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MSc IN FINANCE & FINANCIAL INFORMATION SYSTEMS

*“Facilitators and inhibitors of e-business
adoption by North Greek SMEs”*

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ABSTRACT

Purpose: E-business has become a necessity due to the burst of networking technologies. We intent to shed light on the factors that influence the e-business adoption decision by Greek SMEs.

Method: To empirically test the data we conducted confirmatory factor analysis. Eight factors were generated and the reliability test produced acceptable results for all factors. Finally, logit linear regression was used to test the hypotheses.

Results: The proposed model explains 70 per cent of the variance of e-business adoption. It was found that firm size, firm scope, governmental support, consumer readiness, IT infrastructure and internet skills are the most important e-business adoption drivers. Among them, firm size was proved to be the most significant. On the other hand, willingness and capabilities of supply chain partners, CEOs knowledge, adoption cost, and competitive pressure do not seem to play an important role in the e-business adoption decision by Greek SMEs. From these, adoption cost is an inhibitor of the adoption decision, though with a small significance.

Keywords: E-business adoption, Technological readiness, Organizational readiness, Environmental readiness.

Chapter 1

Introduction

1.1 A few words about e-business

The technological evolution of the past 20 years has changed people's lives. In many cases, it has also changed the way business is done. No one would have expected during the late eighties, when the Internet was distributed for public use (it used to be a communication tool of the U.S. Army) that people would be able to have access to the markets of the world with a click in their computers. Today's reality shows that computerised technology, alongside with the Internet evolution, have penetrated the life of the citizens of the modern world.

This new technological era has created many new jobs and helped businesses commercialise and sell its products throughout the globe. Apart from that, the use of the internet by people of the business world had an impact on improving firm performance, through a much more improved supply chain, a reduction of operational costs and improvement of indicators such as the ROI (return on investment) and the ROA (return on assets). This procedure of conducting business through the use of internet and computerised technology is called e-business.

1.2 Findings

This study was conducted in order to investigate how much the internet evolution has penetrated the procedures and actions of the Greek Small and Medium size Enterprises in the area of Eastern Macedonia and Thrace. In other words, the factors and facilitators of the e-business adoption surged from this research. The results show that Greek SMEs seem to miss the train of the technological evolution due to a number of reasons. In times of financial recession, Greek SMEs are struggling to generate the necessary capital that would help them invest on new technologies. Secondly, SMEs are usually run by people of average education and thus, they hesitate to take such a big investment risk since they do not manage to

understand the hidden gains e-business could bring. Another finding of this research indicates that the support provided by the government is poor and a very small real effort is held to promote e-business. This is probably a good explanation why the inhabitants of the area of Eastern Macedonia and Thrace know little about ongoing programs of the European Union that help SMEs adopt e-business. Another key reason for the small adoption of Internet by the Greek SMEs is the lack of technological expertise by both managers and employees. This could be explained by the small Internet penetration in the area and by the fact that highly expertised employees tend to work for larger companies.

As far as the facilitators are concerned, it could be said that the main indicator for e-business adoption seems to be firm size. In other words, firms with a greater number of employees tend to adopt e-business more easily and more rapidly. The firm scope also plays an important role in the adoption of e-business since companies of a mature industry tend to ignore such challenges while firms that provide services or new and innovative products seem to go along with the adoption.

1.3 Research structure

Let us see how this study is structured. Chapter 2 is dedicated to the literature review of e-business. Initially, general literature is included. Secondly, there exists more specific literature that concerns e-business adoption. A number of articles is presented that concerns e-business adoptions from Australia and China to Botswana and the Malaysia. Like in every research, the literature review is the section that provides with the assumptions that are either going to be accepted or rejected by the scholars.

Chapter 3 analyses the methodology followed. The raw data of the survey is collected through a questionnaire answered by managers of the SMEs of the area. Initially a factor analysis is conducted, which helps us group the questionnaire items into constructs. The new factors are then processed through a regression analysis to provide the answers to the adoption matter i.e. to provide a weighting formula that examines which factor is the most important one. Continuing, the data and empirical results analysis takes place in chapter 4. Firm size, firm scope, governmental support, consumer readiness, IT infrastructure and internet skills were the factors that were found to be the more important. Finally, in chapter 5 the conclusions

drawn from this survey are further analysed and explained and suggestions for further analysis are made.

Chapter 2

Literature review

2.1 Introduction

Having made a slight introduction about e-business, it is time to undertake a review upon e-business literature. There are numerous articles concerning e-business, with the vast majority concentrating upon e-business adoption and case studies of e-business functionality. This chapter can be split up into three sections. The first one deals with general literature about E-bussiness and its implications in SME functionality, the second one has to do with the investigation of facilitators for the adoption of e-business/ ICT methods while the 3rd part gives a slight insight of the SME adoption in other countries both of the developed and the developing world

2.2 General literature review

To begin with, F. Damampour (2001) intents to underline the importance of adopting e-business/e-commerce strategies and sheds light on 5 main key points of these strategies. Primarily, it is stated that e-business has become a necessity that has come out because of the burst of networking technologies. Second of all, there doesn't exist a sole e-business model that would fit any companies. Even companies that belong to the same industrial sector and with similar characteristics, find difficulties in adopting one anothers model. Thirdly, e-business is becoming a powerful tool that helps businesses create better relationships with vendors, suppliers and customers, lower transaction costs, better information management etc. On the other hand, e-business is a premium, remotely for developed countries, since the developing ones do not maintain neither the funds necessary nor do they have the necessary know how. Finally,, the on going needs of enterprises imply the use of smarter systems, computers with better characteristics and more efficient softwares.

Rogers et al (2002) explain how e-business can lead to a competitive advantage. According to the scholars, the improved organisation that is being offered by e-business through the simultaneous intercommunication could lower transaction time and costs. In that manner, enterprises enjoy a greater return on investment. Ofcourse before an enterprise goes into such type of investment, it should weight things and check if it could undertake such a risky cost. It is obvious that not every enterprise can undertake such a risk, but at the end of the day the ones that decide to get involved will enjoy benefits that will make them much more competitive. It is also crucial to point out, according to the scholar, the method followed in order to have a succesful adoption policy

Pai and Yeh (2008) tried to differentiate themselves from the vast majority of scholars that were focused on developing e-business strategies. While others beamed on developing a conceptual framework upon which they would build their strategies, the fore-mentioned scholars performed a case study on manufacturing enterprises in Taiwan based upon the contingency theory. The results of this study indicate that two key factors for the succesful development of e-business strategies are organisational readiness and IS core competence. By the term organisational readiness the scholars mean the state of mind of the managers to provide all the necessary funds and assets in order for the enterprise to step forward, as well as staff commitment in taking in the arriving technologies and the change these technologies may introduce to the business process. Furthermore, this case study claims that managers should evaluate the risk introduced by doing e-business alongside with the benefits it might return them. IS core competence comes to the picture when deciding to implement e-business. For beneficial implementation of e-business, managers should focus on key factors such as hiring a skillfull IS manager, specifying requirements, getting to know information about the IS technology, selecting the proper vendor, agreeing to a contract and monitoring the contract.

Croom (2005), investigates the consequences of e-business in the supply chain management of diverse enterprises. More specifically, the research held by the specific scholar attempted to “chronicle strategic developments for organisations across a diverse range of industries”. The findings of this research indicate five clusters that represent progress and evolution on supply chain management. The first one is focused on the Business to Customer relationship using tools such as email and Website in order to enhance access to a wider market and a larger number of customers. Cluster 2 is beamed upon enhancing customer relationship management through CMR systems. The 3rd one concerns the re-engineering process of the enterprise

through ERP systems. Cluster 4 uses e-procurement systems in order to enhance supply side activities so as to support minimising the overall cost of acquisitions. Finally, the 5th cluster is originated towards maximising the e-supply chain performance using integrated logistics. Supply chain management is one of the most important procedures within an enterprise. The upcoming change of methods that would lead to its enhancement need to be held by expertised staff so that the passing from the present to the future must be fulfilled successfully

Lesjak and Vehovar (2005), gave rise to the subject of evaluating the e-business strategies enterprises may adopt. The two scholars have developed a conceptual model in order to determine the factors that affect e-business evaluation among Slovenian enterprises. They have come down to the conclusion that the vast majority of the companies that employ e-business have shown a great return. Another point made was that more than 50% of the companies that introduced e-business to their activities claim that the gains of e-business are so obvious that they need not be evaluated, thus they do not use some formal method for return evaluation. To continue, a large number of companies utilise ROI, CBA or NPV measurements to express the return in numbers, while other companies have created their own tools that are adjusted to their characteristics. E-business evaluation can also be linked to the perception of problems e-business implementation at a much greater level rather than the type of organisation implementing e-business strategies. The scholars finally, mention that the model for designing and developing these strategies were mainly concerned on the problems and needs of the enterprise.

Gale and Dolphy (2005), performed a slight literature review upon how e-business has transformed enterprises organisationwise. The two scholars commented that since the internet and local intranets were introduced inside businesses, the scenary has changed totally. The business procedures are done with less costs, and within the enterprise, a number of jobs have been changed in the name of technology while others have even been eliminated. The article in other words, underlines the socioeconomic impact of technology adoption. Finally, the scholars point out that the the technological evolution, the market competitiveness and the production chain evolution needs save money for the SMEs managers while on the other hand reduces the needs in labour class on the production side

Ritter and Gemunden (2004) proposed a model that investigates how a business strategy can affect its technological and network competence as well as its innovation success. Having the

response of 308 German companies, the two scholars have concluded that the innovative success of an enterprise is not only influenced by its technological competence. A close attention must be paid to the network competence of the enterprise as it is highly crucial that the enterprise interacts with its environment. If the enterprise fails to do so, it is obliged to deal only with its internal resources which is a negative aspect. Secondly, the scholars have focused on the development of factors that create competencies, since business strategy and innovation success are not directly related. This article also emphasises the need of adoption of new technologies by European SMEs in order to enhance their competitive advantage in the market share and to fulfil the new needs of their customers created by technology advantage and to attract new ones

Palmer (2002) characterises the term e-business as “unnecessary, inappropriate and unhelpful” because their use may mislead to the idea that the norms of e-business greatly differ from the ones of standard business. The scholar also underlines that one must also consider the risks hidden behind e-business practises in contradiction to the benefits these may bring. For a successful e-business strategy to occur, the scholar proposes a framework under which the social context of e-business strategies may well be understood. This framework is based on the clarifying of the norms under which e-business strategies can be operated, on the build up of a dialectic relationship which would help practitioners exchange view points and ideas and not just have a one way transfer of technology knowledge and skills, have a personal connection with everyone interested, keep the conversation easy to understand by everyone by putting aside technological terms that may be incomprehensible.

Malhotra (2000), underlined the problem of an out of date knowledge management that by itself could not lead enterprises into a successful e-business strategy. The scholar’s investigation results indicate the need for the CEO or SME manager to be aware of the latest technologies. This outcome is correlated to the fact that he/she is the one taking the crucial decision of whether to perform the ICT adoption, which in other terms means that he is responsible for the investing of funds for this task. He may as well ask for the help of an expert (outsourcing) but according to the scholar, past experience has shown that this kind of cooperation does not always lead to a win situation. According to the scholar, the transformation of knowledge management that would fit the needs of the computerised business world, alongside with human creativity and innovativeness would help enterprises lead themselves to a successful e-business strategy. The scholar also underlines the points

where enterprises should shift their attention in order to compile a successful transformation to the e-business world.

According to Lumpkin and Dess (2004), there are four main activities to which the Internet technology has contributed, that could help e-business strategies be successful. Namely advanced searching, evaluation, problem solving and transaction. These activities are also supported by customer feedback, expertise and entertainment programming. The scholars also recognised 7 business models, commission, advertising, promotion, fee for service, mark-up, referral and subscription based. The proper use of the activities mentioned before can help enterprises gain competitive advantage.

