Factors affecting e-business adoption in SMEs: an empirical research

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Abstract

Purpose – Nowadays, small and medium enterprises (SMEs) are incrementally using e-business tools in order to compete in an extremely hostile market and gain global access. The importance of e-business adoption for the economic success and survival of SMEs creates a very interesting field of research. The purpose of this paper is to develop and empirically test a conceptual framework that investigates the factors affecting the e-business adoption decision in SMEs.

Design/methodology/approach – The examination of the proposed conceptual framework was made with the use of a newly developed structured questionnaire that was distributed to a group of Greek SMEs. The questionnaire was distributed to 600 companies, while 161 usable questionnaires were finally returned. exploratory factor analysis, confirmatory factor analysis, linear regression methods and the structural equation modelling (SEM) technique were used to test the research hypotheses.

Findings – The proposed model explains 71 per cent of the variance of e-business adoption, with firm size, firm scope, IT infrastructure and internet skills being the most important e-business adoption drivers (with firm size being the most significant). On the other hand, CEOs knowledge, adoption cost, and competitive pressure do not seem to play an important role in the e-business adoption decision.

Research limitations/implications – A limitation stemming from the implemented methodology is the use of self report scales to measure the constructs of the proposed model. Moreover, the present paper lacks a longitudinal approach, since it is cross-sectional and provides a static picture of e-business adoption.

Practical implications – The paper makes an effort in order to point out areas that companies should emphasise in order to successfully adopt e-business and, therefore, harvest its potential benefits. Certain practical implications are offered in the final part of the paper.

Originality/value – First, the present study places SMEs in the centre of its attention, while the contemporary research mostly examines the implementation of e-business practices in large organisations. Second, the present study proposes a three-dimensional conceptual framework, including technological, organisational and environmental context. Such a multidimensional approach has randomly been explored in the existing literature. Third, the results of the study may be generalised in other developed countries with similar economic realities and yield interesting outcomes for practitioners in these countries.

Keywords Greece, SMEs, Structural equation modelling, TOE framework, e-Business adoption, Focus group methodology

Paper type Research paper

1. Introduction

Nowadays, the huge potential of e-business (electronic business) to completely transform business models, structures and processes has been universally acknowledged (Kirs and Bagchi, 2012; Zhu *et al.*, 2006). According to Turban *et al.* (2004), e-business integrates communication technologies with business and management practices via the use of the internet. These technologies assist organisations in understanding customer needs, customising products, adopting effective market solutions and receiving orders from customers (both retailers and wholesalers). Additionally, the use of the internet is having

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a significant impact on firm performance (e.g. improved supply chain, reduction of operational costs, etc.) (Koellinger, 2008; Lopez-Nicolas and Merono-Cerdan, 2011).

Small and medium enterprises (SMEs) are considered to be the backbone of every modern economy, while governments around the globe are trying to push SMEs towards modernisation through funding programmes and other initiatives. On the other hand, the level of education of Chief Executive Officers (CEOs) plays a crucial part in the adoption decision and the evolution of e-business processes. Many companies perceive e-business as an opportunity to gain competitive advantage, while others consider it as a burden 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 crucial part in the decision for adopting such technologies (Lesjak and Vehovar, 2005; Lumpkin and Dess, 2004; Ongori, 2009; Pai and Yeh, 2008; Palmer, 2002; Parker and Castleman, 2009; Rantapuska and Ihanainen, 2008; Ritter and Gemunden, 2004).

Taylor and Murphy (2004) argue that the adoption of e-business by SMEs is a crucial driver of economic growth, since these companies are big buyers, big sellers, big innovators and big employers. It is underlined that many such companies have invested in the digital world, mostly by building websites and using e-mail services. Nevertheless, according to Taylor and Murphy (2004), this is not enough.

The present study aims to investigate the factors that affect e-business adoption of SMEs. In that direction, a robust conceptual framework was developed and empirically tested. Its development was based on two methodological steps: first, an extensive literature review identified the factors that have been used by previous studies as antecedents of e-business adoption (see Table AI for more details); second, a panel of experts was used in order to discuss these factors and provide a list of the most significant ones. That twofold approach was selected due to the significant number of factors that have been proposed in the relevant literature. More specifically, the members of the research team used the opinions of experienced practitioners as a criterion for selecting a specific set of factors from the extensive list that was provided from the literature review analysis. It is strongly argued that randomly selecting the research factors of the proposed conceptual framework would have resulted in the limited reliability of the present research.

The proposed conceptual framework falls under the Technology-Organization-Environment (TOE) framework, which has been introduced by Tornatzky and Fleischer (1990). According to this approach, a company's decision to introduce a new technology is affected by technological, organisational and environmental factors. The proposed conceptual framework includes these three dimensions. Moreover, it is consistent with the work of previous authors of the specific field (Kuan and Chau, 2001; Zhu *et al.*, 2003; Wu *et al.*, 2003, Jeon *et al.*, 2006; Chang, 2010).

More analytically, the proposed conceptual framework includes ten independent factors (IT infrastructure; internet skills; firm size; firm scope; CEO's knowledge; adoption cost; willingness and capabilities of supply chain partners; competitive pressure; government support; consumer readiness) that are classified in three dimensions (technological, organisational and environmental), and one dependent factor (e-business adoption). The independent factors are either facilitators (having a positive influence to the e-business adoption decision), or inhibitors (having a negative influence).

