable are determined, a correlation analysis can be run in order to measure the relation between the two main determinants of the research: *Knowledge Management* and *Innovation Performance*. The goal is to find if and in which magnitude the CSF of KM are related to Innovation Performance. Finally, this article makes a contribution in providing a single CSF Model that can be considered for the companies when implementing KM. The importance in understanding how organizations create new knowledge and the way this knowledge is managed is also quite important. A more fundamental need is to understand how knowledge enhances innovation in the organizations.

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