Van Hooft and Stegwee (2001), claim that e-business based on literature of Internet gurus would not lead an enterprise to a successful e-business performance. According to the two Dutch scholars, e-business has much more to offer than it may cost, only if the interested enterprise intends to fit inside the e-business world through a proper plan. Thus, the necessity of a strategic information system plan (SISP) is underlined. The SISP contains discovering the needs of the information system of the enterprise, performing a market research upon the possible software and hardware needed and the changes in technology from which the enterprise may enhance its performance, define a portfolio and finally, perform purchases and gradually fit into the e-business world

2.3 Literature review of e-business adoption

Parker and Castleman (2009) performed their own literature review upon the facilitators and inhibitors of e-business adoption among small businesses. First, they presented the 5 models that explain e-business adoption. The 2 scholars then ended up to the conclusion that one model does not fit all, i.e. each case was different. To be more specific, they expressed this conclusion by saying that e-business adoption between small businesses is dependant upon the idiosyncrasy and the social context within the business. Despite that fact, it is mentioned that a framework for the adoption of electronic business needs to be built that would more or less provide a more general idea of the factors affecting its adoption.

Taylor and Murphy (2004), claim that the taking-up of e-business by SME is a crucial point for economic growth since these enterprises are “big buyers, big sellers, big innovators and,

most important politically, big employers”. It is undelined that many enterprises have commenced digital action by building up websites and email but according to the scholars, this is not enough. The two scholars also recognise that there are barriers in the adoption that deal with the nature of the business performed by each enterprise. They also underline the diversity of the SME’s philosophy and how differently they may interpret the potential gains of such an action, especially after the great burst of the dot com companies during the early 00’s. Finally, the two scholars conclude that the attention should be taken away from the Internet and Computer Technology as an end, while the ICT should be more visualised as the means to a competitive advantage

Rantapuska and Ihanainen (2008), study the criteria the CEOs take into account in order to perform a system development or a system renovation. The findings of the research indicate that there are three types of decision making CEOs:

- The problem oriented decision makers
- The product oriented decision makers
- The provider oriented decision makers

The 1st category encompasses all the CEOs or decision makers that are concentrated on the needs of the problem they are called to solve. Obviously, they stress their attention upon the system requirements and they “try to express the tacit understanding of user needs into explicit terms” (Rantapuska and Ihanainen, 2008). The criteria of choice is exclusively based on how the system/software is going to solve the problem while the role of the provider comes during the implementation phase

CEOs that are orientated on the system characteristics are gathered in the 2nd category. These decision makers focus their beam upon the potential provided by the specific system. They spend a lot of time in market research to find alternative software with equal or more advanced characteristics and better performance. Obviously in order to perform a market research, these decision makers know the potentials of the software to be substituted and usually they want to proceed on the next available technology without rushing into a big step that encompasses a great deal of risk.

Finally, decision makers that are concentrated on building a long-term relationship with a trustworth provider belong in the 3rd group. CEOs of the specific category rely on the

provider's firm size, reputation and trustworthiness. Usually decision makers of this category are in no big rush in realising gains from this relationship once they know they have picked the right man for the job. For both the provider and the decision maker, the personal contact plays a very crucial part in designing and implementing the system.

The impact of adoption of ICT on Turkish SMEs is studied by Tektas et al (2008). The study results show that in the industry of machinery, SMEs have all developed and designed new and better products and, they have also built their proper websites. This outcome indicates that "the ICT adoption capability enhances the innovation utilisation" (Tektas et al 2008). The creation of websites for Turkish SMEs is considered to be a major development which, for CEO who are a bit thoughtful, may entail a great deal of risk. The study results also point out that there is a correlation between the product and process innovation. In practise, for machinery industry both the product and the process innovation are combined in such a way so that computers are incorporated in the production process. Once the outcomes of this incorporation appear, then even more confidence is gained by the SME CEOs. These outcomes have helped Turkish SMEs, that have incorporated ICT in their production process, expand their sales and exports and gain a competitive advantage in their business.

In 2002 Bertschek and Fryges proposed a model that investigates all the possible factors that may lead a company to the adoption of B2B e-commerce in Germany. Their findings indicate that a very crucial role is played by firm size. It is highly likely that a big enterprise may adopt e-business compared to a smaller firm, because of the level of education of the people that comprise a big company. An equally important factor for B2B e-commerce adoption is competitiveness. As it is clear, the gains of performing e-business could easily lead an enterprise to a competitive advantage in comparison to its "opponents" in the market. Finally, according to the scholars the bandwagon effect plays the most important role in adopting B2B e-commerce. The bandwagon effect is a psychological effect that could be interpreted as monitoring and copying the actions taken by an "opponent" firm in order to benefit from the e-business hype, in the specific case. The more companies adopt B2B e-commerce within its business, the higher the probability that their opponents would as well follow the same path.

Chang (2009), proposed a model for e-business adoption, which aimed at enhancing the "on-demand e-business" performance. The concept of the "on-demand e-business" is focused on developing a hybrid IT model that would help overcome communication drawbacks between

enterprises, suppliers and customers. In other words, this IT model is to enhance the performance of the supply-chain management of an enterprise. The on-demand e-business adoption tool is partitioned in 2 sectors, e-business readiness and environmental readiness. E-business readiness is further split into 2 further components, technological readiness and organisational readiness. Technological readiness explains the capability and the knowledge of taking advantage the IT resources that comprise e-business implementation. Organisational readiness focuses on whether an enterprise has sufficient financial and human resources in order to implement e-business.

On the other hand environmental readiness is divided into 3 sectors, supply chain readiness, readiness of coordination and readiness of market forces. The supply chain readiness is focused on how all the stakeholders of the supply chain perceive e-business and how this perception can influence the magnitude of e-business. Readiness of coordination refers to the capability of an enterprise to handle its internal and external competencies, since e-business is such a complex process to implement. Finally, readiness of market forces explains the influential power of an enterprise's partners (suppliers, customers et al). In other words the term above intends to explain the pressure imposed by partners on enterprises to adopt to the technology demanded so as to fulfil their mutual goals.

The results of this study (Cheng 2009) show that e-business readiness is more influenced by technological readiness than the environmental readiness. Apart from that, organisational readiness plays a very big role in the adoption of e-business. In other words, the internal capabilities of an enterprise play a key role in the adoption of e-business and the design of a proper strategy.

Another key finding of the same study shows that once an enterprise agrees to implement an e-business strategy, the internal capabilities of the enterprise do not play as big a part as supply chain readiness and readiness of coordination. In other words, the relationship quality between enterprises and its partners as well as the capability of an enterprise to handle its competencies play a much more significant role than the part played by the enterprise as a unit in the adoption of e-business. Finally, market forces readiness does not play as big a part as the rest of the factors.

Jeon *et al.* (2006) tried to identify the key factors that would motivate an enterprise in Korea to get started with e-business. The 3 scholars noticed that less than half small and medium enterprises have adopted the e-business technique. Obstacles such as the lack of awareness of the benefits e-business may bring, absence of financial resources, limited expertise and so on. The Korean government has recently taken action by establishing the e-commerce research centre that would play a consulting and training part for Korean SMEs.

Furthermore, based on previous research on e-business adoption, as well as technological innovativeness and interorganisation, the three scholars have developed their tool for performing their study on e-business adoption in Korea. To be more specific, four groups of factors were identified, which may influence the adoption of e-business in Korea namely “chief executive officer’s (CEO) characteristics, e-business characteristics, environmental characteristics and organisational characteristics. To the first group of factors, the CEO’s contact with the technology world, as well as his/her attitude towards innovation were included. The complexity/compatibility issue, the financial issue and the e-business advantages issue were recognised as the e-businesses group of factors . The most important organisational factors recognised were, employees contact with the new technologies and enterprise size. The factors identified for the environmental set were the interindustrial competition, the government support and the enterprises view towards globalisation. Finally,, the country characteristics were thought to play a part in the e-business adoption decision (Asia financial crisis in 1997 and the North Korea issue).

The results of this survey showed that the level of technological knowledges of the CEO, combined with the competitive advantage e-business could bring to an enterprise, the proper governmental support and the enterprise orientation towards globalisation are the key factors that lead to a succesful e-business adoption. The North Korea issue also seems to play an important part in the decision of e-business adoption. Oddly enough, the size of the enterprise, the cost of the e-business action and the market competition did not play such important roles. The conclusions that can be drawn for this study is that SMEs with an open-minded CEO who is highly expertised technologically are more likely to adopt e-business techniques. Another key part is played by the government which funds training programs, informs about the benefits of the e-business and generally tries to keep the road to e-business as safe as possible

Skoko *et al.* (2008) attempted to identify the factors that would motivate Chinese SMEs to adopt ICT (Information and Computer Technology). Initially the scholars underline the expanded growth the Chinese economy has shown over the last decade but they also identified the hidden potential of Chinese SMEs in case they used the Information technology. The need to use the new technologies was also mentioned, since markets are becoming global and the competition is getting greater

To proceed, having followed various literature, the scholars identified 5 possible factors that could boost the use of ICT by Chinese SMEs. These factors slightly differ from the ones in previous literature and are namely “technological, organisational, environmental, economic and individual”. The scholars then proceed to a study in order to reveal which factor influences the decision to adopt ICT technology most. The survey results show that the most common burden of Chinese SMEs in order to fulfil their scope is the lack of financial funds. Only a small number of enterprises has access to funds, by getting loans from the government or other financial institutions, and these funds always seem to be too little to sponsor their project.

Another major drawback of Chinese SMEs is the lack of managerial skills by their owners. Usually, the owners of such institutions lack of formal education, which results to the absence of a strategy, and without a strategy, an enterprise is very hard to survive in such a competitive environment. To add to this point, the market orientation also plays a negative role in the adoption of ICT by Chinese SMEs. Although sometimes, a few SMEs are backed up by high technology, customers seem to ignore that fact and lean towards big companies. To follow, the absence of skilled staff that could work with the system is another withholding parameter. This usually happens because in the heavy industrial environment of China, skilled staff prefers to work for big companies that offer greater salaries and working conditions. Finally,, the researchers conclude with the oriental tradition mentality. Most of the country’s SMEs are governed by the household style of management. In the recent years, people have opened their horizons, but it seems like in China, tradition seems to play a very crucial part as an obstacle to development.

The case of ICT adoption in Malaysian SMEs was studied by Sarosa and Underwood (2005) from the manager’s point of view. The factors affecting the IT adoption were split up into internal factors and external factors. Internal factors included managerial skills such as

perception of the benefits IT may bring to the enterprise, IT knowledge, IT experience and alignment with business strategy, the resources which include financial funds, operational cost and internal IT infrastructure availability and finally, the third part of internal factors is concerned to staff skills, IT experience and IT adoptions.

The external factors include 3 main influences. Primarily, the role of the government which concerns the funds and support available to the enterprises, the diffusion of the importance of IT adoption and its benefits as well as funded training programs that would create skilful employees in managing information. Finally,, there is the customers side and the market competition that may influence an SMEs CEO to consider IT adoption and technology renovation.

The outcomes of this study show that managers were more concerned about the further uses of IT technologies and not that much on the potential risk or the relatively high cost the IT adoption may have. It is worthwhile noting that all decisions were made exclusively by the manager with no external influence by the staff which indicates the centralistic way of managing an enterprises in the far east countries. As far as resources are concerned, the study showed that SMEs did not face such problems since the majority could either get bank loans with small interest rates an pay in installments or they could borrow money from friend or family, on the contrary of what was expected by the survey. A facilitator towards this route may be the fact that IT hardware and software are low-priced compared to the rest of the world and also the high grade of software piracy in Indonesia.

