

Knowledge Management Enabler Factors and Firm Performance: An Empirical Research of the Greek Medium and Large Firms

Nikolaos Theriou, Dimitrios Maditinos and Georgios Theriou
Department of Business Administration, Kavala Institute of Technology,
School of Business and Economics, Greece

Abstract: **Problem statement:** Knowledge has become one of the most important driving forces for business success. Knowledge management helps organizations to find, select, organize, distribute and transfer vital information. Through a successful Knowledge Management (KM) organizations improve their effectiveness and gain competitive advantage. The development of KM has led to the need of identifying its critical success factors. **Approach:** This study identified and discussed the critical success factors or enablers that determine the KM effectiveness within organizations, which in turn influence the total performance of the firm. Based on existing frameworks and models, this study outlined the five most important factors that are believed to be critical for an effective KM implementation. This study also investigated the effect of knowledge management effectiveness on firm performance. **Results:** The proposed research model was tested via an online survey sent to 280 medium and large sized enterprises, randomly selected, all over Greece; from those only 109 answered the questionnaire correctly. **Conclusion:** The results of the study will help organizations to understand the impact that different enablers have on the KM successful implementation and how the effectiveness of KM affect firm performance.

Key words: Knowledge management, knowledge management enabler factors, firm performance.

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INTRODUCTION

Rapid and constant advances in information technology have pushed the world in a new economical era. Knowledge Management (KM) has been a natural evolution over the first years of the twenty-first century and a hot topic in several business communities. The ability to manage knowledge is becoming increasingly more crucial in today's knowledge economy. The task of effective and competitive management of organizations becomes necessary and knowledge management, if understood and applied properly, may be a useful tool for business transformation as well as the key of competitive advantage (Jennex, 2007).

Knowledge management enables an organization to gain insight and understanding from its own experience and procedures. One of the key concerns that have emerged related to knowledge management is how to accomplish it successfully. Thus, it is considered crucial to identify the factors that influence the success of knowledge management initiatives. Knowledge management enablers are the mechanism for the organization to develop its knowledge and also stimulate the creation of knowledge within the

organization as well as the sharing and protection of it. They are also the necessary building blocks in the improvement of the effectiveness of activities for knowledge management (Ichijo *et al.*, 1998; Stonehouse and Pemberton, 1999). Enabler factors should be clear in an organization, because not only they create knowledge but they also prompt people to share their knowledge and experiences with others (Yeh *et al.*, 2006).

The objective of this study is to empirically investigate and test the most critical factors that influence knowledge management's effectiveness within organizations, which in turn influence positively the total performance of the firm. This research presents the result of a survey which was conducted in 109 Greek companies. This research draws on existing studies, frameworks and models that have already identified the factors that potentially affect knowledge management's success.

This study is structured as follows: The Introduction section refers to the literature and the empirical evidence concerning the various factors that affect the effectiveness of knowledge management process and lead to competitive advantage and thus to

Corresponding Author: Nikolaos Theriou, Department of Business Administration, Kavala Institute of Technology,
School of Business and Economics, Greece

End time: 1:46

firm performance above the industry average, and presents the theoretical model and its hypotheses. Section two describes the research method adopted and the characteristics of the companies/respondents. Section three refers to the statistical analysis of the research and its outcoming results. Finally, section four includes the discussion and the implications that could be drawn from this research, as well as some proposed future research directions.

Literature review:

What knowledge management is? Knowledge management is an impressive, multidisciplinary and controversial concept. Knowledge Management enables the existing individual knowledge to be captured and transformed into organizational knowledge, which in turn must be diffused and shared by many employees. These employees use this knowledge but they also create new individual, which becomes organizational and so on. Knowledge Management is also the management of organization's knowledge that can improve many features of organizational performance so as to be more "intelligent acting" (Gupta *et al.*, 2000).

Although knowledge management has been extensively studied by researchers and academics there is not exist a generally accepted definition of knowledge management concept. Defining knowledge management is not an easy issue because it is multi-faceted and controversially concept and what's more is a mix of strategies, tools and techniques. Different authors and researchers have presented different definitions of knowledge management.

Wiig (1995) proposed that Knowledge Management is a group of clearly defined process or methods used to search important knowledge among different knowledge management operations. He also added that knowledge management aims were firstly to facilitate an organization in acting intelligently, in order to secure its viability and success and secondly to make an organization to realize the best value of its knowledge assets. Therefore, the general purpose of knowledge management is to maximize organization's effectiveness (Wiig, 1997).

Moreover, Jennex (2007), defined knowledge management as 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. According to Holsapple and Joshi (2004) knowledge management is an entity's systematic and deliberate efforts to expend, cultivate and apply available knowledge in ways that add value

to the entity in the sense of positive results in accomplishing its objectives or fulfilling its purpose.

There are more than three discrete perspectives of knowledge management, each one leading to a different definition (Dalkir, 2005). From business perspective, knowledge management is a business activity with two primary aspects: Treating the knowledge components of business activities as an explicit concern of business reflected in strategy, policy and practice at all levels of the organization and, making a direct connection between an organization's intellectual assets-both explicit and tacit- and positive business results (Barclay and Murray, 1997).

From the cognitive perspective or knowledge science perspective, knowledge is the fundamental resource that allows us to function cleverly. Over time, considerable knowledge is also transformed to other manifestations, such as books, technology, practices and traditions, within organizations of all kinds and in society in general. These transformations resulted in cumulated expertise and when used appropriately, increased effectiveness (Wiig, 1993).

From processor technology perspective, knowledge management is the concept under which information is turned into actionable knowledge and made available in a usable form to the people who can apply it (Information Week, 2003).

Coleman (1999) defined knowledge management as an umbrella term for wide variety of interdependent and interlocking functions consisting of: knowledge creation, knowledge valuation and metrics, knowledge mapping and indexing, knowledge transport, storage and distribution and knowledge sharing.

At the same year Scarbrough *et al.* (1999) defined knowledge management as "the process of creating, acquiring, capturing, sharing and using knowledge for the boost of organizational learning and performance". For Robinson *et al.* (2005) knowledge management is "a method of exploiting, or transforming knowledge as an asset for organizational use to help continuous improvement" (Bishop *et al.*, 2008). While, Grey (1996) stated that knowledge management is a collaborative approach to the creation, capture, organization access and use of an enterprise's intellectual assets.