The conceptual framework was empirically tested with a use of a newly developed structured questionnaire. The empirical results reveal that SMEs seem to miss the train of technological evolution, due to a number of reasons (e.g. financial recession, relative

low level of appropriate education, lack of technological expertise and poor government support). Moreover, the results highlight the most important e-business adoption drivers, offering interesting managerial implications.

The following points summarise the importance of the present study: it is focused on SMEs, an approach lacking in the relevant international literature; it is one of the very few similar studies that have been conducted on a European country; it is built upon an extensive analysis of the literature (see Tables AI and AII) and a synthesis of previous research, offering room for comparisons and future replication; it proposes a three dimensional conceptual framework that has randomly been explored in the existing literature; it can be perceived as a reference point for future studies, since it offers a critique concerning the multitude of e-business adoption antecedents that have been examined in the literature.

2. Literature review

According to Zhu *et al.* (2006), e-business (electronic business) has the potential to transform whole organisations, alter their organisational structure and significantly modify their business processes. Moreover, e-business has an impact on the relationships with customers, suppliers and other business partners (Bordonaba-Juste *et al.*, 2012a; Ifinedo, 2011; Zhu, 2004; Zhu *et al.*, 2006). E-business can be described as the integration between communication (internet) technologies, business processes and management practices (Simpson and Doherty, 2004; Turban *et al.*, 2004). Bordonaba-Juste *et al.* (2012a) argue that web technologies assist organisations in understanding the needs of their customers (marketing capability), customise their products and services (costumer satisfaction enhancement), adopt product-market solutions (react rapidly to the changes in the external environment), and take orders from customers (improvement in speed of delivery, decreased costs, global approach, increased customer satisfaction).

Numerous empirical studies have investigated the adoption of new technologies by SMEs. The present study conducted an extensive review of the relevant literature, in an effort to grasp a spherical view of the subject under investigation and, therefore, better define its scope. The following paragraphs present a brief analysis of a representative sample of previous empirical studies.

Parker and Castleman (2009) studied the facilitators and inhibitors of e-business adoption among small companies and found that adoption depends on the idiosyncrasy and the social context within each business environment. Moreover, the same researchers argued that a framework for the adoption of e-business needs to be built, so it would, more or less, provide a general idea of the most significant antecedents of e-business adoption (Parker and Castleman, 2009).

Jeon *et al.* (2006) tried to identify the key factors that would motivate a Korean enterprise to adopt e-business. The scholars noticed that less than half of the SMEs of their sample have adopted an e-business approach. Obstacles, such as the lack of awareness about the benefits, the absence of financial resources and the limited expertise were the most important inhibitors of e-business adoption.

Bertschek and Fryges (2002) developed a model that investigated the factors leading a company to adopt B2B e-commerce in Germany. Their findings indicated that a very crucial role is attributed to firm size. Hence, it appears that a big organisation adopts e-business more easily, mostly because of the level of education of its managers.

Similarly, Lucchetti and Sterlacchini (2004) studied the case of Italian SMEs and their attitude towards information and communication technology (ICT) adoption.

The outcomes of their study revealed that the adoption and the effective use of ICT is differentiated, depending on the internal funds and the technological skills of the company, on the one side, and the nature of business, on the other. Harindranath *et al.* (2008) attempted to explain the reasons of the low adoption of ICT by UK SMEs. According to their findings, one major concern of the British managers is the fear of limited use and obsolescence of an IT that would, moreover, require often updates.

Furthermore, Chang (2010) proposed a model for e-business adoption, which was developed around the concept of "on-demand e-business" performance. This concept focuses on developing a hybrid IT model that would help overcome communication drawbacks between enterprises, suppliers and customers. In other words, according to this model, organisations aim to enhance the performance of their overall supply chain management function. The results of Chang's (2010) study indicated that e-business readiness is more influenced by technological factors, rather than it is influenced by environmental factors. Apart from that, organisational factors seem to play a very big role in the adoption of e-business.

Bordonaba-Juste *et al.* (2012a) investigated the antecedents of e-business (IT expertise, firm size, perceived benefits, pressure suppliers, pressure clients, competitive pressure), and its effect on strategy, management and marketing. The authors used empirical data from 691 retailers in seven European countries. Their results revealed that the main factors that influence e-business use are IT expertise and perceived benefits. Moreover, they found that the use of e-business changes management and marketing strategies in the companies of all the countries of the sample. Differences between various groups of countries were found to be minimal. Finally, the study of Bordonaba-Juste *et al.* (2012a) concluded that the external environment mostly pressures companies to adopt e-business practices, something that was in line with the findings of Grant (2003).

In another similar study, Theodosiou and Katsikea (2012) investigated the factors that influence the intensity of e-business adoption by hotels (top management emphasis, organisational learning ability, customer orientation, competitor orientation, adhocracy culture, customer power, normative pressures). They used a sample of 154 hotel companies located in Cyprus. They found out that customer power has the greatest impact on the intensity of e-business adoption, followed by organisational learning ability, adhocracy culture and top management emphasis. They concluded that the recent growth in internet penetration has made customers more accustomed with e-business practices, thus pushing hotels to adopt the e-business approach.