The staff adoption wasn't either the problem for Indonesian SMEs. It seems like that once the manager has decided to adopt an information system, he/she would impose this adoption to his/her staff who would usually "comply and be moved to use this new technology". It was also noted that most of the staff that were to handle the information system were computer science graduates which means that they would have no problem doing as they are told by their managers.

A major concern for the participants of this study were proven to be the governmental infrastructures (Internet and Telecommunications). These obstacles were supposed to be overcome by the new regime in Indonesia but everything did not go as planned. As far as

customer pressure, the study showed that it played a significant part in the adoption of IT combined with the pressure by the market and the very high international competition.

Lucchetti and Sterlacchini (2004), studied the case of Italian SMEs and their attitude towards ICT adoption. The outcomes of the study show that the adoption and the effective use of the ICT are differentiated, depending on the internal funds and the technological skills of the SME on the one side and the nature of business of the SME on the other side. The scholars claim at this point that the information and computer requirements of the SMEs can be split up to general-use, market oriented and production oriented. The general use (web-page, email) are the interface of communication with the customers and has no other characteristic as a requirement of the enterprise. On the other hand, market oriented software is being used by highly educated employees and provide aid to the relationship with the inland market as well as the foreign markets. Finally, the production oriented software is dependant upon the size of the enterprise, the productive channels available with other enterprises of similar type, the existence of highly trained employees and the existence of expertised information systems. Depending of the policy followed by a firm, special attention should be paid accordingly. According to these scholars great attention should be paid towards human resources. In either case, the key goal of the SMEs would be to lower the hiring and training costs of the staff and University graduates should always be given priority

Harindranath *et al.* (2008) attempted to explain the reasons of the bad adoption of the ICTs by UK SMEs. According to the scholars one major concern of the British managers is the fear of little use and obsolescence of the IT which would require often updates. In a high competition world and with the ongoing recession, spending money frequently on updates is a matter to consider. Another concern on the SME managers is the great dependance of the ICT system on vendors. Managers who want to make the best out of their funds and time may select solutions for their SMEs that are focused on the present needs of the SME. The fact of the matter is that the technology can offer solutions to much more critical matters while the SME managers do not see the ICT as a tool to problems of long ter sustainability.

Another major consideration about the British SMEs, according to the scholars, is the lack of a business strategy and a quite narrow perspective. This is a matter of great magnitude in the days of world markets, where competitiveness between the enterprises of similar fields is

great. This lack of strategy can be observed in the investments undertaken by the SMEs over the last years. All the above can be linked with the low grade of technical background of the SME owners as well as the lack of information about various support mechanisms provided by governmental agencies focused on the development of SMEs. Last but not least of course comes the lack of highly trained staff.

The case of New Zealand SMEs was studied by Locke (2004). In his survey, the surveyor came to the conclusion that even though a strong link between economic growth and investment in IT was expected, the case is not so for the local SMEs in terms of sales and market share. A point worthwhile noticing is that the growth in profit for these SMEs had a very strong relationship with the use of IT. This point can be interpreted by the fact that SMEs need further encouragement in using the new technologies. According to the survey's conclusions, the strong relationship between growth in profit and use of IT and the internet is based on the encouragement of entrepreneurship. Finally, while ICT adoption does not seem to have an impact on sales and market share, it looks like it influences the growth in profit by reducing vital costs of the business. In other words, the policy an enterprise follows in order to achieve the one or the other type of growth is linked to the amount of use of new technologies and specifically the Internet.

SME owners in Malaysia do not seem to be skilled enough and the penetration of the ICT within the SMEs is not very famous. According to Hashim (2007), CEOs of Malaysian SMEs have not developed throughout the year the proper strategies in order to incorporate e-business in their activities. This is because, as this scholar believes, they are not very familiar with the electronic technologies that would aid them be more competitive and thus, numbers for ICT adoption by SMEs in Malaysia are kept at a significantly low level.

In previous literature it was mentioned that government support plays a very significant part in electronic means adoption. It is worthwhile mentioning the effort put by the Malaysian government through educational programs, skill development and experience offered through an optimisation of benefits and incentives. It can be clearly seen that the government believes that the adoption of e-business is going to help SMEs develop which is the basis of the local economy. The scholar compares the government effort with the one in Taiwan where the local government has developed a very important information infrastructure, but still Taiwanese SMEs were not so keen on adopting ICT. This fact underlines the importance the ICT skills.

In both cases the government effort was not enough to persuade the CEOs about the pros of the adoption

An effort to compare theory to reality as far as ICT adoption is concerned was carried out by Tan, Mackauley and Scheuer (2006) in the area of Tameside in Britain. The scholars performed a case study which would indicate the reality behind the theory. The study results indicate that even with ideal outside environment conditions, (cheap installation costs, high speed internet at a very logical price cheap hardware and software etc) the SMEs do not seem to show a great deal of interest. In fact according to the numbers presented, 8 out of 10 enterprises showed no interest in advertising in the local business portal. The same percentage showed no interest in getting funded in order to buy new equipment or refurbish the existing one. In addition, 7 out of 10 enterprises were unaware of the training programs provided by the local council.

In line with prior literature review, which stated that the level of education of the CEO plays a crucial role in the adoption of new technologies, statistics show that in the greater area of Tameside it is not that high and this is probably the reason why, CEOs do not seem to be very open minded about new technology. The numbers also show that prior use of the internet has an impact on taking up new technology. The vast majority of the enterprises that had a mini webpage on the business council website, later they developed their own

According to previous literature, enterprise size does play a key part in the adoption of new technologies. Literature shows that enterprises with less than 10 employees are highly unlikely to adopt the ICT since it would provide little help. Furthermore, the type of business also is crucial, according to the literature with SMEs in the retail and manufacturing business being less likely to adopt ICT services For the case of the Tameside area though, where the majority of the SMEs are of this type, communication tools such as email are esteemed and are used widely. As for the type of business, it was proven that the case is similar to the fore mentioned literature, since the majority of the enterprizes in this area is manufacturing and retail business and were not keen on using the ICT services.

To conclude, SMEs in the area do not perceive the usefulness of the ICT since they see it as a useless cost to their enterprise that would not bring very useful results. Another withholding

factor for the adoption is the fact that high speed internet was not very widespread in the area and just a small number of SMEs had it. Finally, CEOs of the SMEs do not pay very much attention on the role played by ICT in the facilitating the supply chain and the relationship with suppliers since this relationship is not very sophisticated

Allan *et al.* (2003), claim that Australian businesses are lagging behind as far as the adoption of ICT is concerned. The potential provided by the adoption of ICT can secure a competitive advantage in the world market. Adopting the ICT can also aid an enterprise compete with medium enterprises while it remains small, as well as to develop further. According to the surveyors, the electronic type of transaction benefits the interconnection with customers, suppliers and the government, while it also enhances the functionality of the supply chain by reducing the transaction costs. The scholars also claim that the fast comprehension of the benefits of the adoption of e-business can eventually help it gradually develop into a totally digitised enterprise.

The scholars proceed by analysing the framework for the adoption of ICT by SMEs by mentioning 4 factors (technological, environmental, organisational and individual) and their components and mention that the main reason for Australian SMEs to adopt e-business is a “defensive” strategy that is provoked by the competitive advantage gained by early adoptors of ICT in the market share. Another good reason for the SMEs in Australia to enter the e-business world is the pressure by their customers or suppliers for new products of higher IT infrastructure and better functionality of the supply chain respectively. Of course, sometimes this kind of pressure can lead SMEs managers into undertaking technologies unnecessary for conducting their business.

To follow, the scholars explain why a certain number of enterprises show a significant level of resistance in the adoption of ICT. According to Allan et al, a large number of enterprises, even though they understand how beneficial ICT can be, they avoid to undertake it, since they consider it irrelevant to their objectives. It should be also underlined that because of time constraints faced by SME managers, the briefing about ICT adoption and the strategies that must be followed to achieve the maximum result possible is always insufficient. Finally, the scholars present the lack of international laws that would enhance the conditions for fair trading. It is a fact that the legal framework always lags the technological wonders and the risk taken by SMEs sometimes seems very high.

Another barrier to the adoption of e-business is the perceived risk of all the operations to adopt ICT as well as security matters. The disruption of the production processes as well as the the complexity of security systems such as online payment, direct debit, electronic databases, act in many cases in a withholding way for the SMEs. As mentioned in other cases this result can be combined with the fact that there is low level of technology expertise amongst SME managers, a fact that makes the risk look larger and larger.

SMEs in Botswana are imposed into the adoption of ICT due to competition according to Ogori (2009). Enterprises in Botswana, with the aid of new technologies are forced into the design of higher quality products with cheaper prices, due to their participation in a global market and the access they have to customers around the globe. The access to more robust information, the development of intra and extra-nets as communication links with the global market, gives them the opportunity to compete with larger enterprises.

To contradict to that, there are withholding factors that do not help in the adoption of ICT by SMEs, states Ogori. Some of them are common, such as the lack of expertise by the SME staff, the ignorance of the CEOs about the benefits of ICT, the high cost of the ICT tools, the lack of information provided by the state, the lack of a legal framework, and other are more rare such as often power failures.

Windrum and de Barrenger (2003), give a different insight to ICT adoption. The two scholars claim that the success of investing in ICT depends on the SMEs network externalities (customers, suppliers) and the timing an investment is being made and not much focus is given on cutting back transaction costs. It is claimed that if an enterprise decided to invest too quickly on the new way of trading while customers and suppliers have not yet adopted to this new medium of transactions, obviously the return they would profit would be very little. On the other hand if an enterprise decided to invest late to the new technologies with respect to its competitors, chances are it is going to be left way back behind. The two researchers claim that the right timing of investment in new technologies is a matter of:

- The industry sector to which an SME is doing business
- The structures of the supply chain within the firm

As for the factors that may influence the decision to adopt to an e-business transaction style, once again the matter of limited time, resources and knowledge is highlighted. Implementing such a large renovation which changes the structure of the business is of course time and fund consuming. The scholars point out that the key point in implementing such a plan is knowledge by both the manager and the staff not only to set it up and run it but also to understand the strategic value of containing such a system within their business and to find ways to get the maximum out of it in order to benefit as much as possible. It is also mentioned that all this, is a function of the quality of the staff to implement, test and run the system. The need for skilled staff that would have a say in the procedure, and the good co-operation between staff and managers is mentioned for the best possible function of the enterprise.

A very crucial factor, according to the article, for the succesful implementation of e-business is the way the enterprise is managed. The study showed that there is a confusion on the distinction of an SME with respect to their organisational structure. A large number of SMEs were identified to follow the organisational structure of large companies with a “centralised and functionally departmentalised structure” (Windrum 2003). Another closely related fact to the fore-mentioned, according to the scholars, is that the decision of technological renovation is not decided by the CEO but by an isolated Information Systems Department which does not link the adoption of the ICT system to the business strategy of the enterprise. The design of a common business strategy is stated to be the agreement of managers with different point of views after negotiations

Finally, the scholars argue that things differ when refference is made to old SMEs of a mature industry. In such cases, renovation is usually imposed by suppliers or drawn by examples different to ones of the specific industry. In such cases, the substitution of old technologies with new ones may destroy competances and also may be proven time consuming and money wasting. This is probably because the new technologies may be proven irrelevant to the scope of the enterprise and may be proven hard to understand for the staff and the business cooperatives. This point shows that the decision for software and hardware renovation as well as the e-business implementation are also dependent upon the type of industry an enterprise belongs

Kitsos *et al.* (2005), attempted to determine the factors that may influence technical innovation in Greece. Primarily the scholars underline the care that has been taken in

selecting the sample and they also underline the significance of the national character of the sample and the different perception in various areas of the country. To follow, there is a differentiation between scientific policies and technological policies. The results of their survey show that the main problems faced by the Greek enterprises in performing technological innovations is the lack of funds, which wasn't a problem for the case of Korea, the very little information provided about the benefits technology innovation could bring to an organisation, as well as the lack of trained staff. Finally,, the scholars reveal the number of factors that may contribute to the diffusion of the technological innovation. These are “the technical applicability, the profitability, the size structure and organisation of an enterprise, the managerial attitude towards innovation and other factors focused on the general environment of the enterprise”

Pileidou (2008), gives us a review of the challenges of e-business in Greek SMEs. The scholar primarily gives a definition of the SME in Greece. Then, a comparison is being made between the Greek SMEs and the ones in Europe. This comparison shows that the Greek SMEs are missing the train of the new technologies. According to the scholars, when during the period 99-03 the greek SMEs were renovating their mechanical equipment and their building, the european SMEs were focused on the improvement of existing products, the design of new ones, the buying of patents, the use of new material and productional technologies in order to improve their competitiveness. She also provides a definition of the e-business. Thus far it was known that the term e-business included the electronic data interchange between the enterprise with its customers primarily, its business associates and suppliers secondly, and finally, inbetween its employees. In this definition, a third dimension is given which includes portals that connects enterprises to governmental institutions such as the state Inland Revenue and the Social Security Services etc.

To continue, the scholar introduces the reader to the advantages of conducting e-business. The research categorises the advantages according to the participants interested. For the enterprises the key advantage is the design of new products, the refurbishment of old ones, the affiliation of all the products to the information technology, the reduced costs of designing new products, commercialising and delivering, the enhancement of logistics and the supply chain control, the access to different markets and even markets that are more isolated et al.

On the customer's side, the enterprises can present themselves through webpages and by that, the choices are becoming wider. To continue, the scholar underlines the fact that, through the larger number of options and through the competitiveness the prices of goods decline. Amongst other positive aspects of e-business, according to the scholar, are the improved customer service, a customer orientated products, the fast response to the customers needs, new products and services and the access to more information about products. Finally, according to Peilidou, suppliers can be present world-wide since the electronic market knows no borders, there is an improved level of competitiveness, there are much smaller supply chains, transactions take less time to be fulfilled, new customers can be accessed and new business opportunities can be taken advantage of.

Concluding, Peilidou indicates the factors that withhold Greek SMEs from conducting e-business. The primary reason is the high cost of maintaining information systems and staff education on new technologies. This aspect, is closely related to the bad relationship usually seen between staff and top management. Another negative factor for Greek SMEs is the fact that managers usually do not perceive the benefits of such a business transformation. Another aspect that causes fear to the top management of SMEs is the possibility that the new technology may not fulfill the goals of the enterprise in the near future, which means an extra cost which is ofcourse not seen positively by the management. The low level of technological skills of the enterprise staff, alongside with the lack of automated business processes, make the transition to a higher level of technological complexity difficult and costly for enterprises that wish

2.4 Summary

There is a great number of papers concerning the adoption of new technologies and especially the e-business methods by the SMEs. SMEs are considered the backbone of every countrys economy, many governments try to push the SMEs towards modernisation through funding programmes, consulting days etc. On the other hand, in many countries the level of education of the SME CEOs plays a crucial part in the adoption decision and in the evolution of e-business processes. Many see it as an opportunity to gain competitive advantage, while others consider it as a burdain and claim that it is out of their business scope. Of course in many cases, the cultural background and the ethnic characteristics of the inhabitants of each country play a part in the decision for adoption of the ICT technologies. For example, in Japanese

SMEs, discipline plays a great role, the decision for renovation is received by the manager and not by the CEO, and employees have no say in it, while in Korea the adoption of ICT is correlated to the North Korean matter.

Chapter 3

Research model and methodology

3.1 Introduction

In the previous chapter, numerous studies concerning the e-business adoption were presented. The most important studies presented were those of Chang (2009), Parker and Castleman (2009), Taylor and Murphy (2004). In addition to the previous one, this chapter focuses on the methodology followed by various researchers, such as Zhu *et al.* (2003), Jeon *et al.* (2006), and Chang (2009), in order to highlight the factors that affect a company's decision to adopt and implement e-business. These factors are either facilitators, having a positive influence to the e-business adoption decision, or inhibitors having a negative influence. The most significant facilitators examined were the organization size and scope, competitive pressure, government motivation, technological level and consumer readiness. On the other hand the examined inhibitors were lack of trading partner readiness, low internet penetration, and the adoption cost.

This study aims to shed some fresh light on the factors that affect an e-business adoption decision by companies located in North Greece. More specifically, the research will be undertaken in the region of Eastern Macedonia and Thrace. In this region numerous small and medium-size enterprises (SME's) are located. All these companies are the population of our research. From this population a randomly chosen sample, described in section 2.2 (research methodology and survey design section), of companies took part in our research by filling a six-page questionnaire (see Appendix 2). The model of this study was constructed based on the TOE (Technology-Organization-Environment) framework introduced by Tornatzky and Fleischer (1990). According to this framework, a company's decision to implement a technological improvement is affected by technological, organizational and environmental factors. The construction of our model is basically based on the studies of Kuan and Chau (2000), Zhu *et al.* (2003), Wu *et al.* (2003), Jeon *et al.* (2006), and Chang (2009).

Finally, the model created examines seven factors that are classified as technological, organizational and environmental. These are the technological readiness, firm size, firm

scope, CEO's knowledge, adoption cost, willingness and capabilities of supply chain partners, and the competitive pressure. These factors are going to be examined using different statistical techniques.

3.2 TOE perception-based framework

As was mentioned in the introduction, the TOE theory was first introduced by Tornatzky and Fleischer (1990) and was expanded during the same year by De Pietro *et al.* (1990). In their study, Tornatzky and Fleischer (1990) identified three characteristics that influence a company's decision to adopt and implement an information technology (IT) innovation. These characteristics were classified as technological, organizational and environmental.

Analytically, the technological context concerns both the internal (inside the company) and external level (market) of technology. The greater this level is, the more improves a company's productive capabilities (Lippert and Govindarajulu, 2006). According to Rogers (1983), there are five technological characteristics that should be examined in a company's infrastructure: a) relative advantage, b) compatibility, c) complexity, d) trialability, and e) observability. Additionally, Kwon and Zmud (1987) stressed on the importance of the *internal technology resource* examined through the company's infrastructure such as technical skills and developer/user time, for a successful IT innovation adoption. Moreover, the organizational context is consisted of characteristics that concern the company itself as an organization. These characteristics are the available resources to support the innovation adoption. Such characteristics are firm size, firm scope, interconnectedness, formalization, and centralization of the managerial structure, and certainly the size and the quality of firms' available human resources (Lippert and Govindarajulu, 2006). The environmental context is the 'field' where a company conducts its everyday operations. Firstly, is the industry where the company conducts business, its competitors, its suppliers, and its customers. Additionally, a company is also affected by the interactions with the government (Tornatzky and Fleischer, 1990). Figure 2.1 below presents the concept of the TOE conceptual model and its interactions concerning the innovation adoption decision.

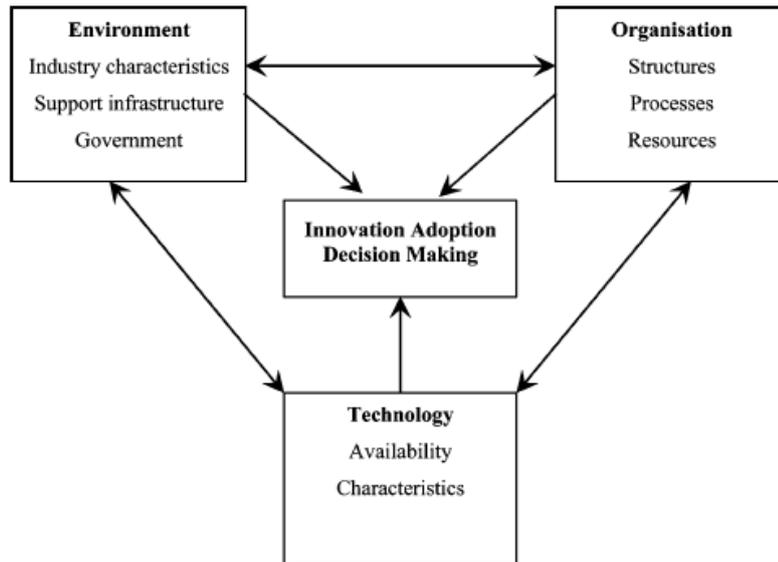


Figure 2.1

Source: Scott (2007), p. 2.

TOE framework was widely used by researchers to explain the drivers of a technological innovation adoption. Iacovou *et al.* (1990), Kuan and Chau (2001), and Premkumar and Ramamurthy (1995) studied the electronic data interchange (EDI) adoption. Besides, Thong (1999) and Chau and Tam (1997) found that the TOE framework best describes the information systems (IS) adoption decision. Cooper and Zmud (1990) and based the material requirements planning (MRP) adoption on technological, organizational, and environmental factors.

3.3 Conceptual model and hypotheses

3.3.1 Technological readiness

A company's technological level was presented to be a crucial element that affects the adoption and implementation of an IS/IT innovation. According to Zmud (1987) a firm's internal technology is affected by its infrastructure, employee's technical skills, developer, and user time. Chang (2009) focused on the enterprises' IT resources that encourage the intention to adopt e-business. According to Zhu *et al.* (2003) a company's internal technological level depends on its IT infrastructure and its employees IT expertise. In the

same sense, Scott (2007) incorporates into the model used IT infrastructure competence and e-business know how. In the present study, similar to Zhu *et al.* (2003) and Scott (2007), we use the IT infrastructure and internet skills sub-factors to examine how the level of technology affects a company's decision to adopt e-business.

IT Infrastructure

Similar studies proved that the level of technology within a company is a very significant factor in the e-business adoption decision (Iacovou *et al.* 1990; Kuan and Chau 2001; Zhu *et al.* 2003; Scott 2007). The IT infrastructure variable will be examined in the questionnaire, through four questions in a seven-point Likert scale based on Kuan and Chau (2000). The first one concerns the company's telecommunications infrastructure to support the e-business adoption. The second one examines whether a company has integrated IS applications encompassing different business areas. The third question is related to the security infrastructure by asking whether the respondents use various security technologies to (e.g., firewall) to protect their data on the internet. Finally, the last question of the IT infrastructure variable is whether the company follows industrial standards to exchange information with trading partners. Therefore, the first hypothesis in our model connects the company's IT infrastructure and e-business adoption.

H₁: Firms with greater IT infrastructure are more likely to adopt e-business.

Internet skills

In the same sense, internet skills are examined using five questions which are based on the questionnaire of Zhu *et al.* (2003). The first question concerns the percentage of employees inside the company who can send e-mails to internal addresses. Secondly, the percentage of employees who can send e-mails to external addresses is examined. The third question is referred to the percentage of your employees who can browse internet sites. Accordingly, the fourth question examines the percentage of the company's employees who can browse intranet sites. Finally, question five concerns the percentage of your employees who can communicate via video-conferencing. The second hypothesis is the following:

H₂: Firms with greater internet skills are more likely to adopt e-business.

3.3.2. Organizational readiness

According to Kwon and Zmud (1987), an IS implementation can be successful, only when sufficient organizational resources exist and are managed wisely. These resources can be sufficient staff, sufficient developer and user time, sufficient funding, and sufficient technical skills. Additionally, Chang (2009) defines the organizational readiness as the “enterprise’s availability of financial and human resources” p.6. The relevant literature reports that the availability of financial and human resources leads to successful e-business adoption (Molla and Licker, 2005). Following previous studies the most significant elements of the organizational context are firm size, firm scope, CEO’s knowledge, and the adoption cost.

Firm size

In the existing literature, firm size has been suggested as a crucial driver influencing the e-business adoption. Densmore (1998), report four reasons why larger firms have a competitive advantage over their smaller peers regarding e-business adoption; 1) they have more free resources to manage the adoption, 2) they are able to achieve scale and scope economies for e-business projects, 3) they can easier bear the risk of a possible failure, and 4) they have a greater bargaining power to urge their suppliers to adopt network externalities, for a more efficient cooperation. Hence, we form the following hypothesis:

H₃ : Larger firms are more likely to adopt e-business

Firm scope

Firm scope is defined as the horizontal expansion of an enterprise’s operations (Zhu *et al.* 2003). Various studies prove that as firm scope increases, costs such as internal and external coordination costs, search costs, and inventory holding costs increase. Additionally, e-business adoption results in lower search costs, improves inventory management and leads to a better coordination, firms with greater scopes have a strong motivation to adopt e-business (Chopra and Meindl, 2001). For that reasons, firms with greater scopes tend to reap the benefits of e-business synergy among them. Firm scope will be measured through the number of establishments that the company has. The connectivity and open-standard data exchange of the internet can create a significant competitive advantage (Steinfield *et al.*, 2002). Therefore, we can hypothesize that:

H₄ : Firms with greater scope are more likely to adopt e-business

CEO's knowledge

According to Harrison *et al.* (1997), CEO* (Chief Executive Officer) characteristics are significant e-business adoption drivers. Jeon *et al.* (2006) use two sub-factors to examine CEO's characteristics that might influence the e-business adoption, CEO's knowledge of IT and CEO's attitudes toward innovation. Likewise, we examine CEO's IT knowledge through one question in the questionnaire and CEO's attitude towards innovation by two (computer software usage and PC usage hours per day). The hypothesis concerning CEO's knowledge is the following:

H₅ : Firms with IT skilled CEOs are more likely to adopt e-business.

Adoption cost

Thong (1999) studied the determinants of information systems adoption in small businesses. From a questionnaire survey among 166 small companies, he found that adoption cost is a significant adoption inhibitor. The highest the IS adoption cost the lowest the company's willingness to adopt e-business. According to Jeon *et al.* (2006), the adoption cost apart from the adoption decision itself, affects the extent of IS adoption. In the present study the cost of e-business adoption is consisted of two sub-factors; the degree of cost burden to adopt eB by the firm, and the cost of maintaining eB.

H₆ : The cost of e-business adoption is negatively related to e-business adoption.

3.3.4. Environmental readiness

Willingness and capabilities of supply chain partners

According to Porter (1979) a company's environment is consisted of the powers of its existing and potential competitors, its partners, and its existing and potential customers. Based on this theory and the study of Chang (2009), the environmental readiness in our model has two components: willingness - capabilities of supply chain partners and competitive pressure.

*Due to the fact that the research concerns small and medium size enterprises CEO might be the owner of the company.

Following Chang (2009), trading partner's capabilities is a significant determinant of on-demand e-business adoption. On-demand e-business is modularized and standardized on the needs of each company. Therefore, a completed supply chain is motivated to use the same e-business architecture to act as an integrated unit. Thus, we set the following hypothesis:

H₇ : Willingness and capabilities of supply chain partners to develop e-business technology is an e-business facilitator.

Competitive pressure environment

Following Jeon et al. (2006), a high competitive environment urges companies to adopt methods and procedures to become more efficient and profitable. Likewise, we test whether North Greek SME's e-business adoption decision is affected by the intensity of the competition in their sector. Competitive pressure is measured through the questionnaire. The intensity of competition in the same industry and the number of rivalries that the answering company face, consist the last factor of our model. The seventh hypothesis becomes as follows:

H₈: High competitive pressure environment leads to e- business adoption.

Governmental support

According to Jeon et al. (2006), another important environmental determinant that motivates companies to adopt e-business, is the financial support and the motivations provided by the government to the companies. Child *et al.* (2003), consider that especially in small economies, such as Greek economy, government bounty plays the most crucial role in the e-business adoption decision. We examine the governmental support factor by two variables suggested by Jeon et al. (2006), which represent two questions in the questionnaire (Appendix). The first variable is the amount of financial support provided by the government for e-business adoption. This amount might be a fraction of the amount spent in the e-business investment, to be returned as cash or tax reduction to the company. The second variable examines the frequency that the company receives or will receive financial support by the Greek government. This variable includes potential renovation and maintenance support. Based on these, it is safe to hypothesize that:

H₉: Governmental support leads to e- business adoption.

Consumer readiness

The last factor to be examined is the consumer readiness factor. Zhu *et al.* (2003), found that consumer readiness is a significant e-business adoption driver. We consider consumer readiness as a combination of two variables: internet penetration in Greece and willingness of Greek consumers to conduct on-line shopping. Following Zhu *et al.* (2003), we consider that a high consumer readiness level and a high level of internet penetration reflect the potential market volume. Therefore, decision makers will be willing to reap the benefits of e-business. The last hypothesis becomes as follows:

H₁₀: Consumer readiness is a determinant of e- business adoption.

Figure 3.2 below depicts the conceptual framework of the model and summarizes the previous analysis. We test whether and to what extent a company's technological, organizational, and environmental readiness affects the e-business adoption decision.

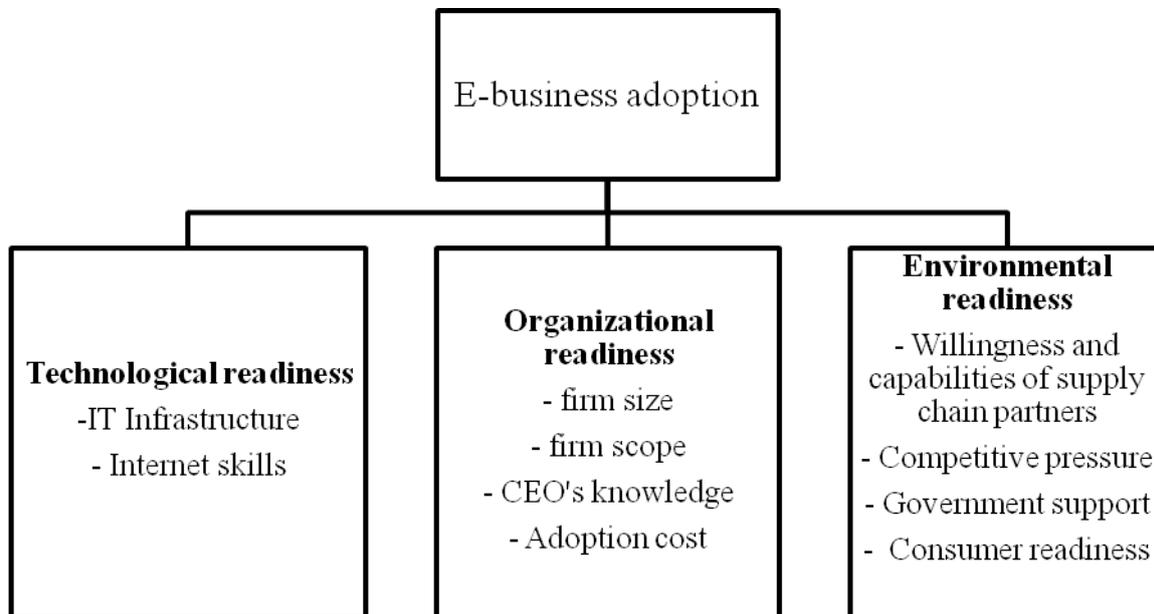


Figure 3.2 Conceptual model of present study

3.3.5 Model construction

Based on the previous analysis and the conceptual model depicted in figure 2.2 above, we constructed a linear regression model to test the hypotheses described. E-business adoption is the dependent variable in a binary logit model where the seven hypotheses are incorporated. Testing the coefficients β_1 to β_{10} whether are non-zero is equivalent to testing whether each one of the hypotheses H_1 to H_{10} are true. Therefore, if we use the symbol “ITI” for I.T. infrastructure, “IS” for internet skills, “FSIZE” for the firm size, “FSCOPE” for firm scope, “CEOK” for CEO’s knowledge, “CT” for the adoption cost, “WCS” for willingness and capabilities of supply chain partners, “CPE” for competitive pressure environment, “GS” for governmental support, and “CR” for consumer readiness the linear regression model will be structured as follows:

$$\text{E-business adoption} = \alpha + \beta_1 (\text{ITI}) + \beta_2 (\text{IS}) + \beta_3 (\text{FSZ}) + \beta_4 (\text{FSC}) + \beta_5 (\text{CEOK}) + \beta_6 (\text{CT}) + \beta_7 (\text{WCS}) + \beta_8 (\text{CPE}) + \beta_9 (\text{GS}) + \beta_{10} (\text{CR}) + \varepsilon$$

The dependent variable (eB adoption) will get values from 1 (for adopters) and 0 (for non-adopters). Technological readiness will be a second-order construct extracted by IT infrastructure and internet skills. Firm size will be examined through the number of employees and firm scope by the number of establishments. CEO characteristics variable will be a construct of CEO’s IT knowledge, computer software capability, and hours of PC usage. Moreover, the adoption cost variable will be a synthesis of adoption and maintenance cost. Willingness and capabilities of supply chain partners variable will be extracted through four questions in the questionnaire. Finally, competitive pressure environment will depend on the intensity degree of competition in the industry and the number of rivalries that the respondent companies face. Same model were used by Chau and Tam (1997) concerning open system adoption, Kuan an Chau (2001) for the study of EDI adoption, and Zhu *et al.* 2003 on their research for the determinants of e-business adoption by European firms. The statistical analysis will be conducted using SPSS 16.0 for windows.

3.4 Research methodology and survey design

In the previous section, the Hypotheses and the model of the study were presented. This section deals with the research methodology and the design of the survey. As was mentioned, the dependent variable will be the e-business adoption. Respondent companies will be classified as adopters and non-adopters by answering the first question of the questionnaire concerning the way they process their orders. If the adopter company uses traditional means such as telephone, fax and e-mail to process their orders, it will be considered a non-adopter. On the other hand, if the respondent company uses “web-services, XML, or other internet based technologies to integrate its order management process with its customer’s procurement process and procurement information can be automatically exchanged between its I.T. system (e.g., ERP) and its customer’s I.T. system, will be considered as an adopter” Chang (2009) p. 25.

As it is clearly stated even in the title of this study, the research is going to focus on small and medium size enterprises (SME’s) located in North Greece. Analytically, the geographical region that this research is going to cover will be Eastern Macedonia and Thrace. This area includes the prefectures of Drama, Kavala, Xanthi, Rodopi and Evros. In those five prefectures over 10,000 SME’s are located. According to Acs and Yeung (1999), small companies are considered those enterprises that employ up to fifty (50) employees and medium size those that employ up to two hundred fifty (250). Data from local organizations, offices and chambers were collected in order to locate a sufficient number of companies to be the target of our research. Finally, six hundred (600) SME’s from Drama, Kavala, Xanthi, Rodopi, and Evros were chosen. The selection of those companies was done using the simple random sampling method (SRS) (Yates *et al.*, 2008). Following the rules of the SRS method, we wrote down in alphabetical order with a serial number, as many companies of those five prefectures as possible. Since, we had gathered 1,200 companies, half of them were selected randomly, simply by choosing all the SME’s had an uneven serial number. Therefore, each company from the list had the same probability of being chosen. Questionnaires were sent to those companies either by e-mail or were given by hand to their CEO’s to be filled in.

3.5 Summary

This study focuses on the determinants of e-business adoption by North Greek small and medium size enterprises. The facilitators to be examined are based on the TOE framework

and cover technological, organizational, and environmental factors. Analytically, the determinants of our research model are the technological readiness, the firm size, firm scope, CEO's knowledge, cost of adoption, willingness and capabilities of supply chain partners, and competitive pressure within the sector. Data have been collected through questionnaires that have been distributed to 600 companies located in the prefectures of Drama, Kavala, Xanthi, and Rodopi. The statistical analysis will be conducted using SPSS to examine a linear regression model constructed. The following chapter presents the results of the statistical analysis.

Chapter 4

Empirical results

4.1 Introduction

In the previous chapter the methodology of this study was presented. The present chapter deals with the statistical analysis, the presentation, and the discussion of the results. The data collection was done using structured questionnaires distributed or sent via e-mail straight to the selected companies and more specifically to their CEO's. Out of the six hundred questionnaires distributed to enterprises, only one hundred and sixty one valid questionnaires were returned. Confirmatory factor analysis and logit linear regression methods were used to test the hypotheses. From the analysis process, it was revealed that the most significant determinants of e-business adoption are firm size, firm scope, governmental support, consumer readiness, I.T. infrastructure and internet skills. On the other hand, willingness and capabilities of supply chain partners, CEOs knowledge, adoption cost, and competitive pressure do not seem to play an important role in the e-business adoption decision by the Greek SMEs.

4.2 E-Business adoption

As was clearly stated even from the title of this study, our research concerns companies located in North Greece and specifically in the area of Eastern Macedonia and Thrace. Analytically, the 161 companies investigated, were located in the prefectures of Drama, Kavala, Xanthi, Rodopi and Evros. It was found that among these companies 74 were e-business adopters and 87 were non-adopters, which means that the adoption rate is approximately 46 per cent. If we scrutinize the data, we will see that the highest adoption rate is met in the prefecture of Rodopi with 50 per cent (15 adopters and 15 non adopters). Accordingly, the adoption rate is 46 per cent in Evros, 44 per cent in Kavala, 37 per cent in Drama and 36 per cent in Xanthi. Table 4.1 below summarizes the analysis above.

Prefectures	<i>Adopters</i>	<i>Non adopters</i>	<i>TOTAL</i>
<i>Drama</i>	11	19	30
<i>Kavala</i>	18	23	41
<i>Xanthi</i>	9	16	25
<i>Rodopi</i>	15	15	30
<i>Evros</i>	16	19	35
<i>TOTAL</i>	74	87	161

Table 4.1 Prefecture allocation

If we expand our analysis to the industrial sector each of these companies belong to, it is obvious that the highest adoption rate is met at the sector of the technological services[†], with 10 adopters out of 14 respondents (71 per cent). Additionally, most of the respondents belong to the commercial sector (42 companies). The adoption rate in this sector is 47 per cent with 20 adopting and 22 non adopting companies. As far as the transportations, financial services, Food/drink sector, and health/beauty services are concerned, the adoption rate is 42, 50, 34, and 42 per cent respectively. Finally, there were 6 adopting companies that did not belong in any of the previous sectors. Table 4.2 depicts the allocation of the respondents among the seven sectors discussed above.

SECTOR	<i>ADOPTERS</i>	<i>NON ADOPTERS</i>	<i>TOTAL</i>
<i>Commerce</i>	20	22	42
<i>Transportations</i>	8	11	19
<i>Financial services</i>	9	9	18
<i>Food/Drink</i>	11	21	32
<i>Health/Beauty services</i>	10	14	24
<i>Technological services</i>	10	4	14

[†] In this industrial sector 14 IT solutions and software companies were included.

<i>Other</i>	6	6	12
TOTAL	74	87	161

Table 4.2 Sector allocation

4.3 Sampling adequacy

As was mentioned in the methodology chapter, there were 600 questionnaires distributed to companies located in five prefectures of Eastern Macedonia and Thrace. From them, only 161 questionnaires were finally answered, a 26 per cent response rate. This rate is used by researchers as a measure of equivalency (Dillman, 2000). The relatively high response rate of the present research was succeeded due to the fact that a significant number of questionnaires were distributed hand by hand straight to the CEOs of those companies. Besides, from the statistical analysis (factor analysis), conducted using the SPSS software, various sampling adequacy measures were extracted. The KMO measure (Kaiser-Meyer-Olkin Measure of Sampling Adequacy) was computed and the result is considered to be acceptable (.670), since it is higher than 0.5 threshold. On the other hand, the significance level of Bartlett's test of sphericity is .000 which is also considered to be satisfactory, since it is less than 0.05 (Tabachnick and Fidell, 1996). Table 4.3 below summarizes the sampling adequacy measures.

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.670
Bartlett's Test of Sphericity	Approx. Chi-Square	1547.713
	df	276.000
	Sig.	.000

Table 4.3 Sampling adequacy measurement

4.4 Factor analysis

In the previous section, it was proved that the sample is appropriate for statistical analysis. In this section the confirmatory factor analysis, conducted using the SPSS, is presented. Rotation with Kaiser Normalization was converged in six iterations and eight components (factors) were extracted. The extraction method used was principal component analysis and the

components had strong loadings. The reliability test has produced acceptable results for all factors (Cronbach $\alpha > 0.7$). The eight factors generated were the I.T. infrastructure, the internet skills, CEO's knowledge, adoption cost, willingness and capabilities of supply chain partners, competitive pressure, governmental support, and consumer readiness. Table 4.5 below presents the rotated component matrix with the factor loadings.

<i>Rotated Component Matrix</i>								
<i>FACTOR</i>	I.T. Infrastructure	Internet skills	CEO's knowledge	Adoption cost	Willingness of partners	Competitive pressure	Governmental support	Consumer readiness
<i>IT1</i>	.705							
<i>IT2</i>	.750							
<i>IT3</i>	.798							
<i>IT4</i>	.916							
<i>IS1</i>		.739						
<i>IS2</i>		.767						
<i>IS3</i>		.744						
<i>IS4</i>		.790						
<i>IS5</i>		.718						
<i>CK1</i>			.596					
<i>CK2</i>			.834					
<i>CK3</i>			.818					
<i>AC1</i>				.877				
<i>AC2</i>				.858				
<i>WCP1</i>					.848			
<i>WCP2</i>					.885			
<i>WCP3</i>					.788			
<i>WCP4</i>					.854			
<i>CP1</i>						.852		
<i>CP2</i>						.843		
<i>GS1</i>							.870	
<i>GS2</i>							.890	

<i>CR1</i>	.865
<i>CR2</i>	.900

Table 4.5 Factor loadings

4.5 Logit linear regression

Apart from the eight factors extracted from the factors analysis, two more factors were included in the linear regression model, as it is presented in the methodology chapter. Firm size and firm scope are also included as factors into the model, since are each one examined by one question in the questionnaire. Therefore, there are ten independent variables incorporated into the model with e-business adoption being the dependent variable. E-business adoption is a binary variable taking prices of 0 for non-adopters and 1 for adopters. Consequently, the logit regression model becomes as follows:

$$\mathbf{E-business}_{\text{adoption}} = \alpha + \beta_1 (\text{ITI}) + \beta_2 (\text{IS}) + \beta_3 (\text{FSZ}) + \beta_4 (\text{FSC}) + \beta_5 (\text{CEOK}) + \beta_6 (\text{ACOST}) + \beta_7 (\text{WCS}) + \beta_8 (\text{CPE}) + \beta_9 (\text{GS}) + \beta_{10} (\text{CR}) + \varepsilon$$

Symbol	Name	Explanation
ITI	Information Technology Infrastructure	Factor 1
IS	Internet Skills	Factor 2
FSZ	Firm size	Number of employees
FSC	Firm Scope	Number of establishments
CEOK	CEO's Knowledge	Factor 3
ACOST	Adoption Cost	Factor 4
WCS	Willingness and capabilities of supply chain partners	Factor 5
COMP	Competitive Pressure	Factor 6

GS	Governmental Support	Factor 7
CR	Consumer Readiness	Factor 8

Table 4.6 Model Variables

The following table 4.6 explains the relative predictive power of the model. The R square value of the model is 0.700 which means that ten variables explain a proportion of 70 per cent of the e-business adoption (dependent variable). The Durbin-Watson value is 2.110 indicating that there is no autocorrelation among the constructs and close observations have a tendency to be different (Manly, 2000).

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.836	.700	.679	.283	2.110

Table 4.6 Model Summary

Table 4.7 below depicts the analysis of variance of the logit regression model. The ten variables used are appropriate to test the model since the F value is 34.920. The F value is used to examine whether the slopes b_1 , b_2 , b_3 , b_4 , b_5 , b_6 , b_7 , b_8 , b_9 , and b_{10} are zero or not. Additionally, the sig. price (.000) designates that the test is statistically significant at the 1 per cent confidence level.

Model	Sum of Squares	df	Mean Square	F	Sig.
1 Regression	27.972	10	2.797	34.920	.000
Residual	12.016	150	.080		
Total	39.988	160			

Table 4.7 ANOVA

Since, the relative predictive power and the variance of the model are in satisfactory levels, the analysis continues with the presentation of the standardized and unstandardized coefficients. Table 4.8 below summarizes the Beta values of each one of the model's

variables. The constant in the model is 1.802 and it is statistically significant (sig. .000). The highest beta values are of firm size and firm scope variables with values of .712 and .569 respectively. Additionally, Beta values for governmental support, consumer readiness, IT infrastructure and internet skills are .498, .370, .313, and .312 respectively. On the other hand, CEOs knowledge, willingness and capabilities of supply chain partners, and competitive pressure appeared low beta values of .099, .039, and .002 respectively. The adoption cost variable has a negative beta value (-0.016) indicating that the cost of e-business adoption is an inhibitor at the adoption task. Thus, the linear regression model theorized before, becomes as follows:

$$\mathbf{E-business}_{\text{adoption}} = 1.802 + .313 (\text{ITI}) + .312 (\text{IS}) + .712 (\text{FSZ}) + .569 (\text{FSC}) + .099 (\text{CEOK}) - .016 (\text{ACOST}) + .039 (\text{WCS}) + .002 (\text{COMP}) + .498 (\text{GS}) + .370 (\text{CR}) + \varepsilon$$

It is more than obvious that the dependent variable of the model is mostly affected by firm size and firm scope. E-business adoption is also affected by governmental support, consumer readiness, IT infrastructure and internet skills variables. Lastly, CEOs knowledge, adoption cost, willingness and capabilities of supply chain partners and competitive pressure do not seem to have a significant interaction to the e-business adoption.

Constructs	Unstandardized		Standardized	Sig.
	Beta	Std. Error	Beta	
Constant	1.802	.049		.000
ITI	.313	.030	.425	.000
WCS	.039	.022	.078	.015
IS	.312	.083	.007	.014
CEOK	.099	.030	.199	.001
CR	.370	.022	.014	.005
GS	.498	.112	.060	.019
ACOST	-.016	.022	-.032	.010
COMP	.002	.023	.004	.007
FSZ	.712	.204	.270	.002

FSC	.569	.122	.182	.010
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Table 4.8 Coefficients

The following table presents the Tolerance and VIF (Variance Inflation Factor) values of the variables. Tolerance values belong in the [0-1] interval indicating that there is a linear relationship with the rest independent variables. Moreover, most tolerance values are close to 1, indicating a small collinearity among the model variables. The VIF values, which are calculated as 1/tolerance, are all below 5 indicating that there is no collinearity among the variables.

Constructs	Collinearity Statistics	
	Tolerance	VIF
ITI	.545	1.836
WCS	.992	1.008
IS	.958	1.044
CEOK	.575	1.740
CR	.994	1.006
GS	.995	1.005
ACOST	.999	1.001
COMP	.957	1.045
FSZ	.257	3.638
FSC	.415	2.411

Table 4.9 Collinearity statistics

4.6 Findings and interpretations

Based on the previous analysis and mostly on the coefficients generated by the SPSS tables, we can examine the set of hypotheses that was described in the methodology chapter and discuss the findings of this research

Finding 1

Firm size, Firm scope, governmental support, consumer readiness, IT infrastructure and internet skills are the most important e-business adoption drivers by Greek SMEs. Among them firm size was proved to be the most significant.

These findings are partially consistent with the findings of Zhu *et al.* (2003) and Jeon *et al.* (2006). According to Zhu *et al.* (2003) the most significant drivers for the e-business adoption in the European countries were the level of technology, firm scope and size, consumer readiness and competitive pressure. Among these determinants, in addition to the present study, firm scope was proved to be the most important factor. Following Jeon *et al.* (2006), governmental support was proved to be the most significant adoption determinant by Korean SMEs. In addition to our study, business size was not an e-business adoption driver.

Finding 2

Willingness and capabilities of supply chain partners, CEOs knowledge, adoption cost, and competitive pressure do not seem to play an important role in the e-business adoption decision by the Greek SMEs. From these, the adoption cost is an inhibitor of the adoption decision, though with a small significance.

In addition to the study of Jeon *et al.* (2006), for the Korean SMEs, in the present study, CEOs knowledge is not an important determinant of e-business adoption. Contrarily, similar to the European companies in the study of Zhu *et al.* (2003), willingness and capabilities of supply chain partners and competitive pressure are the least important environmental drivers.

Finding 3

The TOE framework, introduced by Tornatzky and Fleischer (1990), was proved to be suitable for the study of e-business adoption by Greek SMEs. Moreover, the organizational drivers were proved to be more important than technological and environmental.

Similar to our research, Chang (2009) proved that enterprises' internal capabilities are more important than the environmental characteristics when it comes to the e-business adoption decision. Moreover, several academics such as Iacovou *et al.* (1990), Premkumar and

Ramamurthy (1995), Chau and Tam (1997), Kuan and Chau (2001), Zhu *et al.* (2003), proved that the TOE framework is the best tool to describe an IS adoption decision.

4.6 Summary

This chapter dealt with the statistical analysis and the presentation of the results, mainly through detailed tables. The sample used was consisted of 161 companies located in Eastern Macedonia and Thrace and the prefectures of Drama, Kavala, Xanthi, Komotini and Evros. It was found that the adoption rate in this area was 46 per cent. Since the sample was proved to be adequate for statistical analysis we conducted confirmatory factor analysis and logit linear regression. Eight factors were extracted from the factor analysis. Along with the eight factors, firm size and firm size were also incorporated in a linear regression model. Finally, it was found that firm size, firm scope, governmental support, consumer readiness, IT infrastructure and internet skills are the most important e-business adoption drivers for Greek SMEs. Among them firm size was proved to be the most significant.

Chapter 5

Conclusions and limitations

5.1 Findings and Implications

The e-business adoption decision is a complex and serious decision affected by various technological, organizational and environmental factors (Chau and Tam, 1997). According to Behesti and Salehi-Sangari (2006), e-business adoption leads to efficiency and operational flexibility, which in the long run results in the reduction of transaction and agency costs. The aims and the objectives of this study were made clear from the very start of this dissertation. We intended to illuminate the drivers of the e-business adoption decision by small and medium-size enterprises located in North Greece. Along with this, we aimed to investigate the e-business adoption rate by companies of this area.

As a result, it was found that the e-business adoption rate by SMEs in the examined area is relatively low. From the 161 companies questioned, only 74 were already implementing e-business practices. The rest 87 companies still process their sales and orders via traditional means such as telephone and fax. Therefore, the general adoption rate found is approximately 46 per cent. Analytically, the highest adoption rate was met in the prefecture of Rodopi with 50 per cent (15 adopters and 15 non adopters). In Evros the adoption rate is 46 per cent, 44 per cent in Kavala, 37 per cent in Drama and 36 per cent in Xanthi. In an industrial sector basis, the results indicate a high e-business adoption tense by technological services companies (71%). Moreover, most of the respondents belong to the commercial sector (42 companies). The adoption rate in this sector is 47 per cent with 20 adopting and 22 non adopting companies. As far as the transportations, financial services, Food/drink sector, and health/beauty services are concerned, the adoption rate is 42%, 50%, 34%, and 42% respectively.

Besides, it was found that the most significant e-business adoption facilitator is the firm size. This technically means that as the number of a company's employees increases, the company has the tension to adopt innovative organizational technologies such as e-business. Accordingly, we can assume that as a company grows bigger, it tends to adopt and implement

more efficient I.T. systems and reap the benefits of e-business. From a managerial standpoint, our empirical results suggest that managers and company owners should support their efforts for growth and profit maximization along with e-business adoption.

Apart from the enterprise size, was also extracted that firm scope, governmental support, consumer readiness, IT infrastructure and internet skills are important e-business adoption facilitators by Greek SMEs. This finding offers implications both for firms and the Greek government. Managers and company owners should focus on their company's technological readiness in order to create a compatible business structure ready to accept innovative I.T. systems. In order to succeed in this, managers should keep in mind that technological readiness implies both a high-quality I.T infrastructure and skillful employees. On the other hand, policy makers should support and promote e-business adoption by SMEs, in a more efficient way. Towards this direction, the Greek government should vote for more supportive business and tax laws to stimulate e-business adoption, remove the existing barriers, provide companies with infrastructure and subsidies, and enhance internet penetration in Greece.

5.2 Limitations and Further research

The limitations of this study are at the same time opportunities for further research. Firstly, in order to gain a holistic understanding of the subject, we focused only on the e-business adoption decision and the drivers that affect it. Therefore, there was not a research concerning the implementation process and the adjustments that are necessary for e-business adoption. These last two subjects worth study, especially concerning SMEs were financial resources are limited.

Moreover, our research was expanded among companies of Eastern Macedonia and Thrace. A similar research should be conducted among companies of Southern Greece located close to Athens. The Greek capital provides with more opportunities for access to financial and human resources. Therefore, a research like this would possibly produce different findings than the present one. Another limitation of this study was that the firm size variable was only examined through the number of employees. The original idea was to examine firm size both by the number of employees and the last fiscal year's sales amount. Due to the fact that sales amount was not answered in the questionnaires, it was extracted from the analysis. Finally,

only the number of employees was the firm size indicator. A similar research could be conducted among Greek listed companies were the previous year's sales or net profit amount will be known.

To sum up, through this study became clear that e-business adoption plays a key role in today's business world. SMEs, which are the major contributor to the national wealth of Greece, should proceed faster in adopting e-business practices. This way, Greek SMEs will be able to compete foreign companies and the Greek economy will exit the financial crisis. In this effort the contribution of managers and policy makers is fundamental.

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Appendix A - Questionnaire

COMPANY DATA

INDUSTRY

CD1. In which of the following sectors does your company operate?		
<input type="checkbox"/> Commerce	<input type="checkbox"/> Transportations	<input type="checkbox"/> Financial services
<input type="checkbox"/> Food/Drink	<input type="checkbox"/> Health services	
<input type="checkbox"/> Other	<input type="checkbox"/> Technological	

FIRM SIZE

CD2. How many employees does your company employ?	
<input type="text"/>	(Please write number into the box)

DD3. What was your sales (turnover) amount for the fiscal year 2008?	
<input type="text"/>	(Please write number into the box)

FIRM SCOPE

CD4. How many establishments does your company have?	
<input type="text"/>	(Please write number into the box)

E-BUSINESS ADOPTION

Which of the following best describes your current status? Please choose only one option.

<p>EB1. You process the orders via traditional means such as telephone, fax, and e-mail.</p> <p><input type="checkbox"/></p>
<p>EB2. Use of Web-services, XML, or other internet based technologies to integrate your order management process with your customer’s procurement process. Procurement information can be automatically exchanged between your I.T. system (e.g., ERP) and your customer’s I.T. system (e.g., ERP).</p> <p><input type="checkbox"/></p>

TECHNOLOGICAL CONTENT

I.T. INFRASTRUCTURE

In the following statements please indicate your level of agreement on the scale of 1 (strongly agree) to 7 (strongly disagree).

ITI1. Your company has a good telecommunications infrastructure to support an e-business implementation (e.g. email, internet, or intranet).							
ITI2. Your company has integrated IS applications (e.g., ERP) encompassing different business areas.							
ITI3. Your company uses various security technologies to (e.g., firewall) to protect your data on the internet.							
ITI4. Your company follows industrial standards to exchange information with trading partners.							

INTERNET SKILLS

In the following statements please indicate your level of agreement on the scale of 1 (No one) to 7 (All).

IS1. What is the percentage of your employees who can send e-mails to internal addresses?							
IS2. What is the percentage of your employees who can send e-mails to external addresses?							
IS3. What is the percentage of your employees who can browse internet sites?							
IS4. What is the percentage of your employees who can browse intranet sites?							
IS5. What is the percentage of your employees who can communicate via video-conferencing?							

ORGANIZATIONAL CONTENT

CEO's KNOWLEDGE

In the following statements please indicate your level of agreement on the scale of 1 (Zero) to 7 (Excellent).

CK1. Characterize the level of your general IT knowledge?							
CK2. Characterize your capability to use computer software.							
CK3. What are your PC usage hours per day?							

ADOPTION COST

In the following statements please indicate your level of agreement on the scale of 1 (Insignificant) to 7 (Extremely high).

AC1. What is/was the cost burden to adopt e-business?							
AC2. What is/will be the cost for maintaining e-business?							

ENVIRONMENTAL CONTENT

WILLINGNESS AND CAPABILITIES OF SUPPLY CHAIN PARTNERS

In the following statements please indicate your level of agreement on the scale of 1 (strongly agree) to 7 (strongly disagree).

WCP1. Your trading partners are willing to join committees or work groups for e-business implementation.							
WCP2. Your trading partners are willing to provide with training seminars or share system implementation expertise to help your e-business implementation							
WCP3. Your trading partners support your company's business process reengineering efforts related to the e-business adoption (e.g., providing with the technological or financial support).							
WCP4. Your trading partners are willing to implement process reengineering in order to implement e-business more smoothly.							

COMPETITIVE PRESSURE

In the following statements please indicate your level of agreement on the scale of 1 (Insignificant) to 7 (Extremely high).

CP1. What is the intensity degree of competition in your industry?							
CP2. How many rivalries does your firm face?							

GOVERNMENTAL SUPPORT

In the following statements please indicate your level of agreement on the scale of 1 (Zero) to 7 (Extremely high).

GS1. Characterize the amount of financial support provided by the government for e-business adoption.							
GS2. Characterize the frequency of receiving financial support by the Greek government.							

CONSUMER READINESS

In the following statements please indicate your level of agreement on the scale of 1 (Insignificant) to 7 (Extremely high).

CR1. Characterize the level of the internet penetration in Greece.							
CR2. Characterize the level of Greek consumers' willingness to conduct on-line shopping.							

Appendix B – SPSS OUTPUT

1. Factor analysis

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3,700	15,417	15,417	3,700	15,417	15,417	3,030	12,624	12,624
2	3,138	13,076	28,493	3,138	13,076	28,493	2,947	12,280	24,904
3	2,873	11,970	40,464	2,873	11,970	40,464	2,899	12,078	36,982
4	1,805	7,520	47,984	1,805	7,520	47,984	1,940	8,084	45,066
5	1,714	7,140	55,124	1,714	7,140	55,124	1,721	7,173	52,239
6	1,548	6,450	61,574	1,548	6,450	61,574	1,715	7,145	59,384
7	1,513	6,306	67,880	1,513	6,306	67,880	1,628	6,781	66,165
8	1,143	4,763	72,643	1,143	4,763	72,643	1,555	6,478	72,643
9	,772	3,217	75,860						
10	,654	2,725	78,585						
11	,587	2,446	81,030						
12	,557	2,322	83,352						
13	,538	2,243	85,595						

14	,501		2,089	87,684					
15	,419		1,746	89,430					
16	,409		1,705	91,136					
17	,390		1,623	92,759					
18	,367		1,529	94,288					
19	,300		1,251	95,539					
20	,289		1,205	96,744					
21	,237	,989		97,733					
22	,207	,862		98,594					
23	,194	,810		99,404					
24	,143	,596		100,000					

Extraction Method: Principal Component Analysis.

Rotated Component Matrix^a

	Component							
	1	2	3	4	5	6	7	8

Your company has a good telecommunications infrastructure to support an e-business implementation (e.g. email, internet, or intranet).	,705	,012	,093	-,165	-,018	-,272	,034	-,138
Your company has integrated IS applications (e.g., ERP) encompassing different business areas.	,750	-,034	-,032	-,297	-,013	,162	-,036	,016
Your company uses various security technologies to (e.g., firewall) to protect your data on the internet.	,798	-,035	-,105	,009	,021	,102	,025	,184
Your company follows industrial standards to exchange information with trading partners.	,916	-,074	-,024	-,119	-,002	,034	-,036	-,009
What is the percentage of your employees who can send e-mails to internal addresses?	-,139	-,119	,739	-,149	,163	-,051	-,134	,019
What is the percentage of your employees who can send e-mails to external addresses?	,007	,098	,767	,082	,019	,019	,107	-,023
What is the percentage of your employees who can browse internet sites?	,044	-,096	,744	,040	-,130	-,138	-,156	-,053

What is the percentage of your employees who can browse intranet sites?	-.053	-.084	,790		-.090	-.083	,005	,102	,001
What is the percentage of your employees who can communicate via video-conferencing?	,047	,097	,718	,028		-.143	,007		-.027 ,098
Characterize the level of your general IT knowledge?	-.592	,028		-.015 ,596	,067		,022		-.020 ,065
Characterize your capability to use computer software.	-.216	-.087		-.006 ,834		-.011	-.055	,069	-.068
What are your PC usage hours per day?	-.177	-.024		-.042 ,814		-.005	,056	,015	,084
What is/was the cost burden to adopt e business?	,016	-.087		-.009 ,116		-.097	-.019	,877	-.037
What is/will be the cost for maintaining e-business?	-.019	,095		-.043	-.044 ,171		-.055	,858	-.034
Your trading partners are willing to join committees or work groups for e-business implementation.	-.041	,848		-.073	-.045	-.039	,005	,145	-.005
Your trading partners are willing to provide with training seminars or share system implementation expertise to help your e-business implementation	,026	,885	,088	,073		-.030	,067		-.081 ,092

Your trading partners support your company's business process reengineering efforts related to the e-business adoption (e.g., providing with the technological or financial support).								
	-0,085	,788	-0,041	-0,159	,146	-0,022	,009	,012
Your trading partners are willing to implement process reengineering in order to implement e-business more smoothly.								
	-0,030	,854	-0,037	,025	-0,055	-0,046	-0,060	-,104
What is the intensity degree of competition in your industry?	,113		-0,019	,085	,047	-0,089	,010	,026
								,852
How many rivalries does your firm face?								
	-0,073	,009	-0,042	-0,005	,084	-0,044	-0,094	,843
Characterize the amount of financial support provided by the government for e-business adoption.								
	,041	,051	-0,084	,027	,077	,870	-0,046	-,100
Characterize the frequency of receiving financial support by the Greek government								
	,015		-0,049	-0,020	-0,023	,000	,890	-0,023
								,057
Characterize the level of the internet penetration in Greece								
	-0,071	,066	-0,088	-0,050	,865	,109	,065	-,022

Characterize the level of Greek consumers' willingness to conduct on-line shopping.	,051	-,053	-,073	,062	,900	-,028	,002	,019
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Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 6 iterations.

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.	,670
Bartlett's Test of Sphericity	Approx. Chi-Square
	1547,713
	df
	276,000
	Sig.
	,000

Component Score Covariance Matrix

Component	1	2	3	4	5	6	7	8
1	1,000	,000	,000	,000	,000	,000	,000	,000
2	,000	1,000	,000	,000	,000	,000	,000	,000
3	,000	,000	1,000	,000	,000	,000	,000	,000
4	,000	,000	,000	1,000	,000	,000	,000	,000
5	,000	,000	,000	,000	1,000	,000	,000	,000
6	,000	,000	,000	,000	,000	1,000	,000	,000
7	,000	,000	,000	,000	,000	,000	1,000	,000
8	,000	,000	,000	,000	,000	,000	,000	1,000

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

Component Scores.

2. Linear regression

Descriptive Statistics

	Mean	Std. Deviation	N
Use of Web-services, XML, or other internet based technologies to integrate your order management process with your customer's procurement process. Procurement information can be automatically exchanged between your I.T. system (e.g., ERP) and your customer's I.T. system (e.g., ERP).	1,54	,500	161
REGR factor score 1 for analysis 1	,0000000	1,00000000	161
REGR factor score 2 for analysis 1	,0000000	1,00000000	161
REGR factor score 3 for analysis 1	,0000000	1,00000000	161
REGR factor score 4 for analysis 1	,0000000	1,00000000	161

REGR factor score 5 for analysis 1	.0000000	1,00000000	161
REGR factor score 6 for analysis 1	.0000000	1,00000000	161
REGR factor score 7 for analysis 1	.0000000	1,00000000	161
REGR factor score 8 for analysis 1	.0000000	1,00000000	161
How many employees does your company employ?	12,29	11,131	161
How many establishments does your company have?	1,99	1,601	161

Model Summary^b

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	,836 ^a	,700	,679	,283	,700	34,920	10	150	,000	2,110

a. Predictors: (Constant), How many establishments does your company have? , REGR factor score 6 for analysis 1, REGR factor score 7 for analysis 1, REGR factor score 3 for analysis 1, REGR factor score 5 for analysis 1, REGR factor score 8 for analysis 1, REGR factor score 2 for analysis 1, REGR factor score 4 for analysis 1, REGR factor score 1 for analysis 1, How many employees does your company employ?

b. Dependent Variable: Use of Web-services, XML, or other internet based technologies to integrate your order management process with your customer's procurement process. Procurement information can be automatically exchanged between your I.T. system (e.g., ERP) and your customer's I.T. system (e.g., ERP).

ANOVA^b

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	27,972	10	2,797	34,920	,000 ^a
	Residual	12,016	150	,080		
	Total	39,988	160			

a. Predictors: (Constant), How many establishments does your company have? , REGR factor score 6 for analysis 1, REGR factor score 7 for analysis 1, REGR factor score 3 for analysis 1, REGR factor score 5 for analysis 1, REGR factor score 8 for analysis 1, REGR factor score 2 for analysis 1, REGR factor score 4 for analysis 1, REGR factor score 1 for analysis 1, How many employees does your company employ?

b. Dependent Variable: Use of Web-services, XML, or other internet based technologies to integrate your order management process with your customer's procurement process. Procurement information can be automatically exchanged between your I.T. system (e.g., ERP) and your customer's I.T. system (e.g., ERP).

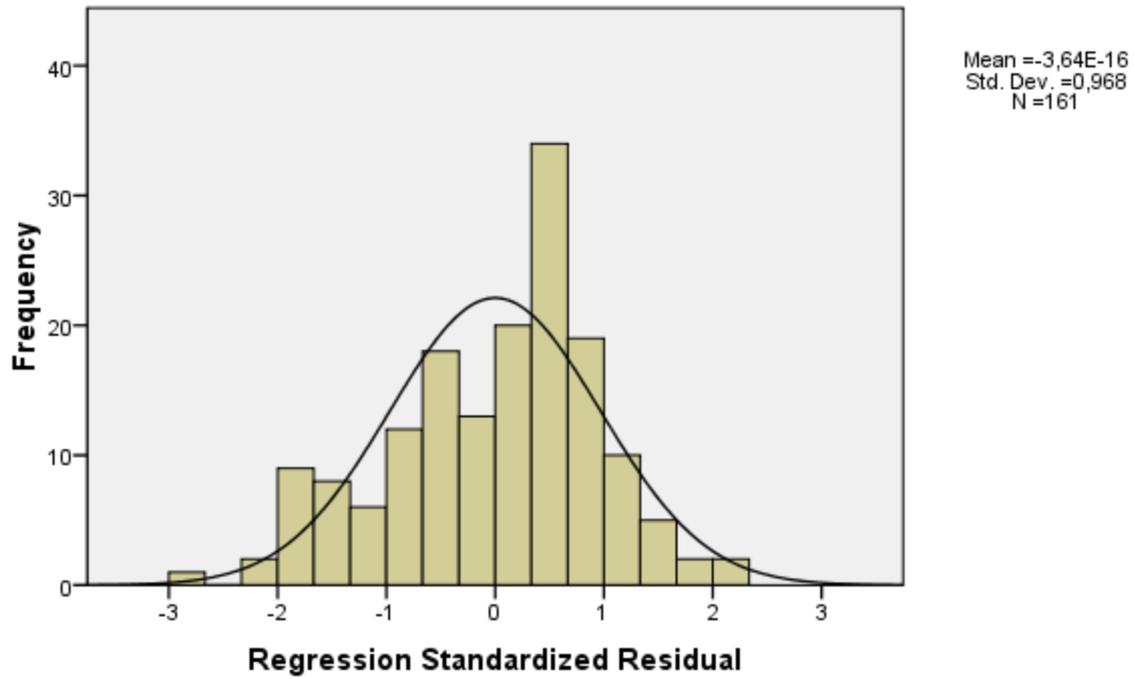
Coefficients^a

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95% Confidence Interval for B		Correlations			Collinearity Statistics			
	B	Std. Error	Beta			Lower Bound	Upper Bound	Zero-order	Partial	Part	Tolerance	VIF		
	1													
	(Constant)	1,802	,049					1,705	1,899					
	REGR factor score 1 for analysis 1 ITI	,313	,030	,425	7,013	,000	,153	,473	,664	,497	,314	,545	1,836	
	REGR factor score 2 for analysis 1WCP	,039	,022	,078	1,732	,153		-,083	,105	,064	,140	-,078	,992	1,008
	REGR factor score 3 for analysis IIS	,312	,083	,007	,158	,141		-,042	,449	,016	,013	,007	,958	1,044
	REGR factor score 4 for analysis ICEOK	,099	,030	,199	3,370	,001		-,158	,141	,416	,265	-,151	,575	1,740
	REGR factor score 5 for analysis 1 CR	,370	,022	,014	,313	,005		-,051	,537	,033	,026	-,014	,994	1,006
	REGR factor score 6 for analysis IGS	,498	,112	,060	1,327	,019		-,074	,615	,069	,108	-,059	,995	1,005
	REGR factor score 7 for analysis 1 ACOST	-,016	,022	-,032	,724	,010		-,028	,460	,023	,059	,032	,999	1,001
	REGR factor score 8 for analysis ICOMP	,002	,023	,004	,091	,027		-,047	,043	,051	,007	-,004	,957	1,045
	How many employees does your company employ?	,712	,204	,270	3,158	,002		-,020	,885	,747	,250	-,141	,275	3,638
	How many establishments does your company have?	,569	,122	,182	2,623	,010		-,100	,714	,671	,209	-,117	,415	2,411

a. Dependent Variable: Use of Web-services, XML, or other internet based technologies to integrate your order management process with your customer's procurement process. Procurement information can be automatically exchanged between your I.T. system (e.g., ERP) and your customer's I.T. system (e.g., ERP).

Histogram

Dependent Variable: Use of Web-services, XML, or other internet based technologies to integrate your order management process with your customer's procurement process. Procurement information can be automatically exchanged between your I.T. system (e.g., ERP) and your customer's I.T. system (e.g., ERP).



Normal P-P Plot of Regression Standardized Residual

Dependent Variable: Use of Web-services, XML, or other internet based technologies to integrate your order management process with your customer's procurement process. Procurement information can be automatically exchanged between your I.T. system (e.g., ERP) and your customer's I.T. system (e.g., ERP).