Holtshouse (1998) proposed that knowledge is a kind of flow that can transfer knowledge between knowledge supplier and knowledge demander. In addition, Petrash (1996) supported that knowledge management is getting the right knowledge to the right people at the right time so they can make the best decisions.

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End time: 1:46

Finally, knowledge management is an organized, systematic business optimization strategy that selects, collects, stores, organizes, packages and communicates information that consider vital to the business of a company in a manner that improves employee performance and corporate competitiveness (Bergeron, 2003).

Concluding we could say that all knowledge management beliefs and methodologies that have been developed focused on the belief that knowledge is an important asset which needs to be handled cautiously while the core of knowledge management is to get the right knowledge to the right people at the right time. Therefore, knowledge management is a process that facilitates organizations to capture, select, organize, distribute and transfer significant information, knowledge and expertise so as to gain business advantage.

Knowledge management enabler factors: Knowledge Management is a driving force of critical importance for business success or failure. Knowledge management is a new but complex process with many factors influencing its implementation. These factors, also known as knowledge management enablers, should be clear in an organization, because not only they create knowledge but they also prompt people to share their knowledge and experiences with others (Yeh *et al.*, 2006).

Nowadays the great objective of many organizations is to identify a suitable knowledge management system and manage their knowledge successfully. A broad range of success factors for a knowledge management implementation have been identified in the literature. One of the earliest studies of knowledge management critical factors was presented by Skyrme and Amidon (1997). They highlighted seven key success factors, including a strong link to business imperative, a compelling vision and architecture, knowledge leadership, knowledge creating and sharing culture, continuous learning, a well-developed technology infrastructure and systematic organizational knowledge processes (Wong and Aspinwall, 2005).

Davenport *et al.* (1998) conducted a study to explore the practices of 31 knowledge management projects in 24 companies, with the aim of determining the factors associated with the effectiveness. The result identified 18 successful projects with eight success factors. These factors were linking knowledge management to economic performance or industry value, a clear purpose and language, a standard and flexible knowledge structure, multiple channels for knowledge transfer, culture, technical and

organizational infrastructure, change in motivational practices and senior management support (Wong, 2005). In addition, at the same year Ruggles (Mathi, 2004) pointed out that factors such as people, process and technology should be taken under consideration in knowledge management implementation, focusing mainly in people and then following process and technology.

Arthur Anderson Business Consulting (1999) believed that people, corporate culture and information technology are the biggest enablers of knowledge management implementation. According to this research knowledge management enablers are the key factors that determine the effectiveness of knowledge management within an organization.

Similarly, Liebowitz (1999) proposed six key ingredients for making knowledge management successful in organizations. He pointed the need for knowledge management strategy with support of senior management, a Chief Knowledge Officer (CKO) or equivalent and a knowledge management infrastructure, knowledge ontologies and repositories, knowledge management systems and tools, incentives to encourage knowledge sharing and supportive culture. His propositions were implemented by the first adopters of knowledge management. A different approach was carried out by Holsapple and Joshi (2000). Firstly, they investigate the factors, which derived from various literature sources and probably influence the success of knowledge management. Secondly, they conducted a Delphi study in order to assess the appropriateness for the factors they evaluated and explored earlier. They suggest three types of influences, managerial, resource and environmental, containing different factors each one. Hasanali in 2002 claimed that the success of knowledge management depends on many different factors. His success factors are leadership, culture, structure, roles and responsibilities, IT infrastructure and measurement. Likewise, Chourides *et al.* (2003) highlighted five categories of factors namely, strategy, Human Resource Management (HRM), information technology, quality and marketing (Wong, 2005).

Also another empirical study conducted by Davenport and Probst (2002) suggested a more extensive list of success factors for the implementation of knowledge management. This list included leadership, performance measurement, organizational policy, knowledge sharing and acquisition, information-systems structure and benchmarking and training. Bixler (2002) created a four pillar model to show the importance of different factors for ensuring successful implementation of knowledge management initiatives.

End time: 1:46

Table 1: A summary of knowledge management enablers

Researchers	Enablers
Arthur Anderson And APQC (1996)	Leadership, organizational culture, technology and measurement.
Earl (1997)	Information Technology, people, and corporate culture.
Skyme and Amidon (1997)	A strong link to business imperative, a compelling vision and architecture, knowledge leadership, knowledge creating and sharing culture, continuous learning, a well-developed technology infrastructure and systematic organizational knowledge processes.
Holsapple and Joshi (1997)	Managerial influences, Resource influences, and Environment influences.
Davenport <i>et al.</i> (1998)	A clear purpose and language, a standard and flexible knowledge structure, multiple channels for knowledge transfer, organizational culture, technical and organizational infrastructure, change in motivational practices, and senior management support.
Liebowitz (1999)	Strategy with support of senior management, CKO or equivalent and a KM infrastructure, knowledge ontologies and repositories, KM systems and tools, incentives to encourage knowledge sharing, and supportive culture.
Arthur Anderson Business Consulting (1999)	Information Technology, people, and corporate culture.
APQC (1999)	Leadership, organizational culture, measurement and technology.
Stankosky and Baldanza (2000)	Organization, technology, leadership, and learning.
Holsapple and Joshi (2000)	Culture, leadership, technology, organizational adjustments, employee motivation, external factors.
Andrew <i>et al.</i> (2001)	Information Technology, organizational structure, corporate culture, knowledge obtainers, knowledge transfer, knowledge application, and knowledge protection.
Chourides <i>et al.</i> (2003)	Strategy, human resource management (HRM), IT, quality and marketing
Hasanli (2002)	Leadership, organizational culture, structure, roles and responsibilities, IT infrastructure, and measurement.
Davenport and Probst (1998)	Leadership, performance measurement, organizational policy, knowledge sharing and acquisition, information-systems structure, benchmarking and training.
Bixler (2002)	Leadership, organization technology, and learning.
Mathi (2004)	Culture, KM organization, systems and IT infrastructure, effective and systematic processes and measures.

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The four pillars were leadership, organization, technology and learning (Mathi, 2004). In addition Stankosky and Baldanza (2000) developed a conceptual framework for knowledge management in which the four pillars were organization, technology, leadership and learning.

Moreover, Mathi (2004) proposed that the factors which determine knowledge management success in an organization are culture, knowledge management organization, systems and information technology infrastructure, effective and systematic processes and measures (Akhavan *et al.*, 2006).

Finally, another knowledge management model that could be mentioned is the one developed by Arthur Anderson and the American Productivity and Quality Center (1996; 1999; 2000). In this model four catalytic factors are emphasized for successful knowledge management: Leadership, organizational culture, measurement and technology. It is important each factor to be designed and managed in alliance with the others for the support of the knowledge management process.

Table 1 presents a summary of the enablers who have contributed significantly to knowledge management implementation.

The effectiveness of knowledge management: Knowledge management has been always important for

business success and can contribute to gain competitive advantage. Organizations today have realized that in order to succeed they have to view and manage knowledge as an asset (Lim *et al.* 1999). According to Hlupic *et al.* (2002) knowledge management is considered to be the vehicle for organization effectiveness and competitiveness. Knowledge management facilitates companies to be faster, more efficient and more innovative. In addition, Gold *et al.* (2001) stated that the effective application of knowledge management enables a firm to become innovative, better harmonize its efforts, quickly commercialize new products, foresee surprises, become more responsive to market changes and decrease redundancy of knowledge and information available to it.

Managing knowledge is significant because knowledge is a strategic weapon that can lead to sustained increase in profits. Business environment today is characterized by continuous and fundamental changes. The business success is determined by its ability to manage and develop appropriately its enterprising knowledge. This knowledge is incorporated not only in the skillfulness of company's executives, but also in the systems that uses. Consequently, the challenge for the modern enterprise is to develop systematic and methodical mechanisms for the management and development of business knowledge and to exploit its possibilities.

End time: 1:46

The organizations nowadays are exposed in an environment that is altered permanently and influenced from technological, political and scientific changes. The customer's demands become more and more rigorous as far as quality, flexibility and speed are concerned, putting as a result the emphasis on improving customer services. An increasingly competitive marketplace with increasing rate of innovation and the exploitation of business opportunities constitute crucial factor of its success. New products and innovations are rising at a faster rate than ever before, along with evolutions in customer preference and need. Such a volatile climate demands a new attitude and approach with organizations actions must be anticipatory, adaptive and based on a faster cycle of knowledge creation. Knowledge management generally, improves customer service and efficiency and leads to greater productivity.

Researchers claimed that organizations achieve the competitive advantage only when accurate and important knowledge is transformed, distributed and intergraded (Probst *et al.*, 1998). In addition Wang and Plaskoff (2002) stated that effective knowledge management demands a knowledge management system which intergrades organization, people, process and technology.

Companies that generate new knowledge and distribute it broadly throughout the organization and rapidly embody it into new technologies and products are considered successful. This procedure promotes innovation and creates competitive advantage. According to Ernest and Young survey in 1997, executives recognize innovation as the most important attribution from knowledge management. (Metaxiotis *et al.*, 2005).

Lucier and Torsilieri (2001) supported that the effective knowledge management can hasten growth, drive individual and organizational learning, provide competitive advantage and generate benefits for shareholders.

Finally, some other advantages of knowledge management that have been widely accepted include organizational learning, enhanced intellectual asset management, increased operational efficiency, time-to-market improvement and continuous improvement (Demarest, 1997).

Proposed theoretical framework and hypotheses: After considering several knowledge management theories above and organizing the proposed KM enablers in Table 1, we could notice that these enablers can be classified in five main categories, leadership, organizational culture, strategy, information technology and people, which are vital for the knowledge

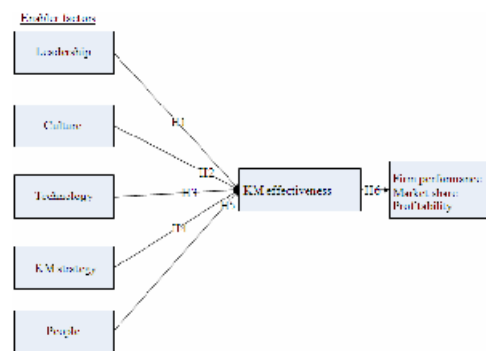
management effectiveness. In turn, an effective knowledge management implementation has a positive influence on the creation of a sustainable competitive advantage and thus to firm performance (Lucier and Torsilieri, 2001; Metaxiotis *et al.*, 2005).

A theoretical framework is presented in Fig. 1 below describing the key factors that contribute to an effective knowledge management implementation and finally to the firm performance (Fig. 1).

We explain analytically each enabler factor and its relationship to the KM effectiveness.

Leadership: Both practitioners and academics agree that the leadership plays a major role in the creation and management of knowledge in the organization, therefore the organizational goal of knowledge management for competitive advantage is facilitated by the practices that leadership implements (Singh, 2008). A study by Andersen and APQC concluded that organization failure to leverage knowledge is due to the lack of commitment of top leadership in sharing organizational knowledge" (Hiebeler, 1996).

Leaders are responsible on how the companies should approach and deal with knowledge management processes as well as practices. The introduction of a knowledge management program can be a major organization change and for this reason the involvement of leadership is considered imperious (Davenport *et al.*, 1998). Leadership should create a climate that encourages the distribution of knowledge, so that people feel safe to contribute in every way and the contributions are recognized by them. In addition, they should have the will to share and offer their knowledge to others in the organization, to learn constantly and to seek new ideas and knowledge (Storey and Barnett, 2000).



End time: 1:46

Greengard (1998) believed that top managers have to understand the importance of knowledge management so as to support and play an aggressive role in decision making. Beckman (1999) argued that top managers should motivate employees, provide them with equal opportunities and development, measuring and rewarding the performance, behaviors and attitude that is considered necessary for effective knowledge management. Similarly, Stewart (1997) claimed that companies with greatly effective incentive programs will not manage to be successful without devoted and responsible managers (DeTienne *et al.*, 2004). Many times employees get into conflicts of interest with knowledge management practices, for that reason leaders should facilitate employees to overcome those conflicts when they appear. Knowledge management executives in every level are primarily responsible for ensuring that knowledge management objectives are in line with organizational strategies and objectives (Berlade and Harman, 2000). Thus, the following hypothesis could be advanced:

Hypothesis 1: Leadership influences positively knowledge management effectiveness

Organizational culture: Culture is important for facilitating sharing, learning and knowledge creation. Culture is values, beliefs, norms and symbols (Price Waterhouse Change Integration Team, 1996). In general, culture highly values knowledge, encourages its creation, sharing, application and promotes open climate for free flow of ideas. The development of such culture is the major challenge for knowledge management efforts. A survey conducted by Chase (1997) indicated that culture was the main obstacle that organizations deal with in order to create a successful knowledge-based business (Wong, 2005).

Organizational cultures change over time as organizations adjust to environmental contingencies. Every organization has its own particular culture and its own unique practices (Schein, 1984). An effective culture for knowledge management consists of norms and practices that promote the transfer of information between employees and across department lines (Yeh *et al.*, 2006). Building an effective culture where people operate in an organization is a critical requirement for effective knowledge management (Gupta and Govindarahan, 2000).

Many studies conducted to investigate causes of knowledge management initiative failure, have recognized that organizational culture is the main barrier to knowledge management success (Tuggle and Shaw, 2000). Culture is a broad concept that consists of

many aspects. One aspect which is considered important for knowledge management is collaboration. Goh (2002) highlighted that collaborative culture is significant for knowledge distribution among individuals and groups. Collaboration has also been empirically proved an important contributor to knowledge creation. Sveiby and Simons (2002) argue that collaborative climate is one of the key factors that influence the effectiveness of knowledge management. Effective knowledge management requires the creation of a supportive and collaborative culture.

Another fundamental aspect of knowledge management is trust. According to Swowden (2000) trust is the most crucial requirement for knowledge transfer. Davenport and Prusak (1998) believe that without trust, knowledge initiatives will fail, regardless of how thoroughly they are supported by technology and rhetoric. The absence of mutual trust, will lead people to be skeptical about the intentions and behaviors of others and therefore they will possibly withhold their knowledge. Building a trust relationship among individuals and groups will facilitate knowledge sharing process, while the lack of trust can undoubtedly hinder the sharing of knowledge. Without trust, the knowledge management program will fail. The creation of new, useful and lucrative knowledge is impossible without trust.

Davenport and *et al.* (1998) stated that companies have to make certain that their initiatives harmonize with organizational culture. If the situation is different then the company should take actions so as to induce matching. Davenport and Prusak (1998) highlighted that effective knowledge management cannot be accomplished without extensive behavioral, cultural and organizational change. Therefore, the following hypothesis could be developed:

Hypothesis 2: Culture influences positively knowledge management effectiveness

KM strategy: Zack (1999) defined knowledge strategy as the approaches an organization employs so as to bring into line its knowledge resources and capabilities to the rational requirements of its strategy. More simply, knowledge management strategy is the process of generating, codifying and transferring explicit and tacit knowledge within an organization, getting the right information, to the right person, in the right place and at the right time. Knowledge strategy determines the needs, means and the activities for the objective's accomplishment.

It is generally accepted in the literature that knowledge management strategy should be integrated

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with the organizations business strategy (Zack, 1999; Cook, 1999; Maier and Remu, 2002). A clear and well-planned strategy is considered important for the success of knowledge management (Liebowitz, 1999). There is an increasing recognition that the competitive advantage of firms relies on the way they create, share and utilize knowledge (Desouza, 2003).

The effective knowledge management begins with a proper strategy. There is a crucial matter that affects the successful implementation of knowledge management and that is how companies can better evaluate and select a favorable knowledge management strategy. The selection of knowledge management strategy, which is a strategic issue, comprises subjective and qualitative judgment (Wu, 2008). Therefore, the following hypothesis could be developed:

Hypothesis 3: KM Strategy influences positively knowledge management effectiveness

Information technology: Technology is a powerful enabler of knowledge management success. It is generally accepted that databases, intranets, knowledge platforms and networks are the main blocks that support knowledge management. Information Technology facilitates quick search, access of information, cooperation and communication between organizational members (Yeh *et al.*, 2006).). It is indisputable that Information Technology is one of the key factors that influence knowledge management implementation (McCampbell, Clare and Gitters, 1999). There is an extensive collection of information technologies such as data warehousing, intranet, internet, which can be implemented and integrated in an organization's technological platform and work together as knowledge management system. Luan and Serban (2002) grouped information technologies into more than one category: Business intelligence, knowledge base, collaboration, content and document management, portals, customer relationship management, data mining, workflow, search and e-learning.

According to Zack (1999) the information technology plays four different roles in knowledge management:

- Obtaining knowledge
- Define, store, categorize, index and link knowledge-related digital items
- Seek and identify related content
- Flexibly express the content based on the various utilization background

In addition, Hendriks (1999); Hedelin and Allwood (2002) have found out that information technology has

a direct and indirect influence on the motivation of sharing knowledge, due to the fact that it can accomplish four different functions: To eliminate obstacles, provide channels to obtain information, correct flow processes and identify the location of knowledge carrier and knowledge seeker. Properly use of information technology can accelerate knowledge management (Mohamed *et al.*, 2006). The implementation of knowledge management technologies without ensuring that the organizations employees are well informed about the organization's overall goals and objectives and how this technology can facilitate the success of these goals, will lead to disappointing returns on the technology investment (Curley and Kivowitz, 2001). Therefore, the following hypothesis could be advanced:

Hypothesis 4: Information Technology influences positively knowledge management effectiveness

People: The role of people in knowledge management success is major. According to Leavitt (1965) people are actors and the persons that carry out work within an organization. People create and share knowledge and for this reason managing the persons who have the intension to create and share their knowledge is considered very important. Since, people are the exclusive creators of knowledge, managing knowledge is managing people and managing people is managing knowledge (Davenport and Volpel, 2001).

Knowledge is hold by individuals and the process of transferring this hidden knowledge to other members within an organization is very important. In other words, to share, use and convert individual knowledge into organizational knowledge is a crucial procedure of outmost importance. Thus, a key factor for an organization to meet success is to support people communicate and share knowledge with others (Nonaka and Takeuchi, 1995). Szulanski (1996) stated that organizations should perceive employees as a vital knowledge resource and adjust knowledge management into their employees' management policy. It is critical for an employee to be motivated to take part in the obtaining and sharing of knowledge (Wong, 2005).

People are a significant part of knowledge management and of organization because they are the source of creativeness. Many organizations in order to enhance their firm tend to invest in technology rather than in employees. However, this attitude will not have the desirable result if the firm's employees are not able to use these systems. Therefore, it is noticed that many successful companies prepare to invest in their

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employees in order to enhance their visions, capabilities and experiences for the universal working environment (Bozbura, 2007). Therefore, the following hypothesis could be advanced:

Hypothesis 5: People influence positively knowledge management effectiveness

Knowledge management effectiveness and firm performance: An effective knowledge management implementation will add more value to the overall performance of the organization (Toften and Olsen, 2003). Hlupic *et al.* (2002) argue that knowledge management is a vehicle for organizations' effectiveness and competitiveness. Moreover, Gold *et al.* (2001) states that the successful application of knowledge management enables a firm to become innovative, harmonize its efforts better, commercialize new products quickly, foresee surprises and become more responsive to market change.

Organizations nowadays have realized that in order to succeed they have to view knowledge as an asset and manage it effectively. Knowledge management facilitates companies to be faster, more efficient and more innovative. The effective knowledge management is a valuable activity due to its consequences to firm performance (Lim *et al.* 1999). Several organizations establish knowledge management in order to improve performance. Improving organization performance by using knowledge management initiatives is a kind of an investment. Knowledge management is of great importance to firm performance due to its contribution on innovation improvement, enhancement of coordination of efforts, better decision making and ultimately better financial results (Holsapple and Wu, 2008). Thus, most organizations today have identified knowledge management as a critical success factor for companies.

Effective knowledge management means that there is an accurate use of resources which will result to better outcomes such as innovation and better financial performance (Darroch, 2005). Ernest Young's Center for business innovation survey suggested that measuring the value and performance of knowledge asset is the second most important activity that organizations should adapt after the activity of changing people's behaviors (Van Buren, 1999). Gloet and Barrell (2003) believe that organizations see knowledge management as a way to provide competitive advantage and contribution to their bottom line. A study conducted in USA of 40 top management consultancies, revealed that over 60 per cent of them believed that knowledge management is a key success factor of their business (Ofek and Saravay, 2001).

Managing knowledge is significant because knowledge is a strategic weapon that can lead to sustained increase in profits. Organizations achieve the competitive advantage only when accurate and important knowledge is transformed, distributed and intergraded (Probst *et al.*, 1998). Companies that generate new knowledge and distribute it broadly throughout the organization and rapidly embody it into new technologies and products are considered successful. Skyrme (1997) also believe that the successful knowledge management programs provide competitive advantage, reduced costs, customer focus, employee relations development and accelerate innovation. Consequently, the following hypothesis is proposed:

Hypothesis 6: Knowledge management effectiveness influences positively firm performance

MATERIALS AND METHODS

Sample and data collection: A survey was undertaken to gather all the appropriate data by use of a structured questionnaire. In order to achieve sufficient sample size and generalizability of the result the sample frame for this study consisted of all 930 Greek companies belonging to the secondary sector (manufacturing and construction) that employed at least 50 people. The population was drawn from a database compiled by ICAP, which is a well-known and reliable source of data for Greek companies.

A pre-test was performed to establish content validity (Zikmund, 2003). The instrument was pre-tested through in-depth discussions with academics and professionals. Two KM managers and one CEO from three manufacturing firms, along with three academics, participated in the pre-testing process. To ensure that the KM managers of the sample firms were willing to complete the questionnaire and to maximize response rate, two research assistants spent 2 weeks telephoning all 930 firms (a large percentage of the sample firms did not have a KM manager due to their relative small size. In such cases, a representative top manager, most familiar with KM issues, was contacted). It should be mentioned that due to time constraints or company privacy concerns many KM managers declined to participate. The questionnaire was sent only to those managers (KM managers or in case of absence to the CEO or any other senior manager engaging to the KM process one way or another) who agreed to participate in the survey, a total of 280 firms. A cover letter explaining the study objectives was also attached.

End time: 1:46

Follow-up letters were sent approximately three weeks after the initial mailing.

From the total sample of 280 survey questionnaires only 120 were returned. Of these, eleven questionnaires were discarded because they were not appropriately completed. Hence, the final number of usable questionnaires was 109, a response rate of 54.50 per cent. Generally speaking, researchers normally work to a 95 percent of certainty. This actually means that with a total population of 930 firms the minimum sample size should be around 180 instead of 109 firms (Saunders *et al.*, 2000). Although the smaller size could be considered as one of the limitations of this research, we could also defend it on the same grounds as those stated by the famous scholar, Shelby Hunt:

“No manuscript should be rejected on the basis of potential nonresponse bias-no matter what the response rate is-unless there is good reason to believe that the respondents do in fact differ from the nonrespondents on the substantive issues in question and that these differences would make the results of the study unreliable” (Hunt, 1990)

To test whether our respondents were different from the non-respondents, we examined if there are any differences in the mean of all variables used in this study between early and late respondents. The rationale behind such an analysis is that late respondents (i.e. sample firms in the second mailing) are more similar to the population from which they were drawn, than the early respondents (Armstrong and Overton, 1977). No statistically significant differences were found, thus suggesting that non-response bias is not a serious issue in the study. Table 2 summarizes the respondent characteristics in terms of industry type, departments and number of total employees:

Questionnaire development and measures: The present study employs a questionnaire survey approach in order to collect data for testing the model’s validity and research hypothesis. A structured questionnaire, running to eight pages and having 43 questions, was framed to collect responses. Multi-item scales were used for measuring the research variables using a five-point Likert scale responses ranging from 1 = strongly disagree to 5 = strongly agree (1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree).

The survey composed of multiple items/questions trying to measure the five KM enablers taken from (Mathi, 2004; Wong and Aspinwall, 2005) and the two constructs of ‘knowledge management effectiveness’

Table: 2 Profile of respondents

Measure	Items	Frequency	Percent
Designate of department	KM manager	22	20.2
	Finance	16	14.7
	Sales-marketing	31	28.4
	Production-logistics	10	9.2
	Research and development	4	3.7
Gender	Human resource	11	10.1
	Other	15	13.8
	Male	64	58.7
Age	Female	45	41.3
	18-28	13	11.9
	29-38	36	33.0
Education	39-50	39	35.8
	50+	21	19.3
	College	18	16.5
	University	56	51.4
	Master degree	34	31.2
Industry type	Doctorate degree	1	0.9
	Cardboard and paper	6	5.5
	Chemicals	7	6.4
	Clothing, footwear and fashion	6	5.5
	Food and drinks	38	34.9
	Healthcare and pharmaceutical	2	1.8
	Furniture and fixtures	22	20.2
	Media and publishing	3	2.8
	Metals and minerals	2	1.8
	Oil and gas	3	2.8
No. of employees	Rubber and plastic materials	6	5.5
	Industrial and commercial metal products	8	7.3
	Construction	6	5.5
Work experience	51-250	82	75.0
	over 250	27	24
	Less than 1 year	10	9.2
	1-5 years	44	40.4
	Over 5 years	55	50.5

and ‘firm performance’ taken from (Ribiere, 2001; Tuggle, 2000). Firstly, respondents were asked to identify their level of agreement on each of the 25 items/questions related to the five KM enablers (culture, leadership, strategy, information and communication technology and people). Secondly, respondents were asked to identify the extent that KM implementation, in the last three years, led to improvements on employees’ efficiency and productivity, their skills and knowledge, customer relations, increased flexibility in production and innovation, knowledge sharing and the communication and cooperation among employees (six questions in total). Finally, respondents were asked to identify the extent that KM implementation, in the last three years, led to the increase in the number of the firm’s markets and in the firm’s total profitability. A detailed questionnaire is provided in Appendix A.

End time: 1:46

RESULTS

Exploratory factor analysis: All theoretical concepts used in the present research were taken from prior studies which provided a theoretical rationale for the existence of these concepts and also the items measuring these concepts. However, due to the fact that for the measurement of each construct we used items from many researchers we used exploratory factor analysis-EFA for the redefining of the theoretical constructs according to the new established factors. Thus, principal component analysis was conducted on the scaled responses to aggregate managers' perceptions of each separate theoretical construct (CUL, LED, STR, TEC, PEP, KM effectiveness and KMF) into categories or factors (dimensions). Varimax rotation was used to identify a set of factors that were uncorrelated with each other.

This first exploratory factor analysis for questions one through thirty-three indicated that questions one to seven which were trying to measure the construct 'culture' produced two factors instead of one. The same occurred for questions fifteen through twenty-one trying to measure the construct 'technology'. Analysis of component and coefficient matrix revealed that

culture questions three and six were the questions with loadings below 0.5 and responsible for the formation of two factors. Similarly, regarding the 'technology' construct, question eighteen, with loading well below 0.5, was considered responsible for the formation of a second factor. Consequently, questions three, six and eighteen were dropped from future analysis. After dropping these questions, exploratory factor analysis was repeated and the group of five and six remaining questions for 'culture' and 'technology' constructs, respectively, loaded successfully one separate factor (Table 3).

Moreover, Bartlett's test of sphericity displayed levels of correlations indicating that a factor model was appropriate ($p < 0.001$) (Norusis, 1994:50). In addition, the total model exceeded the acceptable level ($KMO > 0.6$) on the Kaiser-Meyer-Olkin test of sampling adequacy ($KMO = 0.897$). Also, Table 3 summarizes the results of reliability analysis for each one of six factors. It is noticed that Cronbach's alpha values range between $\alpha = 0.716$ and $\alpha = 0.922$, indicating that all factors/constructs of the proposed framework have internal consistency and, therefore, are considered reliable (Nunnally, 1994).

Table 3: Exploratory factor analysis and reliability analysis

Factors	Items/questions number	Variables' name used in SEM	Loadings	Cronbach's alpha
LED (Leadership) (Questions 8-11)	LED8 LED9 LED10 LED11	LED1 LED2 LED3 LED4	0.718 0.74 0.718 0.701	0.716
CUL (Culture) (Questions 1-7) Withdrawal of items CUL3 and CUL6	CUL1 CUL2 CUL4 CUL5 CUL7	CUL1 CUL2 CUL3 CUL4 CUL5	0.502 0.725 0.628 0.617 0.636	0.908
STR (Strategy) (Questions 12-14)	STR12 STR13 STR14	STR1 STR2 STR3	0.566 0.625 0.534	0.92
TEC (Technology) (Questions 15-21) Withdrawal of item TEC18	TEC15 TEC16 TEC17 TEC19 TEC20 TEC21	TEC1 TEC2 TEC3 TEC4 TEC5 TEC6	0.587 0.539 0.515 0.687 0.766 0.708	0.765
PEP (People) (Questions 22-25)	PEP22 PEP23 PEP24 PEP25	PEP1 PEP2 PEP3 PEP4	0.536 0.698 0.689 0.736	0.758
KM (Knowledge management effectiveness) (Questions 26-31)	KM26 KM27 KM28 KM29 KM30 KM31	KM1 KM2 KM3 KM4 KM5 KM6	0.63 0.553 0.593 0.707 0.711 0.649	0.922
KMF (Knowledge management performance) (Questions 32-33)	KMF32 KMF33	KMF1 KMF2	0.694 0.681	0.89
Kaiser-Meyer-Olin (KMO) = 0.897 Bartlett's test = 2397,412 df = 435 Sig. = 0.001 Total variance explained = 72.246%				

End time: 1:46

Confirmatory factor analysis-overall model fit: In this study, Confirmatory Factor Analysis (CFA) was employed to test the construct validity of the measures used, using LISREL. As shown, five fit measures were used to evaluate the overall model fit (Table 4): Chi-square χ^2 , chi-square/degree of freedom (χ^2/df), Root Mean Square Error of Approximation (RMSEA), Goodness-of-Fit Index (GFI) and Comparative Fit Index (CFI) Root Mean Square Residual (RMR).

The Chi-Square value is the traditional measure for evaluating overall model fit. Although there is no consensus regarding an agreeable standard, recommendations range from as high as 5.0 (Wheaton *et al.*, 1977) to as low as 2.0 (Tabachnick and Fidell, 2007). In our model the χ^2 value is 798.96 with 389 degrees of freedom and p-value $p < 0.05$ meaning that it is statistically significant at 0.05 level. Due to this weakness the Chi-Square to degrees of freedom ratio (χ^2/df) was used instead. The value for an acceptable model should be less than 5 (Harrison and Rainer, 1996) or even less than three (Kline, 1998). In our case the Chi-Square to degrees of freedom ratio (798.96/389) is 2.05, which is considerably less than the suggested maximum value. Moreover, GFI and CFI

scores are above the 0.9 threshold (Bollen and Long, 1993) and RMSEA score is close to the accepted threshold score 0.1 (Hair *et al.*, 1998).

Validation and assessment of the structural model: The structural model analysis was conducted in order to examine the hypothesized relationships. Specific paths coefficients were tested to determine whether each of the six relationships (hypotheses) of the proposed framework is verified by the empirical evidence used in this research. All six stated hypotheses seem to hold since the five key success factors or enablers (leadership, culture, strategy, technology and people) are positively related to knowledge management effectiveness and knowledge management effectiveness is also positively associated with firm performance (Fig. 2).

Table 4: Goodness-of-fit statistics of Laser Model

Goodness-of-fit statistics	Laser model
χ^2	798.960
df	389.000
χ^2/df	2.050
RMSEA	0.099
GFI	0.970
CFI	0.910

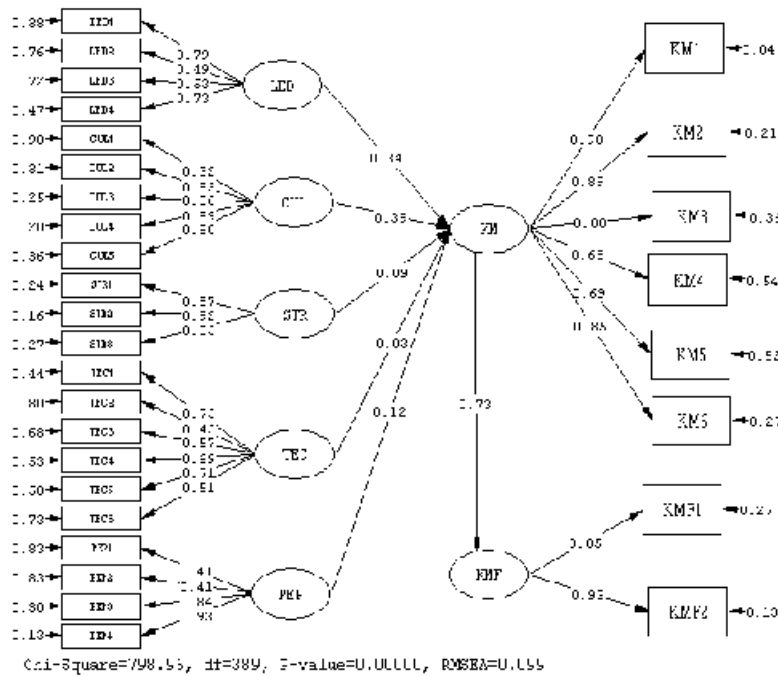


Fig. 2: Standardized path coefficients (structural model)

End time: 1:46

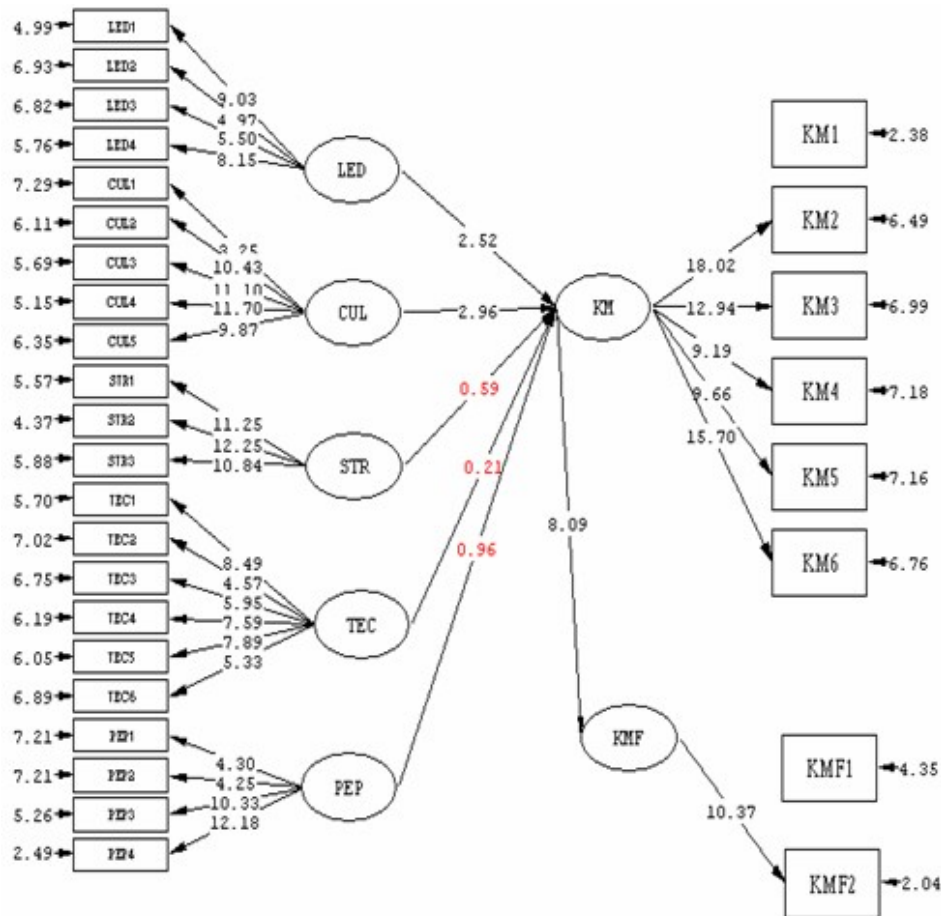


Fig. 3: T-values of the standardized path coefficients

Table 5: Hypotheses Testing

Hypothesis	Path	Path coefficient	t-values	Remarks
H1	Leadership → KM effectiveness	0.34	2.52>1.96	Supported
H2	Culture →KM effectiveness	0.39	2.96>1.96	Supported
H3	Strategy → KM effectiveness	0.09	0.59<1.96	Not supported
H4	Technology →KM effectiveness	0.03	0.21<1.96	Not supported
H5	People → KM effectiveness	0.12	0.96 <1.96	Not supported
H6	KM effectiveness → firm performance	0.73	8.09 >1.96	Supported

However, the results from the structural model used to test the hypothesized research model provide statistical support only for three of the six hypotheses. This is true because only three standardized path coefficients have t-values greater than 1.96 which indicate their statistical significance at the 0.05 level (Fig. 3).

We could say that from the above analysis it could be verified that leadership and culture are the main factors that significantly influence knowledge management effectiveness while the other three enablers, strategy, technology and people, influence, positively, knowledge management effectiveness too but it is not statistically proven, probably due to the

End time: 1:46

small sample used in this research. As far as firm performance is concerned it is very clearly verified that knowledge management effectiveness strongly affects firm performance positively (Table 5).

Table 6: Construct reliability and variance extracted

Items	λ_{ij}	ϵ_{ij}	λ_{ij}^2
Leadership			
LED1	0.79	0.38	0.6241
LED2	0.49	0.76	0.2401
LED3	0.53	0.72	0.2809
LED4	0.73	0.47	0.5329
	2.54	2.33	1.6780
0.73 construct reliability			
0.49 variance extracted			
Culture			
CUL1	0.32	0.90	0.1024
CUL2	0.83	0.31	0.6889
CUL3	0.86	0.25	0.7396
CUL4	0.89	0.20	0.7921
CUL5	0.80	0.36	0.6400
	3.70	2.02	2.9630
0.87 construct reliability			
0.59 variance extracted			
Strategy			
STR1	0.87	0.24	0.7569
STR2	0.92	0.16	0.8464
STR3	0.85	0.27	0.7225
	2.64	0.67	2.3258
0.91 construct reliability			
0.78 variance extracted			
Technology			
TEC1	0.75	0.44	0.5625
TEC2	0.45	0.80	0.2025
TEC3	0.57	0.68	0.3249
TEC4	0.69	0.53	0.4761
TEC5	0.71	0.50	0.5041
TEC6	0.51	0.73	0.2601
	3.68	3.68	2.3302
0.79 construct reliability			
0.39 variance extracted			
People			
PEP1	0.41	0.83	0.1681
PEP2	0.41	0.83	0.1681
PEP3	0.84	0.30	0.7056
PEP4	0.93	0.13	0.8649
	2.59	2.09	1.9067
0.76 construct reliability			
0.48 variance extracted			
KM effectiveness			
KM1	0.98	0.04	0.9604
KM2	0.89	0.21	0.7921
KM3	0.80	0.36	0.6400
KM4	0.68	0.54	0.4624
KM5	0.69	0.52	0.4721
KM6	0.85	0.27	0.7225
	4.89	1.94	4.0535
0.92 construct reliability			
0.68 variance extracted			
Firm performance			
KMF1	0.85	0.27	0.7225
KMF2	0.93	0.13	0.8649
	1.78	0.4	1.5874
0.89 construct reliability			
0.80 variance extracted			

Construct validity and variance extracted: The calculation of the construct reliability of each factor leads the researcher to conclude whether or not the various items of a construct as a set are reliable, in the sense of producing similar construct metrics every time is used by different researchers for similar contexts. This analysis (Table 6) shows values from 0.73 to 0.92, all fulfilling the desirable level of 0.7.

Variance extracted was used as a measure of convergent validity. A variance extracted greater than 0.5 suggests adequate convergent validity. The results here range from 0.39 to 0.80. Only three of the seven factors (leadership, technology and people) were slightly below 0.5. All others (culture, strategy, knowledge management effectiveness and firm performance) have values above 0.5 (Table 6).

DISCUSSION

In today's business environment knowledge management is considered as the main source of competitive advantage for any type of organization, especially those belonging to the service sector (Aurum *et al.*, 2003). Also, Jennex (2007) states that knowledge is recognized as a key economic resource and organizations should possess the right knowledge in the desired form and content under all circumstances in order to be competitive and successful.

The purpose of the present research was firstly to gain a better understanding of which factors are critical for the successful implementation of knowledge management and secondly to test the strong positive impact of knowledge management effectiveness on firm performance proposed by many KM theory developers covered on the literature review section. It was an empirical study which contributed to the validation of some of the assumptions made regarding enabler factors and their impact on knowledge management effectiveness and the critical role of knowledge management effectiveness in the firm performance of the small/medium (with number of employees between 50 and 250 people) and large (with more than 250 employees) manufacturing companies in Greece.

Firstly, we have proved that key enabler factors such as leadership, culture, strategy, technology and people do influence positively knowledge management effectiveness. However, the research findings indicate that only leadership and culture are statistically supported. Enablers such as technology, strategy and people are not significantly related to the knowledge management effectiveness.

Moreover, our results reveal culture as the most vital factor of knowledge management effectiveness. Thus, building and supporting a culture which rewards

End time: 1:46

and encourages employees for seeking, sharing and creating knowledge attributes will most probably lead to the successful implementation of knowledge management. The second most important key factor is leadership. Top Management Team (TMT) plays a critical role in successful knowledge management initiatives. They should first believe and then support, wholeheartedly, a strategy leading to an internal environment where knowledge capture, creation, sharing and transfer of knowledge could flourish.

Secondly, it is also crucial not to overlook the key factors that were less important. For example, although people, according to literature, play a vital role in determining knowledge management effectiveness, in our research this enabler factor was not supported by our sample. However, the fact that many important issues related to people, such as individual rewards and individuals motivations, are included in the “culture” construct might explain why it was proved to be statistically insignificant.

The same with the KM strategy construct. Although strategy plays one of the most important roles in the creation and sustaining of competitive advantage, many organizations do not understand the strategic importance of knowledge in building and maintaining sustainable competitive advantage so do not have well-developed strategic models that integrate knowledge management process to business strategy. Probably, many Greek companies that participate in our survey belong to the above category.

Finally, it is indisputable that information technologies can facilitate knowledge management. Nevertheless, in our study it is evident that technology plays a very minor role in knowledge management effectiveness within the firm. Information technology should not be seen as a sole driver of a knowledge management, since it is only a tool. This may explain why it has been also perceived the least important factor by other researchers too (Wong and Aspinwall, 2005).

The firms that participated in our survey declared that the most important benefits of using knowledge management are improved productivity, improved knowledge sharing, improved client and customer relations and improved innovation.

Concerning the positive relationship between knowledge management effectiveness and firm performance proposed by our model, we found that knowledge management effectiveness is a significant predictor of organizational performance. Organizations can achieve many positive outcomes from an effective knowledge management process (Wong and Aspinwall, 2005). Our results show a strong positive relationship

between knowledge management effectiveness and the two determinants of firm performance, profitability and market share and are in line with those of DeTienne *et al.*, (2004).

In conclusion, the need of knowledge management begins when knowledge is created and subsequently shared. The empirical evidence presented here suggests that organizational culture and leadership are the most important enabler factors, for the small/medium and large manufacturing companies in Greece, that can facilitate knowledge management success having a significant impact on firm performance. The results of the study will help organizations to understand the effect that different enablers have on the knowledge management success and how the effectiveness of knowledge management influence firm performance. The identification of these core sets of factors will facilitate organizations to evaluate the statues of knowledge management implementation and identify areas for improvements. Organizations that facilitate knowledge management and promote effective knowledge transfer today will have competitive advantage tomorrow.

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