Kitsos *et al.* (2005) attempted to determine the factors that may influence technical innovation in Greece. Primarily, they found out that the main problems faced by Greek enterprises when trying to produce technological innovations are the lack of funds, the limited information provided about the benefits of technological innovation, as well as the lack of trained staff. Finally, Kitsos *et al.* (2005) revealed a number of factors that may contribute to the diffusion of technological innovation. These factors are technical applicability, profitability, size structure and managerial attitude towards innovation.

Finally, Pileidou (2008) studied the challenges of e-business adoption by Greek SMEs and made a comparison between Greek and European SMEs. This comparison revealed that Greek SMEs are missing the necessary training concerning new technologies. According to Pileidou (2008), during the early 2000s Greek SMEs were renovating their mechanical equipment and their building infrastructure, while European SMEs were focused on improving existing products, designing new products and buying patents in order to improve their competitiveness. Therefore, it comes as no surprise that Greek SMEs are a step back in adopting various e-business tools.

Tables AI and AII offer a summary of the literature review analysis that was conducted. More specifically, Table AI includes a list of the factors that have used in the literature in order to predict e-business adoption, while Table AII summarises the approaches that have been adopted by 19 studies of the field (methodology, sample, framework, statistical analysis).

The literature review analysis revealed the following gaps in the relevant literature:

- The contemporary literature has failed to focus on SMEs. As it can be seen on Table AII, only four (Chong *et al.*, 2014; Ghobakhloo *et al.*, 2011; Ifinedo, 2011; Jeon *et al.*, 2006) of the 19 reviewed studies have been conducted in SMEs. Additionally, none of these studies were carried out in Europe.
- Very few studies have built on previous research. Table AII reveals that nine (e.g. Lin and Lee, 2005; Theodosiou and Katsikea, 2012) of the nineteen reviewed studies have developed a unique approach (conceptual framework), failing to built on existing knowledge. On the other hand, the TOE framework seems to be the most popular approach, since seven studies have use it as a basis for their analysis.
- As it can be seen on Table AI, there is a multitude of factors that have been used to predict e-business adoption. These factors have been grouped into 11 categories (CEO characteristics, IT/information system (IS), firm characteristics, external environment, perceived benefits, adoption cost, compatibility and complexity, government support, support from other vendors, trading partner collaboration, knowledge management process). This is an indication of a research cohesion that makes the comparison among studies quite impossible and hinders the development of solid overall conclusions. More specifically, the literature has proposed so many antecedents of e-business adoption that one is unable to determine which are actually the most important.
- Tables AI and AII provide a review of the studies that have adopted a quantitative approach. Nevertheless, none of these studies have used specific criteria for selecting certain factors and exclude others from their analysis. In the light of the information presented in Table AI (multitude of approaches that exist in the empirical literature), selecting factors without justification is considered as a significant limitation.
- Government support has very seldom been included in the analysis of previous studies (Durbhakula and Kim, 2011; Jeon *et al.*, 2006). Chang (2010) also support this argument and call for future research on this area.

The present study was designed so as to cover the limitations (research gaps) of the literature described above. Its main goal is to build a coherent conceptual framework including the most significant antecedents of e-business adoption and test that framework gathering quantitative data and using advanced statistical techniques (exploratory factor analysis (EFA), confirmatory factor analysis (CFA), regression analysis, structural equation modelling (SEM)).

In synopsis, the present study contributes in the following areas:

- It focuses on SMEs, an approach that has found limited empirical investigation in the international literature.
- It examines the antecedents of e-business adoption in SMEs of a European country. The literature review that was conducted failed to recognise similar studies.

- It uses a qualitative research in order to recognise the most important antecedents of e-business adoption and develop a conceptual framework based on these factors. According to the best of the researchers' knowledge, such an approach is unique in the relevant literature. Moreover, it is significant, since previous studies used factors that were randomly selected from the literature, without a solid empirical basis (e.g. Bordonaba-Juste *et al.*, 2012a; Chang, 2010; Kitsos *et al.*, 2005).
- Moreover, it enhances the literature with an empirical research that has adopted the most popular methodological approach (TEO framework), offering room for comparisons and future replication studies. Additionally, it offers an operationalisation of several constructs based on previous studies, also offering a basis for future research.

3. Development of the conceptual framework

The main objective of the present paper is to propose a conceptual framework that sheds light on the most important factors that affect the e-business adoption decision in SMEs.

The extensive review of the contemporary international literature that was conducted prior to the empirical research (see Section 2) revealed that numerous (independent) factors have been used in order to predict e-business adoption. An indicative list of these factors can be found in the Tables AI and AII of the paper. Therefore, an important challenge of the present study was to decide upon the factors that were going to be incorporated into its proposed conceptual framework. The main objective was to construct a conceptual framework that incorporates the most significant factors that have been used by the main body of literature. Moreover, the incorporated factors were expected to have a high degree of relevance with the overall context of the study (Greek SMEs).

In order to address that critical issue, a qualitative research was conducted prior to the quantitative research. More analytically, a "panel of experts" was formed in order to evaluate the factors presented in Table AI and assist in selecting the most appropriate ones for the proposed conceptual framework of the present study. More specifically, the focus group methodology was used.

This approach offers certain benefits: first. the selection of the factors that were finally incorporated in the proposed conceptual framework was not conducted according to the subjective judgement of the members of the research team, but was a result of a more coherent and objective procedure; second, the proposed conceptual framework has a strong basis on the opinions of experienced practitioners (managers of SMEs); third, the selection of factors with low significance (for Greek SMEs) was being avoided. It is believed that the random selection of the research factors, without any theoretical or empirical justification, would have resulted in the limited reliability of the present study.

In order to enhance the validity of the qualitative research, two sessions held in different geographical areas were designed (Liamputtong, 2011). The members of the research team made initial telephonic contact with 35 practitioners (managers of SMEs): 15 from companies residing in Athens, the capital of Greece, and 20 from companies residing in Thessaloniki, which is the second largest city of the country. All companies were selected in random, using data from a directory provided by the Chamber of Commerce. Finally, 17 managers agreed to participate in the focus group

session of their respective area. After making all necessary arrangements concerning the time schedule of each session, 14 managers actually participated. Each focus group included seven managers of SMEs. This approach is in line with the main principles of the focus group methodology (Liamputtong, 2011), since there was an appropriate number of participants for each session, two different sessions with different participants were conducted, while represented companies were randomly selected.

The participants of each group were given (in paper) an extensive list of factors that have been used in the literature in order to predict e-business adoption (see Table AI). Then, a detailed conversation was conducted, with two members of the research team acting as moderators. The first moderator ensured that the session progressed smoothly, while the other that all topics were completely covered (dual moderator focus group) (Berg *et al.*, 2004). Each focus group took approximately three hours, while the subjects agreed in video recording each session. Notes were taken during each session by the second moderator, while additional notes were added after reviewing the recorded sessions.

After long discussions and deliberations, each focus group unanimously chose the ten most important factors of the provided list. The two focus groups agreed, with minor exceptions, in the same ten factors. Managers were given the opportunity to propose factors that were not in the pre-determined list, but all proposals seemed to fall into one of the predetermined categories. The ten proposed factors are the ones that are finally utilised in the present study.

The conceptual framework of the present study incorporates the ten independent factors (that were proposed after the extensive literature review and the qualitative research) and one dependent factor (e-business adoption). The independent factors are listed below:

(1) IT infrastructure (ITI);

(2) internet skills (ISK);

(3) firm size (FSZ);

(4) firm scope (FSC);

(5) CEOs knowledge (CEOK);

(6) adoption cost (ACOST);

(7) willingness and capabilities of supply chain partners (WCS);

(8) competitive pressure (COMP);

(9) government support (GS); and

(10) consumer readiness (CR).

The conceptual framework (research model, see Figure 1) follows the TOE framework (Tornatzky and Fleischer, 1990). According to this approach, a company's decision to implement a technological improvement is affected by technological, organisational and environmental factors. The TOE methodology was used because its validity is supported by the literature (Lin and Lin, 2008; Oliveira and Martins, 2010; Srivastava and Teo, 2010; Wang *et al.*, 2010; Zhu *et al.*, 2003, 2004) and the factors that were proposed by the panel of experts fall into the three categories it proposes.

More significantly, the use of the TOE framework as the reference theory is based on its attributes and its better fit with the context and the objectives of the

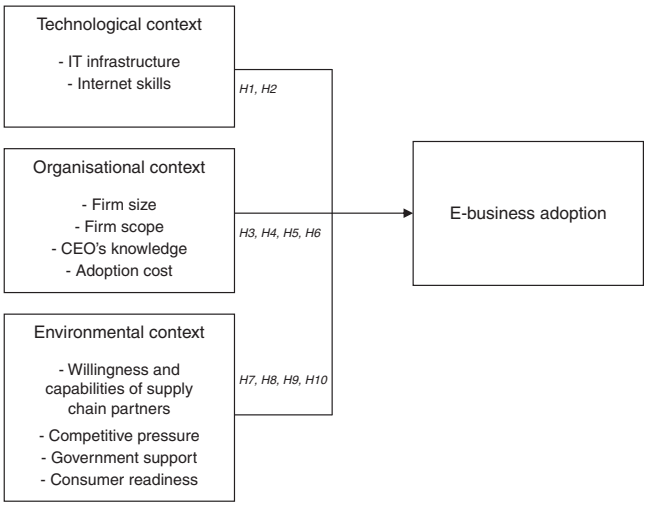

Figure 1.
The proposed conceptual framework of the study

present study. Other proposed models of technology (innovation) adoption (technology acceptance model (TAM; Davis, 1989), theory of planned behaviour (Ajzen, 1991), diffusion of innovation (DOI; Rogers, 2003)) seem to lack the holistic approach of the TOE framework. In contrary with these models, the TOE framework includes the environment dimension, thus becoming superior in demonstrating both the role of inter- and intra-firm associations in the adoption of a certain technology. Zhu *et al.* (2004) underlines the same argument and concludes that the TOE framework is more exhaustive than other proposed models. Additionally, numerous authors (Pan and Jang, 2008; Srivastava and Teo, 2010; Wang *et al.*, 2010) argue that not only the TOE framework is consistent with Rogers' (2003) theory of innovation diffusion (DOI), but actually enhances its reach by including intra-firm innovation diffusion. Finally, according to Barnes and Hinton (2012), the TOE framework brings together the technology and the organisation focus, something unique among competing models. Therefore, it can be concluded that the TOE framework is suitable for using in the context of the present empirical study.

3.1 Technological context

The technological level of an organisation is a crucial element that affects the adoption and implementation of an IS/IT innovation. According to Kwon and Zmud (1987) and Zhu *et al.* (2003) the technological level is highly affected by IT infrastructure and employee technical skills. In that sense, Ongori (2009) has included IT infrastructure competence and e-business know-how in his empirical analysis. In the present study, following Zhu *et al.* (2003) suggestions: IT infrastructure and internet skills are used in order to assess the level of technological readiness.

IT infrastructure represents the technologies (hardware) that enable an organisation to develop e-business processes. The relevant literature (Durbhakula and Kim, 2011; Oliveira and Martins, 2010; Zhu *et al.*, 2006) has investigated IT infrastructure together with IT human resources, under the factor entitled "technology readiness". Despite that, the present study argues that hardware should be investigated separately with employee IT capabilities.

According to Zhu *et al.* (2006) technology infrastructure establishes the ground on which e-business can be built. Companies with enhanced IT infrastructure are in better position to make use of e-business technologies. Zhu *et al.* (2003) argue that e-business is unlikely to be successfully adopted if companies lack the necessary technical infrastructure. Moreover, according to the resource-based view of the firm (Barney *et al.*, 2001), the competitive advantage is based on the resources of an organisation. Several studies have proved that the level of technology within a company is a very significant factor in the e-business adoption decision (Iacovou *et al.*, 1995; Kuan and Chau, 2001; Zhu *et al.*, 2003). Therefore, it is hypothesised:

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

Internet skills represent the competencies of the employees in using internet-related technologies. These competencies are intangible and, therefore, more difficult to be imitated by competitors (Grahovac and Miller, 2009). As such, they can be the basis for a sustainable competitive advantage (Porter, 2011). While IT infrastructure provides the appropriate basis for building e-business processes, internet skills are responsible for using that prerequisite basis in a constructive way. According to Zhu *et al.* (2003), the higher the level of internet skills, the better the use of IT infrastructures and the more likely the adoption of e-business processes. In the same vain with IT infrastructure, internet skills have been also found to significantly affect the e-business adoption of companies (Croom, 2005; Gale and Dolphy, 2005; Kuan and Chau, 2001):

H2. Firms whose members possess superior internet skills are more likely to adopt e-business.

3.2 Organisational context

According to Kwon and Zmud (1987), an IS implementation can be successful only when sufficient organisational resources exist and are wisely managed. These resources may include sufficient stuff, developer and user time, sufficient funding, and sufficient technical skills. Additionally, Chang (2010) defines organisational context (organisational 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). Based on the results of these studies, the most significant elements of the organisational context, which will be adopted by the current research, are firm size, firm scope, CEOs knowledge and the adoption cost.

Firm size has been suggested as a crucial driver affecting e-business adoption. Zhu *et al.* (2003) identified four main reasons according to which a larger company may have a competitive advantage over its smaller counterparts, when e-business adoption is being concerned: larger companies have more available resources in order to manage the adoption; larger companies are able to achieve economies of scale and economies of scope when dealing with e-business projects; larger companies are more able to bear the risk of a possible failure; larger companies have higher bargaining power when trying to persuade their suppliers to adopt network externalities, in order to achieve a more efficient cooperation.

According to Bordonaba-Juste *et al.* (2012b), both the use and the rate of adoption of new internet technologies highly depend upon firm size. For example, the likelihood of larger retailers to adopt an active website is higher in comparison with the likelihood of smaller ones to do so (Wu *et al.*, 2003). More specifically, Ellis-Chadwick

et al. (2002) report that in the UK the largest retailers are implementing e-technologies and using e-commerce at a higher rate. The availability of recourses, existence of skilled personnel and technical infrastructure are, probably, the main reasons behind this effect (Bordonaba-Juste *et al.*, 2012a, b). Despite that, other authors argue that the lack of flexibility and the inelasticity of existing distribution channels inhibit the adoption of e-business technologies from larger companies (Auger and Gallaugher, 1997; Ghosh, 1998). Therefore, it would be interesting to hypothesise:

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

Firm scope is defined as the horizontal expansion of an enterprise's operations (Zhu *et al.*, 2003). Various studies have proven that as firm scope increases, internal and external coordination costs, search costs and inventory holding costs increase as well. There are three arguments that support the hypothesis that firm scope has an impact on the propensity to use e-business technologies.

First, internal coordination costs increase with increased firm scope, due to increased administrative complexity and the need to process more and more information. When facing such a problem, a company may decide to use e-business technologies in order to enhance knowledge sharing, improve inter-functional coordination, thus reducing internal coordination costs (Shapiro and Varian, 2013; Zhu *et al.*, 2003).

Second, search costs and inventory holding costs increase with increased firm scope (Chopra and Meindl, 2001). Companies having an extended network of branches in different geographical areas spend more in searching for partners, distribution networks and attracting customers, increasing their search costs. Moreover, the same companies are obliged to keep inventories in all the different geographical areas, thus increasing inventory holding costs. According to Chopra and Meindl (2001), the use of e-business can reduce these costs. More specifically, e-business reduces search cost across the supply chain and improves inventory management techniques (Sanders, 2007).

Third, companies with greater scopes have the potential to exert more benefits from cooperation with other organisations, thus creating synergies (Zhu *et al.*, 2003). The main tool for enhancing these effects is the development of e-business technologies: the closer the partners, the higher the benefits (Steinfield *et al.*, 2002). Consequently, firms with greater scopes tend to reap the benefits of e-business synergy among them:

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

According to Harrison *et al.* (1997), CEO characteristics are significant e-business adoption drivers. Jeon *et al.* (2006) used two sub-factors to examine CEOs characteristics that might influence e-business adoption, CEOs knowledge of IT and CEOs attitudes toward innovation. They concluded that CEO characteristics do, indeed, have an influence on the adoption of e-business. Additionally, Thong and Yap (1995) found that computer illiterate owners of SMEs cannot perceive the benefits of IS and, therefore, act as inhibitors for their adoption. When top managers understand the relevance and importance of computer technologies for their organisations, they tend to play a significant role in influencing other organisational members to accept the same technologies (Ifinedo, 2011). Moreover, these managers tend to commit more resources to technology adoption (Thong *et al.*, 1996). Therefore, it can be hypothesised:

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

Thong (1999) studied the determinants of IS adoption in small businesses. He found that adoption cost is a significant adoption inhibitor. The highest the IS adoption cost,

the lower 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:

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

3.3 Environmental context

According to Porter (1979), the external environment of an organisation includes its competitors (existing and potential), its customers (existing and potential) and its buyers (existing and potential). Based on Porter (1979) and Chang (2010), the present study used four dimensions in order to capture the "environmental context" construct: willingness and capabilities of supply chain partners, competitive pressure, government support and consumer readiness.

According to Chang (2010), trading partner capabilities is a significant determinant of on-demand e-business adoption. On-demand e-business is modulated and standardized on the needs of each company. Therefore, a complete supply chain is motivated to use the same e-business architecture in order to act as an integrated unit.

Moreover, various empirical studies (Chong *et al.*, 2009; Del Aguila and Padilla, 2008) have found that suppliers and customers can influence the adoption of e-business technologies. Supply chain partners with e-business capabilities are more likely to exert pressure towards their supply chain counterparts in the direction of adopting similar technologies and achieving network effects (Iacovou *et al.*, 1995). Respectively, non-adopters will be under pressure to adopt e-business technologies and adapt its business processes, in order to continue their relationship with their supply chain partners (Chwelos *et al.*, 2001; Kuan and Chau, 2001). Therefore, the propensity of supply chain entities to use e-business technologies may have a significant influence on the decisions of other collaborating companies:

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

Jeon *et al.* (2006) argued that a high competitive environment urges companies to adopt methods and procedures to become more efficient and profitable. Moreover, according to Pavlou and El Sawy (2010), the use of new technologies is more important in competitive environments, in which products rapidly change and in which competitors act in an unpredictable manner. Despite that, it seems that environmental uncertainty has not been extensively investigated in the research of e-business adoption (Larsen, 2003). According to Coltman *et al.* (2007), companies that adopt e-business as a result of environmental pressure significantly improve their performance. When operating in a highly competitive environment, each organisation is required to follow the decisions of the competitors (Gattignon and Robertson, 1989), hence e-business adoption becomes more and more popular. Moreover, in markets with strong competition, companies rely on information from the external environment in order to enhance their technological infrastructures, while technological innovations are being regarded as prerequisites of success (Zhu *et al.*, 2006). Hence, it can be hypothesised:

H8. An environment of high competitive pressure leads to e-business adoption.

According to Jeon *et al.* (2006), an important environmental determinant that motivates companies to adopt e-business is the financial support and the motivations provided by the government. Parker and Castleman (2009) consider that especially in small

economies, such as the Greek economy, government plays the most crucial role in the e-business adoption decision. On the same vein, Papazafeiropoulou and Pouloudi (2000) argue that government support is a key factor for e-business adoption. Governments should not only make use of the internet themselves, but also actively encourage companies to do so (Simon, 2004). A government could provide support via subsidies, procurement, or by acting as a trusted third party (Papazafeiropoulou and Pouloudi, 2000). According to the Economist Intelligence Unit (2009), government policy and vision is one of the main factors for formulating the e-readiness ranking of every country. E-readiness measures the quality of the IT infrastructures of each country and the ability to use these infrastructures for the benefit of organisations (Economist Intelligence Unit, 2009). Spremic and Hlupic (2007) argued that government rules and strategies have a significant effect on e-business development. Government policies will encourage companies to adopt e-business at a high rate, therefore increasing e-business development on the whole country. Hence, it is hypothesised:

H9. Governmental support leads to e-business adoption.

Consumer readiness represents the level of acceptance of e-business practices from final consumers. It is measured through the level of internet penetration in the country, the consumers' willingness to conduct on-line shopping, and their desire to use extended electronic services. Zhu *et al.* (2003) found that consumer readiness is a significant e-business adoption driver. When consumers are ready to use e-business technologies, decision makers will be more willing to transform their organisations so as to reap the benefits of e-business. Hence, it is hypothesised:

H10. Consumer readiness leads to e- business adoption.

Figure 1 summarises all the above hypotheses, thus, presenting the proposed Conceptual Framework of the study.

4. Research methodology

4.1 Methodological approach

The present study was motivated by the significance of the investigated field and the gaps that were recognised in the early stages of the literature review analysis. When examining, in more depth, the factors that have been used in order to predict e-business adoption, the analysis of the relevant literature revealed that a panspermia of such factors actually exists (see Table AI for more details). Therefore, the opinions of numerous practitioners (qualitative research) were used in order to narrow down that extended list and develop a robust conceptual framework that would include only the most important antecedents of e-business adoption (hence the proposed conceptual framework already presented in Figure 1). In other words, the qualitative research (focus group sessions) offered in-depth practical knowledge concerning the factors with the most significant impact on e-business adoption, while the quantitative research that followed (empirical survey with the use of a newly developed structured questionnaire) revealed which of these factors are actually significant.

Figure 2 includes a linear diagrammatic representation of the methodological approach of the present study. Its main scope (development and testing of a conceptual framework) was specified after an extensive review that revealed specific gaps in the relevant literature (see Section 2 for more details). As stated above, the development of the proposed conceptual framework was based on the analysis of the relevant literature and the focus group methodology. The methodological steps towards testing the

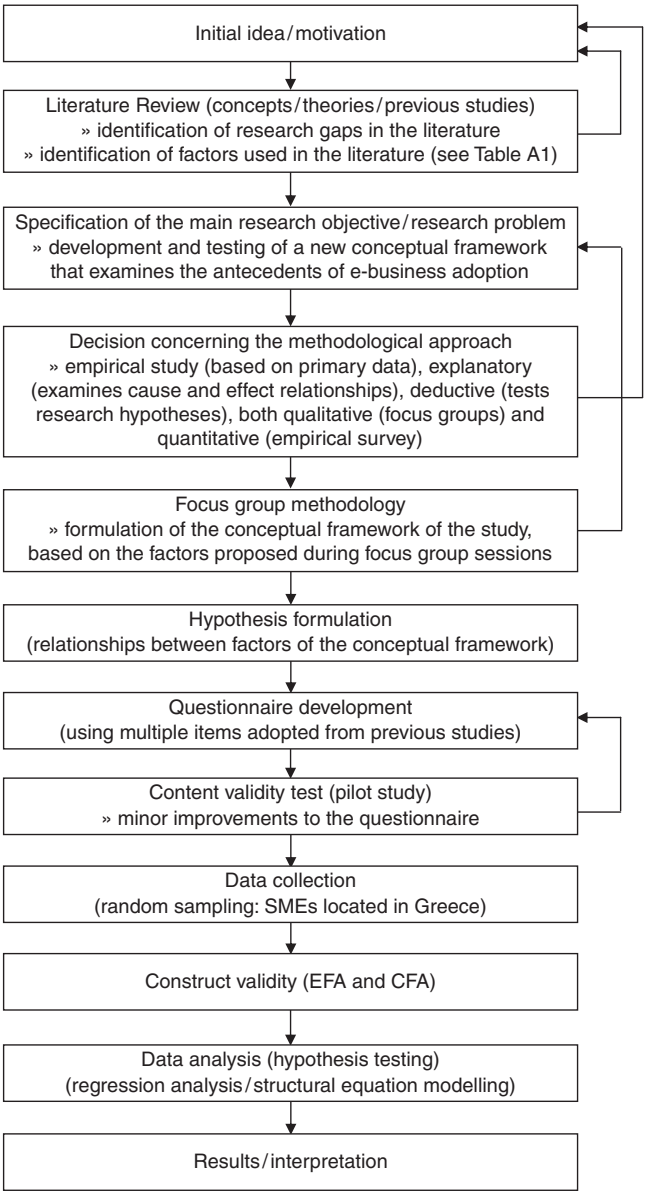

Figure 2.
Diagrammatic presentation of the methodological approach

proposed conceptual framework included: the development of the questionnaire (research instrument); the control for its content validity; the collection of the appropriate data; the control for the reliability and the validity of the research factors; and the examination of the research hypotheses.

The present study is empirical (it is based on primary data), explanatory (examines cause and effect relationships), deductive (tests research hypotheses) and quantitative (includes the analysis of quantitative data collected with the use

of a structured questionnaire). Moreover, qualitative data were used in order to choose the factors that were finally included in the proposed conceptual framework of the study.

4.2 Sample of the study

The proposed conceptual framework was tested using a newly developed structured questionnaire on a sample of Greek small and medium companies (SMEs). SMEs are defined according to the number of their employees and their turnover. More specifically, "medium-sized enterprises are those with fewer than 250 employees and a turnover of less than or equal to €50 million, or a balance sheet of less than or equal to €43 million" (EU Commission, 2003).

SMEs are considered to be the heart of the Greek economy, since they represent 99 per cent of the total number of operating companies. In 2010, there were 742,000 SMEs, with 2,512,493 employees, which represent more than 75 per cent of total employment, well above the EU average. Greece has a very high share of SMEs, particularly micro enterprises, compared to the EU average (Annual Report on EU SMEs 2010/2011, 2011).

4.3 Measures

The present study examines 11 factors, ten of which are independent and one is dependent (see Section 3 and Figure 1 for more details).

The measurement of the only dependent factor of the study (e-business adoption) was considered as a cornerstone for its success. Previous studies have measured e-business adoption as a binary variable (see, e.g. Zhu *et al.*, 2003). The members of the research team tend to disagree with such an approach and propose a multilevel method of measurement. First of all, measuring the main factor of the study with a single item seems inadequate, and second e-business adoption is a complex meaning that cannot only be defined by one single dimension. Therefore, based on previous empirical studies (Wu *et al.*, 2003; Jeon *et al.*, 2006; Ghobakhloo *et al.*, 2011), the present study utilised nine items (questions) for measuring e-business adoption.

Moreover, firm size was measured using two relevant questions (number of employees and turnover for the last fiscal year) (Zhu *et al.*, 2003), while firm scope was measured with a single question (number of establishments) (Steinfield *et al.*, 2002).

All the other factors were measured using multiple items (questions) that have been adopted from the international literature (the same applies to e-business adoption) (see Table I). A five-point Likert scale was used for the measurement of all these factors.

All items have been translated to the Greek language and then back to English by another person, in order to detect and consequently improve possible discrepancies. The structured questionnaire consisted of 12 sections. The first 11 were used for measuring the 11 main factors of the study, while the 12th section included demographic questions about the person answering the questionnaire and the respective company (see Table I for more details).

4.4 Data collection

Data were collected from SME's located in Greece (September to December 2012). The companies of the sample were selected randomly (random sampling technique) from a directory provided by the Chamber of Commerce. The questionnaire was sent to the IS managers of these companies, because of their relation to the subject and their extensive knowledge over e-business processes. Moreover, the selection of IS executives as key respondents ensured the validity of the results.

Factors	Number of items	Adapted from
IT infrastructure	4	Zhu *et al.* (2003)
Internet skills	5	Zhu *et al.* (2003)
Firm size	2	Zhu *et al.* (2003)
Firm scope	1	Steinfield *et al.* (2002)
CEO's knowledge	3	Jeon *et al.* (2006); Lin and Lee (2005)
Adoption cost	3	Jeon *et al.* (2006); Ghobakhloo *et al.* (2011)
Willingness and capabilities of supply chain partners	4	Chang (2010)
Competitive pressure	4	Jeon *et al.* (2006); Zhu *et al.* (2003); Bordonaba-Juste *et al.* (2012a)
Government support	4	Jeon *et al.* (2006); Durbhakula and Kim (2011)
Consumer readiness	4	Zhu *et al.* (2003); Chang (2010)
E-business adoption	9	Wu *et al.* (2003); Jeon *et al.* (2006); Ghobakhloo *et al.* (2011)
Total	43	

Table I.
Factor measurement

Six hundred SME's were initially chosen (initial sample), using the simple random sampling method (SRS) (Yates *et al.*, 2008). From those, 161 valid questionnaires were returned (26.8 per cent return rate). An initial analysis of the main dependent factor of the study (e-business adoption) suggests that the SMEs of the sample do not have high e-business adoption rates. More specifically, the mean score of the 8 factors that were used for the measurement of e-business adoption is 3.36 (standard deviation $= 0.86$) (1 = non-adopters, 5 = full adopters).

The majority (18.3 per cent) of the companies of the sample belong to the "food" industry, while 13.5 per cent to the "electronics" and 13.1 per cent to the "informatics" industry. Moreover, the 32.2 per cent of the companies employ 101-250 employees, 35.7 per cent employ 51-100 employees, while 32.1 per cent of the companies employ less than 50 employees. Finally, the results indicate that the annual sales of the 28.2 per cent of the companies of the sample are between 10 and 50 million euros, while the rest 71.8 per cent of the companies have an annual turnover less than 10 million euros.

5. Empirical results

5.1 Reliability and validity

The research instrument has been tested for both its content and construct validity. The content validity test was conducted prior to the beginning of the survey and included: consultation with academics of the field; consultation with experienced practitioners; and pilot testing of the questionnaire. More specifically, five academics and seven practitioners were asked to fill in the final draft of the questionnaire and make detailed comments concerning their level of understanding. The discussions that were conducted aimed at discovering whether the various factors appeared to be understandable, whether the questions (items) were appropriately phrased, whether the responding options seemed reasonable, and whether the various measurement scales were relevant and representative of the constructs they were supposed to measure. The comments of the participants of these discussions improved various aspects of the questionnaire (e.g. minor improvements in the use of language, use of terminology that is better understood by practitioners, etc.). The enhanced questionnaire was, then, handed to 20 managers of SMEs for completion (pilot study) (Hertzog, 2008).

A first review of their answers failed to reveal any problem with the overall validity of the survey. Therefore, the questionnaire was finally crystallised.

For the examination of the construct validity, each of the appropriate nine research factors was evaluated for its unidimensionality and reliability. The estimation of the unidimensionality was conducted using EFA with principal component analysis. Moreover, Cronbach α was used to measure the reliability of the measurement scales. All tests concluded that the scales used are valid and reliable (see Table II for the main results).

Furthermore, the evaluation of the goodness of fit of each of the research factors was conducted using CFA. All tests conducted produced satisfactory results (see Table III for the main results). More specifically, the following measures have been examined (Schumacker and Lomax, 2010):

- χ^2: it should be statistically insignificant ($p > 0.05$).
- Normed χ^2 (χ^2/df): values between 1 and 3 are desirable, while values between 1 and 5 are acceptable.
- