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MSc in FINANCE & FINANCIAL INFORMATION SYSTEMS

“INFORMATION TECHNOLOGY AS A DETERMINANT OF ORGANISATIONAL LEARNING AND TECHNOLOGICAL DISTINCTIVE COMPETENCIES – EVIDENCE FROM GREECE”

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# Table of Contents

**Abstract**

1. **Introduction**.............................................................................................................6

2. **Literature Review**....................................................................................................7

   2.1 Organisational learning .........................................................................................7

   2.2 Information Technology........................................................................................16

   2.3 Technological Distinctive Competencies..............................................................22

   2.4 Knowledge Intensity..............................................................................................28

   2.5 Business Performance..........................................................................................31

   2.6 Organizational learning and knowledge creation ..................................................34

   2.7 Proposed Framework.............................................................................................36

   2.7.1 Research model and hypotheses........................................................................36

       2.7.1.1 Information technology as a determinant of organizational learning........38

       2.7.1.2 Organizational learning as a determinant of technological distinctive competencies............................................................39

       2.7.1.3 Organizational learning as a determinant of perceived business performance............................................................................40

       2.7.1.4 Technological distinctive competencies as determinants of perceived business performance..........................................................40

       2.7.1.5 Information technology and its significance for the development of technological distinctive competencies.........................................................41

       2.7.1.6 Information technology and its influence on perceived business performance.................................................................................42

       2.7.1.7 Knowledge intensity sector as a determinant on organizational learning.................................................................43

   2.8 Summary.................................................................................................................44

3. **Research Methodology**............................................................................................44

   3.1 Sample Description ...............................................................................................44

   3.2 Measures................................................................................................................47
4. Data analysis…………………………………………………………………………………48

5. Conclusions…………………………………………………………………………………51

6. Limitations – Further Reading…………………………………………………………51

References………………………………………………………………………………52

APPENDIX A…………………………………………………………………………...66
APPENDIX B……………………………………………………………………………71
Abstract

With this study we will try to demonstrate the effect that information technology (IT) has on organisational learning. In this research organisational learning is depicted as a procedure of knowledge generation and is comprised of the interface of stocks and flows variables. It is also going to be investigated the way that both IT and OL affect business performance. Moreover we will also present the generation of technological distinctive competencies, testing also whether TDCs can assist to the development of improved business results. In the end, knowledge intensity is tested on its potential positive influence on organisational learning. The relationships in our model have been examined via statistical analysis that took place with a sample of 123 firms. The statistical analysis has been performed with the assistance of the statistical program of SPSS 15.00.
Introduction

Many surveys have tried to use organisation learning as a tool that enables enterprises to be up-to-date with continuous changes that occur in the world market. Organisational learning facilitates companies to overcome their everyday complexities and contributes to their existence in the market (Real, Leal and Roldán, 2005). Organisational learning is a factor that contributes to the successful survival of many firms globally. OL according to many previous researches could become a foundation for the generation of competitive advantages due to the organisations’ capacity for learning. The constant process of always generating information is not so significant as its spread and appliance inside the organisation (Real, Leal and Roldán, 2005). That is the main reason why the dynamic focus is considered more important than the static one (Real, Leal and Roldán, 2005). Nonaka and Takeuchi (1995) use the term of learning so as to depict the innovation procedure that takes place in the internal environment of the companies.

Technological Distinctive Competencies are developed through technological innovation since the latter term has indeed an “educational” character inside the organisation. Dutrenit (2000) supports the fact that organisational learning is a critical factor on the generation of knowledge since it is affected to an extent from previous incidents and experiences. Generally it could be said that firms that have shown signs of generating learning skills during their life will present better innovative skills.

The Resource-Based-View and Knowledge-Based-View theories together propose that the capabilities and the technical knowledge contribute to the development of competitive advantage, having learning becoming a basic step for achieving it. According to KBV, competitive advantages come from the developed competencies of the firms having in parallel learning transformed into a vital strategic theme.

This dissertation will adopt the theory of organisational learning and KBV to base its theoretical background. As the relationship of OL and knowledge creation is presented, the study sets as a target to clarify and demonstrate the way that organisational learning affects the development of technological distinctive competencies. Knowledge intensity is tested on its impact on organisational learning. Simultaneously technological competencies have an effect on the repercussion of organisational learning on business performance. Lastly, another certain factor that is
also under attention in this survey is information technology and its transformation into an asset in terms of competitive advantage for the organisations.

In order to perform our study we divide the paper into sections that will structure our research. The first chapter begins with by presenting the theoretical background of the research in order to form the model of the study and its hypotheses. Each of the sectors will be tried to be demonstrated thoroughly. The selected sample together with the formation of the questionnaire and the design of fieldwork will be our next chapter. Going further with our analysis we proceed in the data analysis of the 123 companies that participated in the research. Finally the research ends with the presentation of conclusions and implications together with proposals for future research.

2. Literature review

2.1 Organisational learning

With the entrance of twentieth century the scientific community became increasingly interested in suggesting new ways of business alteration. One of the main areas that the researches turned to focus on, in order to achieve this result, was organisational learning (Robey, Boudreau, and Rose, 2000). Organisational learning was addressed together with information technology and was taken as a powerful tool that could offer significant solutions to the transitional phase of companies into the world of information.

Various definitions have been given to the term organisational learning. OL produces competences that are unique to the firm’s customers and as a result, it develops competitive advantage for the companies. Organizational learning is concerned with developing new organizational knowledge with the purpose of enhancing organizational performance.

According to Manasco (1996) cited in Pemberton, Stonehouse and Yarrow (2001) organizational learning is focused on the strategies and procedure of recognising, “arresting” and leveraging knowledge to augment competitiveness towards other companies. The procedure of organisational learning and the creation of
fresh knowledge are difficult. Learning can be based upon previous past understandings and know-how, analysis, and testing or from teaching, following two wide but also contrasting theories of learning (Jackson, 1993 cited in Pemberton, Stonehouse and Yarrow, 2001). A differentiation given by Senge (1990) cited in Pemberton, Stonehouse and Yarrow (2001), distinguishes two categories of organisational learning. The first known as adaptive leaning and the second named as generative knowledge. Adaptive learning is based on the continuous transformations that might occur in consistence with the radical changes in the internal environment of the firm. The latter known as generative learning has as a main concept the creation or construction of innovative commodities and working flows that assist to the gaining of a competitive thesis in the market field. No common definition of organisational learning has been totally accepted by the scientific community, though a large number of them converge to the point that organisational learning is a team outcome parted from useful past working practices and experiences (Curado, 2006).

According to an older definition of organizational learning it is depicted as a process parted from basic steps. Organisational learning begins with the information gathering, its understanding (Daft and Weick, 1984 cited in Choe, 2004). Later on, Huber (1991) suggested that organizational learning includes four steps to its best integration.

In previous years the misconception of the terms learning organisation and organisational learning led to their wrong use in the literature (Argyris, 1999 cited in Kontoghiorghes, Awbrey and Feurig, 2005). Indeed, several scientists proposed possible interpretations of the above terms during the years. Ortenblad (2001) expressed three differences between organizational learning and the learning organisation that existed in previous researches. Learning organisation was defined as a kind of company in contrast with organisational learning which was depicted as a series of actions taken by the companies (Tsang, 1997 cited in Kontoghiorghes, Awbrey and Feurig, 2005). Another issue arisen from the distinguishing attempt of those terms is that researchers admitted that leaning occurs in the companies while a learning organisation is difficult to grow (Dodgson, 1993 cited in Kontoghiorghes Awbrey and Feurig, 2005). What is also mentioned is that the rise of organisational learning ensued from scientific researches in contrast with the learning organisation that is formed with the help of practise (Easterby-Smith, 1997 cited in
Kontoghiorghes Awbrey and Feurig, 2005). Garvin (1993) states that the formation of the learning organization refers to an organization that is competent at producing, obtaining, and transmitting knowledge, and adjusting its activities to generate new knowledge. According to Cavaleri (2004) organisational learning is seen as an effort of investigation that has deepened into the explaining past cases but takes for granted that knowledge stems from learning actions. In the literature exist many opinions and explications of the term “organisational learning” without including the term “knowledge” in them.

According to Kim (1993) organisational learning can be seen as our own conception of individual learning because of the fact that organisational learning stems from the individual learning that each person has gained through his working experiences. Another definition given by Nonaka and Takeuchi (1995) declares that organisational learning is a series of procedures that are produced and developed by socialisation, externalisation and combination of those two. The spread of information and its distribution is interpreted into the company’s products, systems, organisational formation, procedures and competitive strategy (Bontis et al. 2002).

Today it is considerably very important the fact of enhancing our capacity for taking effective action. Cavaleri (2004) argued that OL and Knowledge Management serve the same purpose since they both attempt to augment the capacity of employees to effective activities. Effective action happens in case we manage to succeed targeted results. Although Organizational learning and Knowledge Management have been regarded as different fields of implementations they tend to be promoted synergies between them that enable managers to leverage mental capital for performance. In OL, dialogue, planning and collaboration are ways that ameliorate the knowledge features. OL is recognised as a type of action learning that point out the role of social interaction in emerging and probing one's beliefs, intellectual models and common shared beliefs. The philosophical basis that both approaches come from a philosophy called "pragmatism". Nowadays, OL and KM have a mutual background in terms of their concentration in effective activities, learning cycles and their acknowledgement in the significance of intellectual models.

According to Huber (1991), organizational learning is investigated through four constructs: Knowledge acquisition, information distribution, information interpretation and organizational memory. The acquisition of knowledge represents the ways and procedures that knowledge is achieved. Knowledge distribution is the
procedure by which information coming from various sources is distributed and consequently leads to innovative information. Information interpretation is the procedure by which shared information is provide with numerous understood interpretations. Organizational memory provides the way for knowledge to be stored and used in the future. As a consequence, those organizational processes and sub-processes, such as Congenital Learning, Experiential Learning, Crafting etc. that influence an organisation’s behaviour are much more than those that are suggested by the literatures of the specific field. In addition, it has been noticed a lack of documented theory, namely conclusions referred to previous research are not handled by researchers dealing with organizational learning. Generally, the effectiveness of OL does not tend to be depended by the existence of related guidelines that studies in OL possible have generated. On the other hand, work related to OL is not mentioned in forums or media by researchers who used to be leaders of organizational process.

Despite the fact that organisational learning has been examined by various researchers, there has been no association of it with strategic matters (Crossan and Berdrow 2003 cited in Curado 2006). During the last years has organisation learning and capabilities development been regarded as an important part of the company’s strategic policy. In parallel there has also been an examination of the potential dissimilarities that existed between company’s resources and assets (Lei et al., 1996 cited in Curado 2006). Furthermore studies of knowledge management theories depict a connection between great knowledge bases with business performances coming from organisational learning (Senge, 1990; Garvin, 1998 cited in Curado, 2006). Other views of organisational learning propose that OL comes from specific employees inside the company that hold knowledge and can also be connected with certain amendments that take place inside the company (Cook and Yanow, 1995 cited in Curado, 2006).

Martin and Solomon (2003) have been occupied by presenting an international picture of organisational learning. Their studies have showed that companies do have an inclination of transmitting knowledge to the external environments and especially to multinational firms. Many authors like Marcharzina et al. (2003) cited in Curado, (2006) have demonstrated the various forms that organisational learning takes in the inside of multinational enterprises. According to Child (2003) with the strategic coalitions between firms in worldwide joint venture (Lyles, 2003) are certain cases
that show how organisational learning gains an international aspect (Martin and Salomon, 2003).

In the modern world every organisation in order to become competitive has to depend on several factors that enable its competitiveness. A factor that enables enterprises to achieve their goal is through organisational learning. Many researches have reached the conclusion that the fundamental entities of learning are individuals who work in the companies (Mehra and Dhawan, 2003). Globalisation of the world markets has contributed to the development of what is known as knowledge demanding products fact that has made the evolution of learning, information technology critical.

Mehra and Dwawan, (2003) tried to investigate the progression of organisational learning that is formed by the personnel of information technology industries. The results showed that the largest number of the employees were young people who had little experience in past working environments. What was attempted to studied was the practice of learning at a personal stage which is the basis of competence in these enterprises. The height of contentment was the measure that allowed this kind of results in the research. It also assisted in finding out whether or not a specific firm was in the procedure of “competence building” which was an essential factor that would permit the preservation of their leading role in the economical world. Five elements were declared as the most significant ones to study the importance of organisational learning and the potential actions that could be taken by the companies. The first two elements, organisational health and chances to learn were found to be satisfactory unlike the following flexibility/risk taking and innovativeness which were simply at a basic level. The last element was interaction and had the lowest results in comparison with the other 4 factors. What was revealed from this survey was the hesitation that the software companies had, to promote the innovative spirit among their employees. According to the results of this survey the personnel in order to receive compensation for the innovativeness should turn to a learning style firm. Communication and cooperation between the staff was at a low level in terms of contentment. Good channels of communication allow the easy exchange of several types of information and leads to a stronger feeling of membership.

Moreover what can be concluded from the survey is the services in the enterprises augment while the degree of contentment in the sector of organisational
health as it is seen by the people who work in the business, decreases. Due to the “explosion” that has occurred in the field of information technology all the firms that would like to stay competitive must make steps forward in innovativeness.

Another aspect of this study focuses in the significance of team processes. The main factors that influence team procedures are challenge, range at work, team actions and empowerment. The most elevated were noticed at the sections of group actions and challenge. Both the range at work and empowerment were at a basic level. A logical conclusion that was conducted showed that the more aged is a person the lower the is the psychology of group that he belongs. The basis of learning begins with the close partners so when the group disposition is low then the learning outcomes are low also. Furthermore when there is no space given for personal choices, ideas in the team, it is certain that they would be unwilling not only to share any new knowledge but to even gain some.

Calantone, Cavusgil and Zhao (2002) studied the way company performance was influenced by its learning direction and its capacity for innovation. The survey showed that the working environments that were inclined to learning and acquiring knowledge delivered better manufactured goods. Cooperation between colleagues and the spread of precedent knowledge are critical for the productivity of the company and its position in the market. In previous research of Baker and Sinkula (1999) cited in Calantone, Cavusgil and Zhao (2002), it was found that there was a positive connection between the company’s direction to knowledge and its performance. Going further with their analysis, Calantone, Cavusgil and Zhao (2002) reached the conclusion that learning orientation can increase the business performance in an immediate way and also to affect in an oblique angle, competitive advantage. The term of competitive advantage is parted from many domains such the fulfilment of clients’ demands, competitors’ tactic that all have as a start, organisational learning. It is also mentioned that bringing into the firms’ internal environment knowledge as a guide it supports the evolution of innovativeness and in final analysis the business performance.

The research had as a main purpose to investigate the influence of organisational learning and leadership on innovation and business performance (Aragon-Correa, Garcia-Morales and Cordon-Pozo, 2005). Aragon-Correa, Garcia-Morales and Cordon-Pozo (2005), have found that organisational learning had a strong influence on the business success but this was achieved mainly with the
contribution of innovation. Because of the fact that innovation cannot be applied in a proper way in all organisations this survey tried to emphasise on the way that leadership as an individual facto of influence had a strong impact on innovation. Here organisational learning was proposed as a shared capability that was grounded on experiential and cognitive procedures which contained the gaining of knowledge, its spread though the business environment and its employment by the firm (Dibella et al. 1996; Zolo and Winter, 2002 cited in Aragon-Correa, Garcia-Morales and Cordon-Pozo, 2005). The findings revealed that the influence of organisational learning on innovation was greater than the factor of leadership. The research also mentions the possibility of an indirect influence of organisational learning on the business performance, mainly with the assistance of innovation (Aragon-Correa, Garcia-Morales and Cordon-Pozo 2005). The association of organisational learning and firm innovation appeared to be more powerful than the connection formed between organisational learning and business performance.

A business can achieve an increase in its performance by simply augmenting the level of its capacity to learn (Day, 1994; Slater and Narver; 1995, cited in Perez Lopez et al. 2005). A previous research concluded that its results gave an affirmative connection between the idea of organisational learning and the business economic performance (Perez Lopez et al. 2005). The ability to focus on the company’s clients, competitors enables the company to gain a better market share improving its performance (Day, 1994 cited in Perez Lopez et al. 2005). A firm that has a learning orientation can develop specific strategies concerning its clients and its “contestant” companies so that the outcome can be more than satisfying for its profits. (Slater and Narver 1995; Tippins and Sohi, 2003, cited in Perez Lopez et al. 2005). Signs that a company is inclined to learning, can be seen in its sales growth. Differentiated products minded at each client can only be produced by a learning company and they lead to sales augmentation (Slater and Narver 1995; Tippins and Sohi, 2003, cited in Perez Lopez et al, 2005). A last factor that indicates high levels of performance is the client satisfaction. The higher the levels of satisfaction the higher will be the profit contrast the sales (Slater and Narver, 1995 cited in Perez Lopez et al. 2005). The results confirmed that organisational learning does enhance business performance though knowledge and understanding (Fiol and Lyles, 1985 cited in Perez Lopez et al. 2005). Empirical studies though are restricted despite the fact that the significance of organisational learning is widely accepted (Perez Lopez S. et al, 2005). There have
been limitations in this research due to certain factors such as the chosen sample, the use of cross-sectional data and the low number of answered questionnaires from the Spanish companies.

Choe (2004) used organisational learning to test certain models of management accounting information systems which were supposed to be suitable for advanced manufacturing technology for succeeding better results in production performance. The observations of this study expressed the appearance of strong affirmative connection between information and better development in production performance. The findings of the research revealed that enablers of organisational learning have a limited influence on the association information and performance progress. The best exploitation of learning facilitators with the assistance of information led to better results in the business performance.

Prieto and Revilla (2006) examined the ways that learning capabilities can lead to a sustainable competitive advantage. The study used two parameters of the latter, stocks of knowledge and flows of learning and tested their ability to influence performance. The term performance was separated in two aspects: the non-financial and financial. The findings of this research show the significance of the association of knowledge stocks and learning flows in the firm’s performance. Differentiations that are located in the firm performance are due to dissimilarities in the learning capacities that each firm obtains. The better the interface of knowledge stocks and learning flows in the company the better increase will achieve the business performance.

Chenhall (2005) examined the way strategic performance measurement systems are structured in relation to the business strategy. By combining the productive procedure with strategy and indicating that strategic performance measurement systems assist the two latter and also presenting the rise of organisational learning the firms can be able to gain significant competitive advantages towards their competitors. The findings indicated that OL and competitiveness have a strong positive relationship on performing strategic results and are in alignment with previous theories that distinguish organisational learning as a source of competitive advantage (Senge, 1990; Starbuck, 1992; Garvin, 1993; Tenkasi and Boland, 1996; Edvinsson and Malone, 1997). In specific strategies though, like having low costs policy, organisational learning is found to have a non-important association with the gaining of competitive advantage.
Hsu and Pereira (2006) present a model that attempts to examine and explain the past evidence that led to today’s internationalisation and the connection of the latter with business performance having organisational learning as a moderating factor affecting them. Moreover, the term organisational learning is regarded to have variable aspects and is parted from three kinds of learning activities. The finding of the research supported previous research that internal reserves and product innovations are prior to internalisation (Wernerfelt, 1984; Atuahene-Gima, 1995 cited in Hsu and Pereira, 2006). It was also confirmed that organisational learning did appear on the association of performance and internationalisation. The benefits of becoming an international company are connected with the certain kinds of activities that are included in the area of organisational learning. Emphasis is given on the developing of knowledge of the targeted countries that is necessary when a company strives to start an opening in them. A non-important effect, organisational learning appears to have on the association of internalisation and business performance when technological learning is tested. Finally, the outcomes of the study depicted higher levels of internationalisation-business performance which led to better financial results when the multinational firms of the study were more committed to organisational learning.

Pemberton et al. (2001) studied the connection of organisational learning and benchmarking in order to accomplish competitive advantage. The study was carried out in two economic areas: the manufacturing and the service area. The findings of the study supported the theory which combines a firm’s benchmarking with the well-structured organisational learning leading the firm performance in high levels. The two different business domains showed great percentages of similarity in their responses, not eliminating completely though, the differences. Organisational indicators in both the manufacturing and services domain were proven most important in the statistical analysis when they were in confrontation with their market rivals, fact that leads to the conclusion that organisational learning is an indispensable element for higher results in business performance.

Robey, Boudreau and Rose (2000) proposed a theoretical framework that consisted of two flows concerning the relationship between organisational learning and information technology. The fist flow of their research was based on previous researches that presented organisational learning as an enabler in the procedure of establishing information technology and the second showed the construction of a
proper form of information technology in order to hold up organisational learning. What it was revealed from the first category was that experience hold one of the most significant parts when the information technology is introduced in the firm. Organisational learning comes from the personnel’s involvement and training in the new technology and possible inhabitation can be defeated by following the example of other firms that have already implemented information technology. The conclusions coming from the second theoretical flow show that information systems which support the firm’s past experiences are assisting to the advance of the organisation. It is also mentioned the ambiguous double role of information technology that can lead to the development of organisational learning or its disablement. One last conclusion coming from the above research is the short period of time in which companies should spend on learning the new information technologies. When the trial period expires the new procedures become the established ones in the organisational internal environment.

2.2 Information technology (IT)

Nowadays, Information Technology (IT) is considered to be an indispensable part of a company’s everyday activities. Some of the main tasks and activities that IT includes in its various definitions are “the process of data, information gathering, stores collected material, the accumulation of knowledge and the expedition of communication” (Chan, 2000, p. 214). His early contribution to the companies was its participation in the forming of their strategic plans. This condition changed with the entrance of successful establishments of information technology innovations. Today, information technology holds one of the most important parts in the business processes.

With the expansion of knowledge management an enhancement of analysts and researchers’ concentration on IT has arisen (Powell and Dent-Micallef, 1997). One of the first definitions given to the term information technology was that of Huber’s (1990) who defined IT as a factor that could augment decision-making of the organisations to higher levels. Another definition for information technology describes it as “any form of computer-based information system, including mainframe as well as microcomputer applications” (Orlikowski and Gash 1992; Powell and Dent-MIcallef, 1997, p.376).
Throughout the years the cost of IT fell in such levels that allowed its establishment in more companies and in parallel augmented the number of IT investments. Attaran (2003) proposes that information technology was used to enable the communication and to support reengineering procedures. What is of attention is the fact that IT was employed in order to accelerate everyday work tasks and not to change it entirely. Most managers regard IT itself as a fundamental basis of business competitiveness. A definition given by Attaran (2003) describes information technology as a variety of capabilities that companies can receive by computers, specific information, and knowledge to personnel and procedures. There have been times that IT has hold the role of helpful instrument in analysis and constructing in the manufacturing domain. Furthermore, the term IT in the manufacturing area covered areas like construction timetables, logistics and procedure designing.

According to Ruiz-Mercader, Merono-Cerdan and Sabater-Sánchez (2006) information technology is a term that differs from information system. The term IT is used to describe the meeting of the total technologies that each company has as assets and can be precisely identified. In the opposite site, information system is used to describe the ways that information is distributed within the business environment in order to come up to the expectations of covering the potential needs of the enterprise (Gunasekaran et al. 2001; Merceder et al. 2006). Certain authors like Chou (2003) have depicted IT as a “network” that would allow the existence of knowledge management.

Choi and Lee (2003) demonstrated information technology as a tool for choosing the suitable knowledge management process. Information technology can contribute to the simplification of certain organisations’ thesis, to the development of rapidity in the firm communication and finally to create and categorise suggestions for improvement (Grantham and Nichols, 1993; Tyndale, 2002). Tyndale (2002) argues that the main role of information technology is to facilitate workflows and achieve to the best use of resources on certain purposes.

Porter and Miller (1985) in Rivard, Raymond and Verreault (2006) determined information technology as the main way for a company to achieve competitive advantage by augmenting those factors that in total define business profitability. The increase of those factors comes from the diminishing of costs or even the augmentation of differentiation. Crowston and Myers (2004) said that it is widely accepted the fact that IT is able to change companies and sometimes even the whole
industrial. This has been said on the grounds that information technology offers its protection to the public picture of companies but also to reconstruct them.

Certain studies examining the relationship of organisational learning and information technology have revealed various conclusions. Some findings demonstrate the fact that information technology assists to the forming of a learning company by increasing its memory and the distribution of information among the company personnel. On the contrary, there have been studies whose outcomes have shown that information technology can prohibit organisational learning by giving emphasis on non-flexible systems (Robey, Boudreau and Rose, 2000).

Bhattacherjee (2001) in Premkumar and Bhattacherjee (2006) commented that recognition at the beginning is a very significant step towards the acceptance of informational technology is an important first-step toward realizing the IT accomplishment. The most critical part for the companies though, is the steady direction so as to secure the life of IT innovations. Despite all the scientific opinions that information technology offers to the companies sustainable competitive advantage there has been serious concerns because of the increasing possibilities that IT will be easily replaced because of its short period of its IS and their dependence on computers (Ballou and Slater, 1994; Alter 1998; Dehning and Stratopoulos, 2003).

Chan (2000) suggested a theoretical background of IT which held three main roles. The first proposed was that of “initiator”. Information technology can be of use when there is a need of including new requirements in the already existing IT of the company. IT also acts as initiator because it permits personnel’s acknowledgement to possible solution before the birth of the problem (Hammer and Champy, 1993; Chan 2000). The second role of IT presented by Chan (2000) is that of “role of facilitator”. Here, information technology makes easier business tasks. There is a necessity to construct certain products so as to satisfy any latest requirements. The justification of the facilitator role also stems from the creation of new operation that will support the birth of a new product (Chan, 2000). The last role of information technology as an “enabler”, adds to IT the capacity to run specified operations in the productive line.

Kettinger et al. (1994) performed a research in to search whether information technology contributes to the existence of competitive advantage in the companies. The authors focused on companies that had implemented information technology on their working environment and regarded IT as part of their strategy. The findings of the study proved that there were several differences between the companies. There
were two categories, those that managed to be “sustainers” of competitive advantage and the “non-sustainers”. The main conclusion of the study revealed was the implementation of information technology in an organisation is not capable of bringing competitive advantage. Potential technological innovations participating in strategic scheduling are not considered enough if not accompanied with already existed company resources.

Strategic management has offered two mainstreams in the term “information technology”. In the first theory, the company is seen as a “bundle of strategic activities aiming at adapting to industry environment by seeking an attractive position in the market arena” (Spanos and Lioukas, 2001). Here, information technology is seen as an instrument that contributes to the achievement of competitive advantage by modifying the competitive powers that define the industrial revenues. This is can be achieved by the drop of costs or by the increase of differentiation (Rivard et al. 2006).

The second mainstream describes the company as a collection of resources that are priceless to the company and they determine its strategic plan. From this angle information technology is perceived through its own IT capabilities and they become the company’s competitive advantage (Bharadwaj, 2000).

In this stream the definition of information technology will be “borrowed” by Gold, Malhotra, and Segars (2001) in Real, Leal and Roldan (2006) and will be defined as IT capabilities that facilitate the distribution of knowledge in a firm to be helped. The information technology infrastructure is consisted of various technological reserves and that will uphold the variety of knowledge and learning activities (Leonard – Barton, 1995).

Premkumar and Bhattacherjee (2006) studied two different theories that the show the transform of IT focus. In the antecedent studies the focus was placed on the level of approval of the entrance of new information technology; while the concentration in the new theories was placed on the long term use of IT and. The most accepted theories are Technology Acceptance Model (TAM) and the Expectation-Disconfirmation Theory (EDT). Research was also conducted to check whether these models could lead to the integration and development of a new information technology usage model. The contrast of the two theories was meant to examine their association and their possible union in order to provide better explanation of the IT usage. Their comparison showed that Technology Acceptance Model demonstrated better results in the rationalization of IT usage than EDT. Furthermore the united
model offered even better explanations among the concepts and the opinions concerning the IT use and the developing factors that were met in a first confrontation with a new IT. Another result that came from the exploration was that the factors “satisfaction” in terms of purpose in the EDT model was in higher levels than in the in combined model.

Dehning and Stratopoulos (2003) explored the part of various factors that was proven successful to the remaining of an IT competitive advantage. Their research revealed that there was no association between IT skillfulness or infrastructure and their influence on positive results on competitive advantage. What was indicated though was that this fact could be due to possible measurement mistakes. The researchers also examined the length of competitive advantage and they demonstrated that a long term advantage could be feasible if it was made by the appropriate personnel and was restricted in the internal environment of the company not allowing it to come out to public.

Crowston and Myers (2004) proposed three different ways to study information technology and industries. The three dimensions were referred as economic, institutional and socio-cultural. The outcomes of the study were differentiated. From economic aspect the enhancement of IT use could possibly direct to the unearth of real estate agents while in the contrary in the second area the influence of information technology differentiates from country to country. Finally, the last perspective proposes that IT can contribute to the augmentation in the agents’ social capital. It is also mentioned by the researches that the evaluation of interrelationships of the three aspects in the real estate domain, is not seen in short terms and further research is strongly suggested.

Powell and Mikallef (1997) investigated the relationship of IT and business performance. The study was focused on the retail industry and the results showed that information technology itself cannot be responsible for the development of competitive advantage. Information technology consists of production dynamics but the researchers conclude that IT cannot be by itself the power that will lead to superior results, a fact that, Unfortunately, many managers support.

Business Process Redesign with the assistance of information technology can produce better opportunities of development of group-targeted and other kinds of IT capabilities. Attaran (2003) proposed that information technology can be a powerful instrument in business process redesign. The studies of several enterprises that
adopted information technology while they were in the reengineering process and had satisfying results at the end of its establishment; demonstrated greater levels in the productivity area, in terms of quality enhancement and lowered inventories.

Researches have been conducted in exploring whether information technology was adopted to back up organisational learning. With the design of new systems that will include previous volumes of technical functions inside them, information technology can assist to the business memories and enable new flows of learning (Robey, Boudreau and Rose, 2000). Robey, Boudreau and Rose (2000) also presented information technologies to increasing OL by giving focus on the flow of information and the intercommunication inside the organisations. IT is also demonstrated as a facilitator of organisational learning and the opposite. The allowance of making back ups in the firm memory has proven to be helpful however it could turn out to be an obstacle if it is not used properly.

Subirana et al. (2003) explored the connection between information technology investment and productivity. Their main target was to form a methodology to measure the influence of information technology named RFID (radio frequency identification devices) in business procedure performance. The study was mainly focused on warehouses and the findings of the research demonstrated that RFID did have a weight on the performance metrics of the company.

It has been said that the researchers have put emphasis on large-sized companies in order to study information technology. Bruque and Moyano (2007) performed a research which was focused on small or medium companied named elsewhere as SMEs and focusing on the IT adoption and its establishment in those companies. The differences that appear between large firms and the SMEs are placed in the decision level, in the development of long term strategy or even on the kind of information systems that they use (Premkumar, 2003; Bruque and Moyano, 2007). Difficulties in selecting the appropriate information system due to unawareness or limitation in the funs of the firms are also mentioned (Cragg and King, 1993; Bruque and Moyano, 2007). The outcome of the study revealed that there are certain factors that affect the adoption of IT in that kind of enterprises. One of the most important factors of the IT adoption was the constant increasing size of the companies. This particular result of the research has been proved to be in total agreement with previous studies (Premkumar, 2003; Bruque and Moyano, 2007). The findings also showed that there are more indicators that are connected with the firm development and through it
with the adoption of information technology. The managers of the companies were in favour of new technology that would contribute to the better distribution of the information and in the new formation of the organisation. Results that came from the research and were in consistence with previous theories showed that top management is considered significant part in an implementation process of new information technology. Lastly, it was revealed that managers preferred a total training of the employees starting from the basics than having to re-train them in the new work-processes that would be followed with the adoption of new technology.

2.3 Competencies

In the latest years there has been under attention a new theme for researches to explore. A firm’s competences came into the practitioners’ focus due to the rise of a new perspective in strategic management. The Resource Based View as new aspect in strategic management placed its basis on the firm’s internal resources and skills that are growing over time (Prencipe, 1997). Resource based theory gives a very special attention to the company’s owned resources that consequently lead to competitive advantage (King and Zeithaml, 2001).

Teece, Pisano and Shuen (1997) define competences as facilitators for desired outcomes that could not be achieved without the assistance of the latter. Adding to the previous perspective, there has been a development of a new category of capabilities (or else competences) named as dynamic capabilities. They have concentrated on the means that a firm develops and invests on generating innovative abilities and capacities. Teece, Pisano and Shuen (1997) in their analysis follow the proposition made earlier by Learned et al. (1969), that every company is accompanied by strengths and weaknesses and that the most significant task for a company is to clarify its dynamics and to separate its strengths and weaknesses.

Hitt and Ireland (1985) concentrated their research on the association among distinctive competences, corporate policies, industry sector and corporate performance. The findings of their study demonstrated that the kind of industry and the strategy can cut down the connection between distinctive competences and company performance. Furthermore, the companies in order to augment their performance should enforce the designing of distinctive competences bearing in mind the kind of strategy and industry they belonged in.
Mc Grath, MacMillan and Venkataraman (1995) sought the reasons of the evolution of competences in the companies. They demonstrated two processes that were the basic of the appearance of competence. The first was emergence of understanding and the second one named as deftness. According to their results there comprehension at the beginning influences dexterity while the latter influences competence in a continuous sequence of procedures that come to an end when a new initiative evolves.

Prahalad and Hamel (1990) demonstrate that business gain short term competitive advantage by placing their recent products in low prices; though in the future this will be based upon the core competencies of the firm. Core competences according to the latter authors produce the way on how to regulate the various production abilities and to join together the differentiated technological streams.

According to Ljungquist (2007) the strongest feature of a competence is evolution, not taking into consideration the fact that it is intrinsic in humans and groups. Henderson and Cockburn (1994) proposed a distinction of competences into two main domains. Functional competences which were needed in everyday activities and integrative competences that assisted to the development of new competence elements. Danneels (2002) proposes that it is through the full utilisation of competences that the organisational renovation is accomplished. Due to constant changes in the market, companies are faced with a continuous reformation of their competences. Danneels’s research focused on the opportunity of deigning new client competences in specific occasions of technology leveraging. The author proposed that leveraging competences through innovative designing product is parted from removing the competences used for already existing products and refocusing them in new ones. Furthermore Danneel (2002) differentiates competences into two main categories: First-order and second –order competences. Empirical studies have demonstrated that marketing and technological skills are essential for the evolvement of innovative manufactured goods.

A general term that has been given to the firm competencies suggests that they are the foundation of a company’s competitive capacities in a specific market domain. More specifically, technological competencies are defined as “the ability to produce and design new products and processes and to function resources more efficiently” containing the learning skill (Dosi, Teece and Winter, 1992) in Prencipe (1996: p.1261).
Makadok and Walker (2000) characterise distinctive competencies as a continuous capacity that drives the company to greater economic results. There have been many characteristic occasions where the distinctive competences have been proven quite useful. The authors concentrated on the forming of the relationship between distinctive competences and their predecessors and consequences. They used a particular competence: forecasting capacity and the findings showed that it directs to higher economic profits and it enhances and being enhanced by the company size. It is also demonstrated that this particular competence in a very high percentage is an organisational competence and not based on personal level.

Technological Distinctive Competencies have been used by Nieto (2004) to depict the procedure of technological innovation that occurs in a company. Nieto (2004) defines technological innovation as a flow magnitude that explains the way of developing technological knowledge. Furthermore, Henne and Sanchez (1996) have also connected the innovation procedures with the development of core competences and along with them, Teece, Pisano and Shuen (1997) preceded in associating technological innovation with the dawn of dynamic capabilities. The term technology can also be demonstrated as a sum of core competences and dynamic capabilities (Nieto, 2004). Accordingly, Chiesa and Barbeschi (1994) in Real, Leal and Roldan define technology as a competency that is comprised of a solitary mixture of knowledge and abilities that permit the development of sequence of innovations. A different definition to the term information is given by Teece et al. (1997) that connects it with the dynamic capabilities given that the latter depict the skill of a company to acquire forthcoming types of competitive advantage.

While focusing on the technological competencies, it has to be mentioned that not all the companies are adjusted to a small number of information technologies (Prencipe, 1997). Several researches have shown that large companies base the product development on a great number of technological competencies. Patel and Pavitt (1994) in Prencipe (1997, p.1264) suggest that it would be more appropriate to address the companies by their technological profile because of the large number of technological domains they are engaged in.

Technological competencies are known as the ability of a firm to produce and create New products and procedures and also, to improve its already existed knowledge it in various ways (Wang, Lo and Yang, 2004). TDCs also depict the variety of technical assets that a company has acquired throughout its existence. Technological
competencies are often very connected with all kinds of technologies used in all company aspects.

Porter (1980) in his studies reveals that vertical integration for a company can be proven a both positive and negative task. This occurs due to the fact that this kind of integration requires a complete understanding of the existing technology that can bring positive results to the company. On the other hand the adoption of vertical integration can cause risks of technological nature, meaning the company is in full responsibility of producing its own technological competences instead of depending on similar technological capabilities of other organisations. The task of arising new technological competences is something that must be taken in serious consideration by the firms that have in mind of proceeding with vertical integration.

Technological capabilities as given by Bell and Pavitt (1993) are the resources that are necessary to produce and handle technological alteration and contain capabilities, knowledge and experience. According to Prencipe (1997) technological competences come from all the productive workflows in the companies and not particularly from the departments of research and development. The association of core competences and technologies combined with secondary ones and vertical integration based only in economic criteria is dangerous for firms to adopt.

Several analyses have demonstrated the fact that technologies are not entirely exploited by its personnel. It is generally admitted that all the companies have resources that productive procedures left unused. Burgelman (1994) revealed that a company’s technological competences have such great dynamic that can overcome the targets set by the company’s strategy in every occasion. Leveraging competences are often connected with the exploitation of underestimated and unused resources. Generally the procedure of leveraging includes the new designing over an already existing competence to the development of a new one. More specifically technological competences leveraging is a mixture of a previously used one combined with the discovery of new clients (Danneels, 2007). Mitchell (1992) defines technological competences as a mixture of tangible and intangible technically associated resources. Danneels (2002) proposes several resources to part of technological competences such as “manufacturing facilities and know-how, engineering know-how and procedure for quality check” (Danneels, 2002) in (Daneels, 2007, p.512).
Despite the fact that leveraging procedures produce very positive financial results for the firms, companies have often difficulties to accomplish it. Furthermore leveraging technology indicates each technological competence as a separate element from the merchandises that already include them inside. Other authors declare that competences are not explicit on the company’s products but they surpass any specific product (Prahalad and Hamel, 1990, in Danneels 2007, p. 512). A lack of knowledge in the leveraging of technological competences is the part of resource distribution and conversion. Lastly, though the technological competences can be recognised for potential leveraging in many applications, the development of resources focused on the market can be proven to be difficult if not problematic.

Awuah (2007) examined the reasons that affect the competences of a company in a long term period of time. In particular the author focused on the competences obtained by a services company. The findings of the study demonstrated that a services company’s capacity to come up to its competences is influenced heavily by its interface with its clients and other factors. This occurred, due to the fact that all the in-firm capacities, capabilities and resources were in a very high level related to other factors. Both the services companies showed signs of satisfying their customers using their competences and what is more achieving contracts that were long termed.

Globalisation and worldwide competition have lead international firms to very high levels of knowledge and technology. This had as a consequence for the companies, the need of leveraging their competences in all their branches in order to achieve competitive advantages leading to high business performances (Doz, Santos and Williamson, 2001). Hansen and Lovas (2004) focused their research on the flows of technological competences among the production department of a mother company and the subsidiaries. The term multinational firm is determined as a total of subsidiaries placed world widely and are in a sense mixture of differentiated technological competences and market-merchandise tasks. The relatedness of technological competences is a significant indicator of where a firm should focus on to gain competences. A branch becomes a target of technological competences when it is found that it has satisfactory levels of technology and expertise in the same domains that the team of product designing seeks. Another determinant of technological competences is the geographical location. This indicator justifies the cases of successful competences’ adoptions by product designers in contrast with others that fail (Hansen and Lovas, 2004). Geography can be depicted in several
aspects. The first aspect regards the determinant as a kilometrical distance between a multinational company’s branches, the second as civilisational differences between the subsidiaries and the last one as the possibility of potential interface inside the country’s borders. Another certain factor that defines the distribution of competences is the formal organisation structure. The combination of two subsidiaries as a team having the same purpose and receiving upper control can bring competence transfers. The last determinant is about informal relations and is depicted as a working relationship among people from two different subsidiaries. These close associations between the subsidiaries underlie the existence of a similar structure present a higher tendency in the exchange of information and provide the benefit of solutions to several problems that may occur. The authors found empirical findings that demonstrated informal relations and great kilometrical distances more significant in occasion the technological competences in comparison with the existence of associated competences. Despite the fact that distance is an inhibitory factor both official and unofficial mechanisms smooth this tendency.

Danneels (2007) presented a case study where a company with a certain technology was considered successful while it could not fully exploit its potential resources. The particular company was also in a disposition in that it could not enter in new markets using the same resources. The absence of specific competences that would be utilised to satisfy a new customer was an outcome of the problematic technology leveraging. Danneels (2007) tried to explore the missing chances during the leveraging of technological competences. The research investigated the leveraging of capabilities in variable markets and going further with the analysis, it deepened in the causes of lost added value. The results revealed that the absence of competences to gain new clients and their satisfaction both with the presence of competences that attempt to satisfy the existing customers inhibit the technology leveraging. Moreover, it was shown that a firm’s resources independently of nature was important to be enough in amount, focused on distribution and continuous throughout time to receive successful technology leveraging outcomes. The significance of resources transformation is signified by the research. It is also demonstrated that the transformation is dependant on clients’ boost or on esoteric boost coming from marketing competence.

De Carolis (2003) performed a study to investigate whether technological competencies influence in a positive way business performance. Based on the
resource-based theory to support the connection between competencies and performance De Carolis (2003) took as sample, pharmaceutical companies the results of the examination revealed that the competences did have an encouraging influence on business performance, more specifically on ROA.

2.4 Knowledge Intensity

According to Drucker (1993), knowledge is considered to be one of the most precious and significant assets in a company that influences its competitiveness and their long term existence in the market. In a market where volatility is apparent in every issue, companies are obliged to depend on knowledge so as to sustain competitive advantages (Nonaka, 1991). Knowledge for a firm plays such an important role that it has been suggested by Nonaka and Takeuchi (1995) as the main criterion that distinguished the successful companies from the unsuccessful ones. Going further on the significance of knowledge, it has to be mentioned that “knowledge-based view of a company” was performed in order to demonstrate that the generation of knowledge is more essential than to simply apply lower costs in a firm. According to Grant (1996) knowledge could be a crucial criterion in elucidating performance dissimilarities in various companies.

Polanyi (1966) in Haahti et al. (2005) distinguishes knowledge in two categories: tacit knowledge and explicit. The first type (tacit), has its roots in personal activities and experiences. Personal characteristics like instincts, feelings, and values are also included in tacit knowledge. On the contrary, explicit knowledge is the kind of knowledge that can be depicted in essays if it is needed and can be distributed whereas tacit knowledge is confronted with difficulties in expression and transfer (Lam, 2000).

Smith (2002) studied the knowledge intensity and distributed knowledge bases. It was found that modern economies are more affected by knowledge intensity. The last finding is not meaning that the only carrier of the new knowledge economy is specific sectors or technologies. In contrast mature industries have a deep and complex knowledge base. David and Foray (1996) cited in Smith (2002) described that the above result is generated via “knowledge systems”.

- 28 -
The outcomes discussed above are important for both developed and developing economies. For the developed economies it was found that growth is mostly visible on sectors like food, vehicles, engineering and wood products and less in new fields like biotechnology and ICT. It would be a mistake to claim that ICT has no rapid growth; in contrast it is a sector with fast development but started from a low base and with a slight outcome share. Moreover the development in these sectors is innovation-based and the knowledge is deep and changing discontinuous.

Here, it is important to mention that growth is not only based on genesis of new fields but also based on the internal transformation of already existing sectors and technological upgrading. It is suggested that when the above category is internal transformed complex innovation systems are created. Many industries included in the low-tech category are using scientific knowledge in a great scale. In these sectors Smith (2002) include the food production, machinery, printing and publishing, wood products and different services. The internal knowledge’s complexity and depth of the above sectors are not directly linked to the R&D performance and the use of this fact as indicator could be misleading.

The extracted knowledge bases taken from the above kind of industries can be found in knowledge fields, agents and institutions. All relevant knowledge fields can be found in the sciences. These sciences are linked with universities research institutes and supplier companies as said by the author. As said above low-tech industries are knowledge-intensive but also they are part of high-tech systems. Moreover when trying to explain the expression “knowledge economy” all distributions and motions must be taken into consideration not only as carriers and users of the knowledge but also as guides of transformation.

The above fact results to a problem when rejecting the association that growth and innovation have in many high-tech implementations principally when the basis and determinants of innovation are searched. It is suggested that the analysis on the pioneering decisions should be in depth on various subjects, one of which is the conditions under the resources of a firm should be offered to result to a knowledge-intensive accession to manufacture.

Knowledge intensive business services (KIBS) are services provided by a business or corporation in assistance to other businesses. This help could either be technical or professional. For example, a business that provides technical support and
knowledge to a firm employs a large number of scientists and engineers, who provide R&D services, engineering services or computer services. On the other hand, professional KIBS employ staff such as accountants, lawyers, managing consultants and in general, staff that can help on the organizing part of a business.

Janney and Dess (2006) performed a study concerning a revised concept of risk taking for entrepreneurs in knowledge intensive businesses. This paper pays attention on the risk that may be occulted behind setting up a new enterprise. Past theory shows that expertise knowledge can create great opportunities. The two scholars point out that traditional risk measures do not always have the desirable result, since the uncertainty of a risk paying off gets greater in magnitude when the expertise knowledge is not easily tracked. The two scholars recognize a number of risks and propose a number of solutions. For example to the question debt or equity, they give a middle answer that has to do with the securitization capital of the enterprise. Another important conclusion drawn is that the more accurate the measure of the cost of capital, the more revealing the information an entrepreneur can get about the future of the enterprise. Finally the scholars also ended up in the conclusion that the interpretation of the traditional ways of diversification could lead into different results in the knowledge intensive business part depending on the perspective of the entrepreneur.

Autio et al. (2000) performed a study about the internationalization of a hi-tech firm. In contrast to other studies which were concentrated on how prior experience can help a firm expand on international markets, Autio et al. (2000) focused more on time of entry, knowledge intensity and the imitability of its technology. The general conclusion withdrawn was that the sooner a new company goes international, the better feeling the managers have about the potential of the market the firm was established. Another useful conclusion was that knowledge intensity plays a very important part in the expansion of a firm on international soil. Finally the 3 researchers have also come to the conclusion that imitability and rate of growth were positively related

Mercader, Cerdan and Sanchez (2006) investigated the relationship between information technology and learning is small business environments. Their study has proven that there is a statistically strong relationship between the two. Results also
prove that individual studying combined with collaborates and individual IT plays a very significant role in the organizational learning. Furthermore organizational and self learning have a positive impact on organizational performance. The three scholars have also concluded that when small businesses employ high knowledge intensity levels then the possibility that they use IT tools frequently gets greater and greater.

2.5 Business Performance

Performance has been the in centre of attention in almost every research in the scientific world of economics. Despite its significance the term performance has been given many definitions and there has been diffusion about a totally accepted definition. It is hard though, for a researcher to proceed in a survey without having a specific definition because business performance is indeed the most vital element in strategic management (Venkatraman and Ramanujam, 1986). Efficiency of the firms is usually taken under consideration when there is an exploration on company formation, strategy and scheduling (Dess and Robinson, 1984). Generally studies that add in company performance should be in alignment with two conditions. First of all, there has to be a definite framework which determines performance and secondly there have to been mentioned the measures that are used to organisation performance (Dess and Robinson, 1984).

Empirical researches have ranked organisational performance in very high levels in the domain of company policy (Dess and Robinson, 1984). Performance as a scientific theme of research is of great importance when subjects like structure, strategy and scheduling. The scientists that are preoccupied with performance are confronted with two serious issues. The first has to do with the appropriate theoretical framework that will provide a definition for the performance and the second has to do with the selection of the variables that will define it (Dess and Robinson, 1984).

Spanos and Lioukas (2001) demonstrated empirical evidence that showed the significance of both industry and organisations influences on performance. What is of importance is that they interpret different angles of performance. The findings showed that industry appears to affect market performance and gained profits, the company assets manages to make success in the market field. Spanos and Lioukas (2001) based their study on two different measurements of performance: Profitability and market performance. The first dimension represents the internal organisation success due to
the correct strategic choices and the second the external success of the companies in the market. The profitability was measured with items such as ROE, profit margin and net profits according to the company’s competition and market performance was measured with market share, the size of sales and augmentation in sales and market share.

In order to prove the significance of business performance three different aspects have been presented by Cameron and Whetten (1983). In the theoretical aspect, many researchers have underlined the fact that business performance is the basis of strategic management since it is one of its most significant measures. From the empirical aspect, business performance is engaged to investigate a number of strategy subjects and procedure concerns. The last perspective of the significance of business performance is the managerial, which is apparent in many studies used to measure performance enhancement.

Venkatraman and Ramanujam (1986) in their study determined business performance as a subfield of the whole notion of business effectiveness. According to these authors the most restrained sense of business performance focuses on the final financial results that depict the success of the targets set by the firm. According to Hofer (1983) the term of financial performance is the most usual in the empirical studies than the others two that had been mentioned above. In this kind of version financial ratios are used to examine the outcomes concerning performance. Other authors wanting to obtain more recent views adopted other measures like the stock-market-returns (Kudla, 1980 in Venkatraman and Ramanujam, 1986, p. 804). A very popular measurement of accounting performance is also Tobin’s Q, a ratio which represents “the market value of a company to the replacement value of its assets” (Lindberg and Kamath, 1984).

Another approach of business performance is the operational one which includes except for the financial instruments mentioned above, measures like market-share, new manufactured goods’ appearance in the market and others that are part of the technological competence measures. This is considered to be a more widened approach that includes operational criteria and does not focus completely in the financial factors. This process could potentially utilising operational indicators conclude in financial performance.

Dess and Robinson (1984) studied the exercise of “subjective” gauge as one potential way of verifying two usually used economic pointers of organisational
performance. The previously mentioned authors tried to determine the connection between “Subjective and objective measures of return on assets and growth in sales and secondly the measures of return on assets and growth in sales and overall, global performance measures.”

In this particular study two determinant factors of performance were used. First was “after tax on total assets” which was seen as one operational gauge of the company performance related with the lucrative use of its whole asset base (Ansoff, 1965 cited in Dess and Robinson, 1984 p.268). The second variable was “growth in sales” that depicts the level of a company’s ability to adjust in its environment committing an opening on their “product market scope”.

According to Hansen and Wernerfelt (1989) there are two approaches which depict the elements that determine company performance. The first stream which has its roots on economic practices, gives its significance to the outside market reason that that leads to successful companies. Through the other perspective a more social approach is tried. These organisational determinants and their alignment with the company’s environment considered to be the key determinants to satisfying results. Those two approaches and their union are under examination in the latter authors’ study. For the analysis of the first (economic scope), the authors used explanatory variables that were categorised in three domains. The industry variable was measured with the assistance of average industry profits instead of other variables like capital intensity because of the fact that the research’s concentration was on the significance of industry per se. Lastly, from the firm variables, company size was selected to finish the formation of the economic model of business performance. (Hansen and Wernerfelt, 1986). On the other hand, Hansen and Wernerfelt (1986) used a widely accepted variable known as organisational climate. This particular variable relates an opened platform of organisational and perceptual variables that depict employee and business interface that influence personal behaviour. The latter authors used this specific variable because it offers a connection between detailed examination at the organisational and that the personal level. The conclusions of the research verified the significance and independence of the total factors used in analysing performance. It was also demonstrated that the organisational features were able to elucidate two times more the variance in company earnings than the economic ones.

A conclusion that came from various studies that explored the decisive factors of financial performance is that they were presented as measures of separate
associations in models and connected the underlying variables to several performance measures (Capon, Farley and Hoenig, 1990). During the exploration of financial efficiency, defined and verified experimental checks cannot exist. In order to measure the influence of a specific determinant on performance, with the use of statistical instruments the rest of the determinants remain steady. A technique used by the authors was meta-analysis. This technique allowed the quantification of a contrast of outcomes from different studies that were not able to be compared immediately in matters of research technology. Environmental variables determined at the industry stage have an important influence on the performance both business and industrial. Determinants that were chosen for this measurement were the industry size, industry expansion, focus and advertising. Other factors that had a definite impact on the performance and confirmed previous studies were the constraints of entrance in other companies of similar products, the large product distribution in various markets. Furthermore, Capon, Farley and Hoenig (1990) used another category of variable named as strategic that also enhanced both company and business performance. These contributors were specified as market stock, company advertising, process of enlargement and research and development. In this study the companies that presented organisational subjects were few and what can be concluded was that capacity utilisation has a positive influence on company and business performance while other variables failed to provide explanations for their impact on performance.

Swamidass and Newell (1987) studied the influence of environmental vagueness on manufacturing strategy and the latter’s impact on business performance. Manufacturing strategy in the particular research becomes the instrument which is used to achieve business targets. The authors supported the thesis that the determinants of business performance differ from research to research. For their study Swamidass and Newell (1987) used growth as a measure but they expanded its impact on three subcategories which were: growth in return on assets, growth in sales, and growth in return on sales. The authors adopted also the statement made by Dess and Robinson in 1984, of the preferable use of subjective determinants rather objective ones when the latter are not available to the scientists.

2.6 Organisational learning and knowledge creation

Organisational learning as a term has been faced with many disagreements when addressing the matter of definition. One of the most usual difficulties is the
separation of organisational learning with knowledge creation. (Robey, Boudreau and Rose, 2000). The apparent study approaches organisational learning as an active procedure of knowledge creation formed at the centre of the organisation by the use of the employees and teams, concentrated at the produce and development of distinctive competences that facilitate the company to refine its performance and. Organisational learning has certain aspects that need to be mentioned during the formation of the conceptual model. One of the characteristics of organisational learning is that it can take place in three levels: individual, group and organisational. Another aspect of OL is that it can be used as an instrument to produce competences that are unique for the company, appreciated by the clients and sustains the competitive level of the firm Crossan and Berdrow, 2003). As it has been also mentioned in the literature review Tippins and Sohi (2003) proved the existence of a strong relationship of organisational learning and the business performance of a firm.

In the formation of the concept of organisational learning of this study we are going to be based on March (1991) terminology. The latter author based mainly on Holland (1975), identifies two kinds of activities in for learning in a company. The first one is called exploration or feed forward and the second exploitation or feedback. Feed forward learning consists of scientific expressions like risk taking, innovation, elasticity while exploitation uses terms like refinement, preference, implementation, completing. Both feed forward and feedback are crucial for companies, although they fight for limited resources. Consequently the companies make tacit and explicit selection between the two. Tacit choices are not easily “found” in the organisation because they hide behind certain rules set in organisational activities for eliminating stagnancy or even in the manners in which aims and goals are defined and changed. March (1991) in demonstrating the high significance of their mutual existence in the companies stated that if exploitation was eliminated in a firm this could cause costs in experimentation losing its potential gains for the organisations and the exclusion of exploration could lead in a pessimistic future position of the companies by placing them in a steady balance.

2.7 Proposed Framework

2.7.1 Research model and hypotheses
In this study we adopt the 4I model of organisational learning taken from the study of Crossan et al. (1999) which includes both organisational learning and knowledge creation (KC) procedures. Organisational leaning is parted from four associated sub-processes (Real, Leal and Roldán, 2006: p. 506) “(1) intuition which is a preconscious process taking place in the individual level (2) interpretation, as a first type of transmission of elementary cognitive elements, acts as intermediary between individual and group levels (3) integration process, or how what it is interpreted is inserted in the organization, acts as a link between group and organizational levels; and finally, (4) institutionalization process, or how changes are consolidated, is exclusive for the organizational level”.

With the assistance of Strategic Learning Assessment Map (SLAM) was suggested by Bontis, Crossan and Hulland (2002) cited in Real, Leal and Roldán, (2006). SLAM includes all the essential aspects of organisational learning. Totally there are four steps in SLAM. At the beginning there is an extended description of the numerous levels and then description of theoretical framework. Learning is transformed into stocks and flow magnitudes. Organisational learning is separated into three levels of existence: the individual, the group and the organisational level and regarding its flow in the organisation is divided into parts regarding its feedforward and feedback process. In the model that is going to be presented the learning stocks are an intangible resource that is associated with the knowledge housed in a specific agent (Hedlund & Nonaka, 1993), in two aspects. The first is characterised as technical and includes capabilities like understanding and familiarity and the second follows with the cognitive aspect consisting of competences like ideas, significance and other. Learning flows develop during the move and circulation of knowledge in the whole internal environment of the company. Vera and Crossan (2004) cited in Real, Leal and Roldán (2006) demonstrated that exploration flow goes from the personal (individual) and team to the company using the 4I learning procedures: “intuiting–interpreting, interpreting–integrating, integrating–institutionalizing and intuiting–institutionalizing “. Simultaneously feed back flow occurs in the organisation from itself to the individual and groups inside it. A completely new range of processes is generated, presented in Real, Leal and Roldán (2006:507) as: “value institutionalizing– integrating, integrating–interpreting, interpreting– intuiting, and institutionalizing–intuiting”. A more clear view of the definition of SLAM constructs is given in Table 1.
Taking the perspective of OL as an organism of stocks and flows through levels and knowledge intensity as an added factor that influences organisational learning, the research model that is proposed is depicted in Fig. 1.

**Figure 1**

*Source: Real, Leal and Roldán (2006) and Ruiz-Mercader, Merono-Cerdan and Sabater-Sanchez (2006)*

Taken as an example the research of Real, Leal and Roldán (2006) the model of our study begins by regarding the organisation learning- knowledge creation course
as a capacity of the firm to develop new knowledge at the beginning ranks like the individual or groups to circulate it throughout the company so as to include it in goods and services. In order to achieve our target the model is divided in three domains. At the beginning it is investigated the importance of information technology in the organisational learning. It is also examined the effect that knowledge intensity has in OL. We proceed on setting up a connection which associates organisational learning with the knowledge creation and the development of forming technological distinctive competences. It is also going to be demonstrated the impact of information technology on the outcomes of OL and is represented by the conversion of resources into competencies. Lastly it is examined the function of organisational learning and technological distinctive competences in the impact of perceived business performance is also examined (Tippins and Sohi, 2003) cited in (Real, Leal and Roldán, 2006). We now proceed in the formation of the hypotheses that we are going to base our model.

2.7.1.1 Information technology as a determinant of organizational learning

The definition that is going to be needed in our research is taken from Gold, Malhotra and Segars (2001) defines information technology as the common IT capabilities that facilitate the distribution of knowledge in a firm that is need of it. In information technology all the kinds of such resources are included like technologies for the circulation and sharing of knowledge and many others. As it has been analysed previously, information technology with the assistance of other resources, can lead a company in a competitive position in the market. In addition it has been supported that organisational learning is a procedure that holds a significant position in increasing a company’s capabilities and sustain its competitive advantage (Lei et al. 1996). Organisational learning in alignment and cooperation with information technology has positive impacts in the companies if they are implemented together. Having presented the theoretical background of information technology we can place our first hypothesis:

\[ H1. \text{Information technology has a positive influence on organizational learning as a knowledge creation process.} \]
2.7.1.2 Organizational learning as a determinant of technological distinctive competencies

In our previous analysis there has been an extensive description of technological distinctive competences that have been used to the design of our model. TDCs became the tool for Nieto (2004) to demonstrate the systematic series of actions of technological innovation that takes place inside an organisation. The transformation of an activity into an everyday procedure for the company is the means that operational knowledge becomes eventually part of the organisation. Technological competencies in the apparent study depict the company’s ability to utilise every resource that possesses; in order to allow the development of new manufactured goods (Teece et al, 1994). The term distinctive competencies include a variety of conditions in order to justify its definition. The main purpose of TDCs is to utilise all the technological knowledge to succeed in generating and sustaining technological innovations De Carolis, 2003 cited in Real, Leal and Roldán, 2006. Nelson (1991) supports the fact that the competencies of a firm constitute an important asset by taking the role of competitive advantage. As it has already been mentioned above Danneels (2002) approaches competencies with an already existing procedure that connected them with organisational learning as was generated throughout time. Lynn, Skov, and Abel (1999) demonstrated a positive connection between learning and the flourishing advance of new goods in companies of the high technology domains. At last, Dutrenit (2000) depicts OL as a procedure by which companies generate knowledge and obtain technological competencies. Having in mind the above thesis of different studies that have connected organisational learning and the generation of technological distinctive competencies we can base our following hypothesis:

H2. Organizational learning as a knowledge creation process has a positive influence on the development of technological distinctive competencies

2.7.1.3 Organizational learning as a determinant of perceived business performance
Business performance as a term in this specific study includes issues like team performance, organisational success and employee contentment (Bontis et al., 2002) cited in Real, Leal and Roldán (2006). Apart from studying performance in three levels it is also examined the quantity of organisational learning that is required. The issue on the kind of association that organisational learning and business performance have developed attracted attention throughout the years yet there has not been a total agreement on that. Due to the various definitions to organisational learning and the different measures used to analyse it there have been many controversies. Lei et al, 1999 has proved that organisational learning has an encouraging impact on the financial level of a firm. Taking into consideration the above arguments set by various authors we adopt the hypothesis also set in Real, Leal and Roldán (2006).

\[ H3. \text{Organizational learning as a knowledge creation process has a positive influence on perceived business performance.} \]

\subsection*{2.7.1.4 Technological distinctive competencies as determinants of perceived business performance}

In order to be able to support the next hypothesis we need to adopt the Competence-Based approach. Prahalad and Hamel (1990), give the distinctive competencies the title of the main resources that can lead future incomes for a company. Consequently, the utilisation of a company’s resources sufficiently drives to sustainability of competitive advantage that underlies positive economic news for the interested company.

Wang, Lo and Yang, (2004) found that technological competencies affect performance the performance of a company in a positive way. Their research took place in Chinese firms that were placed in high-tech sectors. Leonard-Barton (1992). Studies in various industry sectors have revealed a positive relationship between technological distinctive competencies. An example that proves the above statement true is the study of Lee, Lee and Pennings (2001) that browse a fruitful relationship between TDCs and the financial performance in beginner technological companies placed in Korea. McGee and Peterson (2000) studied the small, American retailers and proved that there was an affirmative association between the firm competences
and the performance. Decarolis (2003) provided a theoretical framework that demonstrated an association between technological competences and firm performance. The results of the author’s study proved that there was indeed a positive influence of TDCs on performance based on the return on assets measure. Having in mind the previous studies made we continue to the formation of our next hypothesis

\[ H4. \textit{Technological distinctive competencies have a positive influence on perceived business performance} \]

\[ 2.7.1.5 \textit{Information technology and its significance for the development of technological distinctive competencies} \]

Andreu and Ciborra (1996) demonstrated an organisational learning model that regards information technology as an asset in the company, a resource. As it has been said previously information technology is an essential part in the process of conversion firm resources to capabilities. Going further with our analysis the latter authors also give emphasis to the function of information technology in the conversion of existing capabilities to technological competencies. Information technology holds an important part in the spreading of knowledge for technological competencies inside the business environment. Lado and Zhang (1998) performed an exploration into possible ways that technology can became a starting place in developing competitive advantage but in the same time to assist in keeping-up-to date and increasing the competences of a firm.

Zhang and Lado (2001), based their research on resource-based theory, which as it has already been referred associates the existence of company competencies with sustenance of competitive advantage. Any possible impact of information technology on the generation of competitive advantage can be viewed as its influence on the production and exploitation of firm competencies. Summarising the above and based on Real, Leal and Roldán (2006) the formation of the following

\[ H5. \textit{Information technology has a positive influence on the development of technological distinctive competencies} \]
2.7.1.6 Information technology and its influence on perceived business performance

Over the years many opinions have been expressed about the advantages coming from information technology. The majority of the researchers admit the importance of IT in their studies. Kettinger et al (1994), have proposed that the success in getting competitive advantage stems from company special characteristics combined with information technology. With the previous mentioned “cooperation” the achievement of business performance could be sustained for many years.

On the other side there have been researchers that have placed their interest in confirming the fact that information technology as being a strategic resource. This fact gives IT the opportunity to become itself the source of competitive advantage. Information technology here is defined by Powell and Dent-Micalef (1997) as unique, precious, restricted, and almost impossible to imitate. The above authors also mentioned that information technology by itself cannot be hold as strategic resource if not combined with corresponding resources. Information technology cannot amount for competitive advantage.

There have been various studies of companies that information technology operated as a way of lowering costs or transforming products in order to appear unique in the targeted markets (Mata, Fuerst and Barney, 1995). A firm achieves a competitive advantage when it utilises innovative information technology that is not used in other firms and the latter do not possess the required resources or knowledge to obtain it. Mata, Fuerst and Barney (1995) support the proposition that it is not information technology that leads the firm to a superior competitive position but the IT management skills.

Bharadwaj (2000), based on the resource-based view of the company performed a research on information technology as a firm capability and its relationship with business performance. The findings of the research proved that the relationship with higher IT and higher business performance was strongly positive. Information technology in Bharadwaj (2000), is connected with personnel’s IT skills and also with intangible assets. In accordance with the above the following hypothesis is presented
H6. Information technology by itself does not have a positive influence on perceived business performance.

2.7.1.7 Knowledge intensity sector as a determinant on organisational learning

Knowledge intensity is often presented together with information technology, organisational learning and business performance. Mercader, Merono-Cerdan and Sanchez (2006) do not demonstrate a specific classification for sector knowledge intensity. Using Smith’s study (2002, p.15), the indicators for sector knowledge-intensity are “R&D investment data as well as other non R&D innovation expenditures such as training, market research related to new product development, design, patents, licenses, and capital investment R&D investment data as well as other non R&D innovation expenditures such as training, market research related to new product development, design, patents, licenses, and capital investment”.

Kein (2002) attempted to depict aspects of knowledge creation with evidence from Europe. This attempt was made to in order to demonstrate that knowledge creation is an economic broad procedure allocated through sectors that does not count on research and development. This attempt was made to in order to demonstrate that knowledge creation is an economic broad procedure allocated through sectors that does not count on research and development. According to the previous author there is great evidence that the companies are driven to a world that depends severely on knowledge.

Mercader, Merono-Cerdan and Sanchez (2006) support the fact that sector knowledge intensity is a determinant that affects organisational learning in a constructive way. Having as a basis the above proposition by the latter authors the following hypothesis is proposed.

H7: Sector knowledge-intensity has a positive effect on organisational learning in the businesses
2.8 Summary

The aim of chapter was to present past findings having as main subject the role of information technology in organizational learning and their influence on technological distinctive competences and business performance. It has also been demonstrated the theory of technological distinctive competences, their development and their impact on the firm reaching for better results. Knowledge intensity theory and findings have been also referred their association with organizational learning.

Chapter 2, began with the presentation of the constructs that will form the final model of the apparent study. Each of them has been presented with the theory that has been developed over the years accompanied in the end with the past findings from the researches that have been made in the past. As it has been already mentioned before the study on organizational learning is a very important matter for the companies that want to remain competitive in a floating and unrest business environment (Real, Leal and Roldán, 2005). After having described our theoretical background we proceed to describe the research methodology followed in our study.

3. Research Methodology

3.1 Sample Selection

In accordance with the theoretical framework that has been presented in the previous chapter, areas that have been defined as innovative have been selected as the sample for the specific study. Due to the fact that the companies studied are placed in competitive markets the particular firms are faced with constant adjustments towards environmental and market changes. The necessity of obtaining mechanisms that will allow the companies to react towards those fast changes is of great significance.

The main criterion used in the justification of the company sector chosen for this research was the level of technological competencies that existed in each company. Firms that had strongly developed the element of research in terms of innovation as defined by Pavitt’s (1984) analysis were selected to be our sample. The sample of firms was chosen in a random way from the database edited by the Chamber of Commerce and Industry. The sectors selected to participate in the
research are: “food and drinks, cardboard and paper, the chemicals sector, rubber and plastic materials, non-metallic minerals, metallurgy and manufacturing of metal products, machinery and mechanical equipment, electrical, electronic and optical material and equipment, and manufacturing of transport material” (Real, Leal and Roldan, 2005). The Greek market is quite developed and the last years present a growth rate that is over the average growth rate of the other countries-members in the European Union.

Each questionnaire of this research needs to be completed by a single employee in every company. The nature of the questionnaire requires its completion to be performed by the upper levels of administration because the particular person will depict the all the employees inside the company (Lyles and Schwenk, 1992 cited in Real, Leal and Roldan, 2005).

The strategy required for the proper send of the questionnaires was based on follow-up methodology presented by CyCyota, Harisson (2002). The person that was responsible for the completion of the questionnaire was originally telephoned or emailed to ascertain its participation in the present research. He was informed about the subject of the present study, informing him about the significance of participating in it and also informed about the necessity of the existence of such research. The person was guaranteed that the company’s data and answers would be confidential. The receivers of the questionnaires were encouraged to make potential suggestions concerning the questionnaire or even to ask for possible misunderstandings or wonders. Furthermore it was also stated that the findings of the apparent study would be available to each company that expressed its interest and desire to acquire them. Finally, acknowledgements for the companies’ participation in this study were expressed to highlight the importance of the research. The questionnaires were sent both electronically and by mail. They were accompanied with a short introduction that stated all the above and also including a prepaid envelope for returning it completed.

The questionnaire was sent to 400 companies and receiving 133 of which 10 was considered unusable due to the fact that there were not completed properly (e.g. missed questions). Consequently the number of questionnaires reached 123. This represents a responds rate of 30.75%. In order to achieve a proper sample distribution it was tried to have analogical numbers from each sector and size. Below we present two tables that show the kind of industries each of the companies that has answered
our questionnaires belongs to (Table 2) and the number of employees that the companies employed (Table 3).

**Table 2: Industry Type**

<table>
<thead>
<tr>
<th>Industry Type</th>
<th>Number of companies</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Food and drinks</td>
<td>28</td>
</tr>
<tr>
<td>2) Cardboard and paper</td>
<td>5</td>
</tr>
<tr>
<td>3) Chemical sector</td>
<td>13</td>
</tr>
<tr>
<td>4) Rubber and plastic materials</td>
<td>14</td>
</tr>
<tr>
<td>5) Non-metallic minerals</td>
<td>8</td>
</tr>
<tr>
<td>6) Metallurgy and manufacturing of metal products</td>
<td>7</td>
</tr>
<tr>
<td>7) Machinery and mechanical equipment</td>
<td>12</td>
</tr>
<tr>
<td>8) Electrical, electronic and optical material and equipment</td>
<td>15</td>
</tr>
<tr>
<td>9) Manufacturing of transport material</td>
<td>2</td>
</tr>
<tr>
<td>10) Services</td>
<td>19</td>
</tr>
</tbody>
</table>

**Total number of companies** 123

**Table 3: Total number of employees**

<table>
<thead>
<tr>
<th>Number of employees occupied in the companies</th>
<th>Number of companies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 10</td>
<td>25</td>
</tr>
<tr>
<td>10 to less than 50</td>
<td>48</td>
</tr>
<tr>
<td>50 to less than 250</td>
<td>23</td>
</tr>
<tr>
<td>250 to less than 500</td>
<td>17</td>
</tr>
<tr>
<td>500 and above</td>
<td>10</td>
</tr>
</tbody>
</table>

**Total** 123
3.2 Measures

A very crucial matter concerning the measurement tools was the translation off the questionnaire to the native language of the responsive firms. All the scales were “transformed” into the Greek language and after the completion they were retranslated in the original language in an effort to guarantee that the essence of the other questions was kept. In Appendix A we have a presentation of all the measures that participated in the research.

In order to measure those indicators we used scales that were already validated and attention had been drawn in making the proper changes in the language that the research is worked on. All the variables were Likert 1-5 measurement scales from 1 = strongly disagree to 5= strongly disagree. In the technological distinctive competencies the measurement scale was also Likert 1-5 starting from 1=very poor to 5=excellent.

Gold et al., (2001) provides the 11 indicators concerning the information technology scale (IT). Having a general view from Tippins and Sohi’s (2003) study we “borrow” a series of technical items to frame the company’s structure. Going further with the analysis of the IT items the first two elements include hardware which provides a backup for any dissimilar technologies. IT2 and IT3 present technological perspectives in terms of acquiring knowledge concerning competitors, IT4 and IT5 collaboration technologies and IT6 and IT7 the knowledge circulation. In continuance IT8 concerns localisation and its utilisation IT9 and IT10 and finally IT11 knowledge development with regards on clients, the company’s personnel and providers.

Concerning the measures OL they were taken from Bontis et al. (2002) cited in Real, Leal and Roldan’s (2005) study that demonstrated 50 indicators circulated in five domains (SLAM). Organisational learning is divided into five sectors that are: individual (OL_II), group (OL_GG) and organizational (OL_OO) learning stocks; and feedforward (OL_FF) and feedback (OL_FB) learning flows.

The use of Technological Distinctive Competencies came from the sequential work that has been done by the Spanish author Camison in the years 1999 and 2001. There are twenty seven items that conclude to the formation of a unique factor. TDCs elements are mainly focused to demonstrate the competences of a firm for producing unique products, the ability to sustain its position in competitive position in
technological matters, perfect knowledge of managing innovation, ability to generate innovative atmosphere in the company environment, and the total concern of all company resources in research and development issues.

The knowledge intensity measures were formed with the thought that there is no specific definition for it. Smith (2002), classifies research and development activities as well as other innovative investments like training, examination of the market in term of generating new products, design, new copyrights and capital venture. The previous items provide a separation into three main categories that are presented below: Innovative Differentiation from items ID1-ID4, Marketing Differentiation items MD1-MD4, Low Cost LC1-LC3.

In order to measure Perceived Business Performance we used the 10 items in Real, Leal and Roldan, (2005) originally conducted by Bontis (2002). The performance items are separated into three main levels: the individual (PERF_I) concerning items from PERF1 to PERF3, group (PERF_G) including items PERF4 to PERF6) and organizational (PERF_O) including items PERF7 to PERF10. The above argument is in consistence with previous theories concerning knowledge aspects. The three ranks of performance are placed in the organisational environment over the inter-organizational area (clients, providers, and company rivals). Finally in order to assist in the proper formation of the questionnaire several interviews with persons well experienced in their domain.

4. Data Analysis

The data collected from 123 questionnaires are going to be tested with the assistance of the statistical program of SPSS 15.00. In order perform our statistical analysis it has to be mentioned that for each one of the model components we calculated their mean.

As a first step we performed a Pearson Correlation Analysis and the summarised results are presented in the Table 4 below. According to the results regarding the first hypothesis we have verified that IT does have a positive impact on OL in terms of its being a knowledge creation process. The findings for H1 show that R is positive and equal to 0.283 and that is statistically significant at the 0.01 level (sig=0.001, 2-tailed).
The second hypothesis considered the positive influence of OL in the generation of TDCs. The findings showed that there is indeed a positive influence of organisational learning on technological competences having an R (R= b) equal to 0.224 and also being statistically significant at the 0.05 (sig = 0.013, 2-tailed).

Going further with the statistical analysis we examined the hypothesis of the positive impact that OL might have on Business Performance. The results demonstrated the existence of a positive influence of OL on Performance having R equal to 0.459 and statistically significant at the 0.01 level (sig=0.000, 2-tailed).

Technological Competencies were examined in order to check their positive impact on the business performance. The hypothesis was accepted due to the positive results of R (r=b=0.402) and its statistical significance at the 0.01 level (sig=0.000, 2-tailed).

The fifth hypothesis as also presented in the Table 1 examined IT and its positive influence on technological competencies. We turned down this hypothesis despite R being positive, it was not statistical significant (sig=0.219).

The sixth hypothesis proposed that Information technology alone did not have a positive influence on performance. The results though showed that positive evidence of R equal to 0.209 and its being statistical significant at the 0.05 level (sig=0.021, 2-tailed).

Lastly our final hypothesis proposed that the knowledge intensity sector had a positive impact on OL. The outcomes of this research showed that there is a positive relationship with the latter referred components. Pearson correlation was positive (R=b=0.278) and is statistically significant at the 0.01 level (sig= 0.002, 2-tailed). Summarising, it is presented below a brief synopsis of the most important results regarding our hypotheses (Table 4).

**Table 4: Pearson Correlation Summary Results**

<table>
<thead>
<tr>
<th>Hypotheses</th>
<th>R</th>
<th>Significance (2-tailed)</th>
<th>Decision</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>H1 Information technology has a positive influence on organizational learning as a knowledge creation process</strong></td>
<td>0.283</td>
<td>0.001**</td>
<td>Accepted</td>
</tr>
<tr>
<td><strong>H2 Organizational learning as a knowledge creation process has a positive influence on the development of technological distinctive competencies</strong></td>
<td>0.224</td>
<td>0.013*</td>
<td>Accepted</td>
</tr>
</tbody>
</table>
Organizational learning as a knowledge creation process has a positive influence on perceived business performance

Technological distinctive competencies have a positive influence on perceived business performance

Information technology has a positive influence on the development of technological distinctive competencies

Information technology by itself does not have a positive influence on perceived business performance

Sector knowledge-intensity has a positive effect on organisational learning in the businesses

R = Pearson Correlation (R is equal to the beta coefficient of a simple linear regression model)

* Correlation is significant at the 0.05 level (2-tailed)
** Correlation is significant at the 0.01 level (2-tailed)

The second step in our statistical analysis was to perform a multiple regression analysis. By carrying out the multiple regressions we tried to test the following relationship formed as presented below:

\[
\text{PERF} = IT + OL + \text{TDCs}
\]

As it seen from Table 5 we have run the multiple regression having as independent variables information technology (IT), organisational Learning (OL) and Technological Distinctive Competencies (TDCs) and as dependent variable the Perceived Business Performance.

Table 5: Multiple Regression Analysis – Summary Results

<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>Standardised Coefficients</th>
<th>Significance (sig)</th>
<th>VIF</th>
<th>F sig</th>
<th>R^2 Adjusted</th>
</tr>
</thead>
<tbody>
<tr>
<td>IT</td>
<td>0.069</td>
<td>0.385</td>
<td>1.090</td>
<td>0.000</td>
<td>0.292</td>
</tr>
<tr>
<td>OL</td>
<td>0.369</td>
<td>0.000</td>
<td>1.056</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TDCs</td>
<td>0.311</td>
<td>0.000</td>
<td>1.133</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The findings of the study allow us to support the results that have already been conducted from the Pearson correlation analysis. The $R^2$ Adjusted Square represents the percentage that the independent variables explain the dependent variable. In our model the independent variables of IT, OL and TDCs can predict the dependent variable (PERF) by 29.2% (Table 5). All the independent variables present positive beta and are statistically significant except for the significance of IT, that is not statistically important. At last the measure of VIF of all the independent variables is above 1 which means that the whole multiple regression model is not characterised by multicollinearity. In general the VIF measure is accepted when the $1<$VIF$<5$. In Appendix B the outputs of both Pearson Correlation and the Multiple Regression analysis are depicted in a more analytical depiction.

5. Conclusions

Our study has concentrated on the literature of organisational learning having OL considered as a knowledge generation process. During this research, we have analysed the relationships developed among OL, TDCs, IT and PERF. Organisational learning has been demonstrated as a procedure though which companies can produce competitive advantages. Moreover, TDCs have been proven to be a factor that influences the performance of the firms. Information Technology holds an important position in OL process and in fact and is considered to be an indispensable part of OL. Finally, Knowledge Intensity sector has depicted its positive influence on OL.

By depicting the great importance of OL firstly in the generation of competencies inside the firms and secondly in achieving high levels of business performance, the Greek companies are becoming more and more concerned in producing an environment that encourages and embraces learning. The success in generating a learning atmosphere in the working environment on the one hand eliminates potential business failures and on the other hand enables the research, the inquest of new knowledge and innovation.

6. Limitations and Further Future Research

At this point it is crucial to demonstrate various implications that we have come across during this research. This study includes examinations of many sections
in an organisation that each presents different characteristics. Organisational learning appears to have elements of efficiency, and the Information Technology cannot have long term influences on the organisation.

The research has evaluated the generation of knowledge that stems from the internal environment of the companies and it would be interesting to examine the production of knowledge that stems from the shareholders. In this way that study will demonstrate new fundamental basis of innovative ideas.

The sample has been gathered from only 123 Greek companies and taking in consideration the results it may not represent the total Greek Industry. A more thoroughly based and extended research is required in order for the researchers to be confident that their results do include the real depiction of the Greek organisations. Another type of research that could be carried out in the future is the concentration of the apparent study in specific industrial sectors that would represent more homogeneous results.

References


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and the resource-based perspective” Strategic Management Journal, 22(10), pp. 907–934


Appendix A. Measures

CONSTRUCT

Information Technology (IT)

My organization. . .
IT1 Has clear rules for formatting or categorizing its product knowledge
IT2 Has clear rules for formatting or categorizing process knowledge

My organization uses technology that allows. . .
IT3 It to monitor its competition and business partners
IT4 Employees to collaborate with other persons inside the organization
IT5 Employees to collaborate with other persons outside the organization
IT6 People in multiple locations to learn as a group from a multiple source or at multiple points in time
IT7 It to search for new knowledge
IT8 It to map the location (i.e., an individual, specifics system, or database) of specifies types of knowledge
IT9 It to retrieve and use knowledge about its products and process
IT10 It to retrieve and use knowledge about its markets and competition
IT11 Generate new opportunities in conjunction with its partners

Organisational Learning (OL)

Individual-level learning stocks (OL_II)
II1 Individuals are current and knowledgeable about their work
II2 Individuals are aware of the critical issues that affect their work
II3 Individuals feel a sense of accomplishment in what they do
II4 Individuals generate many new insights
II5 Individuals feel confident in their work
II6 Individuals feel a sense of pride in their work
II7 Individuals have a high level of energy at work
II8 Individuals are able to grow through their work
II9 Individuals have a clear sense of direction in their work
II10 Individuals are able to break out of traditional mind-sets to see things in new and different ways

Group level learning stocks (OL_GG)
GG1 In meetings, we seek to understand everyone’s point of view
GG2 We share our successes within the group
GG3 We share our failures within the group
GG4 Ideas arise in meetings that did not occur to any one individual
GG5 We have effective conflict resolution when working in groups
GG6 Groups in the organization are adaptable
GG7 Groups have a common understanding of departmental issues
GG8 Groups have the right people involved in addressing the issues
GG9 Different points of view are encouraged in group work
GG10 Groups are prepared to rethink decision when presented with new information

Organizational-level learning stocks (OL_OO)
OO1 We have a strategy that positions us well for the future
OO2 The organizational structure supports our strategic direction
OO3 The organizational structure allows us to work effectively
OO4 Our operational procedures allow us to work efficiently
OO5 The organization’s culture could be characterized as innovative
OO6 We have a realistic yet challenging vision for the organization
OO7 We have the necessary systems to implement our strategy
OO8 Our organizational systems contain important information
OO9 We have company files and databases that are up-to-date
OO10 We have an organizational culture characterized by a high degree of trust

Feedforward learning flows (OL_FF)
FF1 Lessons learned by one group are actively shared with others
FF2 Individuals have input into the organization’s strategy
FF3 Groups propose innovative solutions to organization-wide issues
FF4 Recommendations by groups are adopted by the organization
FF5 We do not ‘‘reinvent the wheel’’
FF6 Individuals compile information for everyone to use
FF7 Individuals challenge the assumptions of the group
FF8 The company utilizes the intelligence of its workforce
FF9 The ‘‘left hand’’ of the organization knows what the ‘‘right hand’’ is doing
FF10 Results of the group are used to improve products, services and processes

Feedback learning flows (OL_FB)
FB1 Policies and procedures aid individual work
FB2 Reward systems recognize the contribution made by groups
FB3 Group decisions are supported by individuals
FB4 Company goals are communicated throughout the organization
FB5 Our recruiting practices enable us to attract the best talent
FB6 Company files and databases provide the necessary information to do our work
FB7 Information systems make it easy for individuals to share information
FB8 Training is readily available when it is needed to improve knowledge and skills
FB9 Cross-training, job rotation and special assignments are used to develop a more flexible workforce
FB10 When making decisions for the future, we do not seem to have any memory of the past

Knowledge Intensity Sector
Innovative differentiation

My organization provides…
ID1 R&D expenditures for product development
ID2 R&D expenditures for process innovation
ID3 Emphasis on being ahead of competition
ID4 Rate of product innovation
Marketing Differentiation
MD1 Innovation in marketing techniques
MD2 Emphasis on marketing department
MD3 Advertising expenditures
MD4 Emphasis on strong sales force
Low Cost
LC1 Modernization and automation of products processes
LC2 Efforts to achieve economies of scale
LC3 Capacity utilization

Technological distinctive competencies (TDCs)
TDC1 Capability to obtain information about the status and the progress of science and relevant technologies
TDC2 Capability to develop new products
TDC3 Capability to develop new processes
TDC4 Capability to generate advanced technological processes
TDC5 Capability to maintain the firm at the sector’s technological frontier
TDC6 Skill for technological differentiation of products
TDC7 Firm’s capability to generate and protect patents of products and processes
TDC8 Capability to be up to date and introduce innovations based in information technologies, both for internal use and to achieve an effective knowledge management and virtual meeting of geographically dispersed professionals
TDC9 Capability to assimilate new technologies and useful innovations or with a proved potential
TDC10 Capability to attract and retain its qualified scientific-technical staff
TDC11 Skill to organize efforts of innovations and R+D
TDC12 Skill to pre-determine the potential of R+D and innovation projects
TDC13 Skill to develop a business culture of innovation
TDC14 Skill to articulate the R+D plan with the competitive strategy
TDC15 Capability to dominate, generate or absorb basic and key technologies of business
TDC16 Allocation of financial resources to R+D department
TDC17 Allocation of human resources to R+D department
TDC18 Skill to innovate and obtain competitiveness increasing the product and technology portfolio, rather than to respond to market demands or competency pressures
TDC19 Capability to achieve an effective collaboration with other organizations in R+D and innovation areas
TDC20 Effectiveness in definition of monitoring and revising instruments of R+D projects
TDC21 Awareness of its innovation competencies, particularly with reference to key technologies
TDC22 Effectiveness in setting-up programs oriented to internal development of technological or technology absorption competencies, either from R+D centers, or suppliers and customers
TDC23 Capability to coordinate integrate all innovation process stages and their interrelations with functional tasks of engineering, production-operations and marketing
TDC24 Effectiveness in organization of multidisciplinary R+D teams, integrated by members belonging to different functional areas
TDC25 Capability to develop knowledge management programs that guarantee the ability of technology generation or absorption from other organizations, besides the participation of its employees in the elaboration of technology plans
TDC26 Effectiveness in the development of appropriate training programs in order to allow the technological knowledge base of the firm to be communicated to organizations of innovation diffusion and technology transfer
TDC27 Skill to be the original innovator introducing new products in the market

**Perceived Business Performance (PERF)**

Individual-level performance (PERF_I)

- PERF1 Individuals are satisfied working here
- PERF2 Individuals are generally happy working here
- PERF3 Individuals are satisfied with their own performance

Group-level performance (PERF_G)

- PERF4 Our group makes a strong contribution to the organization
- PERF5 Our group performs well as a team
- PERF6 Our group meets its performance targets

Organizational-level performance (PERF_O)

- PERF7 Our organization is successful
- PERF8 Our organization meets its clients’ needs
- PERF9 Our organization’s future performance is secure
- PERF10 Our organization is well-respected within the industry
Appendix B

1. Pearson Correlation Analysis

Table 1: Descriptive Statistics

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>IT_mean</td>
<td>3.3282</td>
<td>.53694</td>
<td>123</td>
</tr>
<tr>
<td>OL_mean</td>
<td>3.4728</td>
<td>.28776</td>
<td>123</td>
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<tr>
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<td>TDCs_Mean</td>
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Table 2: Correlations

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<th>TDCs_Mean</th>
<th>OL_mean</th>
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<td>.402</td>
<td>.459</td>
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<tr>
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<td>.112</td>
<td>.283</td>
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<td>.224</td>
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<td>.283</td>
<td>.224</td>
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<tr>
<td>Sig. (1-tailed)</td>
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Table 3: Descriptive Statistics

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### Table 4: Correlations

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### Table 5: Model Summary

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<th>Adjusted R Square</th>
<th>Std. Error of the Estimate</th>
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<td>.309</td>
<td>.292</td>
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</table>

a. Predictors: (Constant), OL_mean, TDCs_Mean, IT_mean
Table 6: ANOVA

<table>
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<th>Model</th>
<th>Sum of Squares</th>
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<td>Residual</td>
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<td>Total</td>
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a. Predictors: (Constant), OL_mean, TDCs_Mean, IT_mean
b. Dependent Variable: PERF_Mean

Table 7: Coefficients

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
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<th>Sig.</th>
<th>Collinearity Statistics</th>
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<td></td>
<td>Tolerance</td>
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<tr>
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</tbody>
</table>

a. Dependent Variable: PERF_Mean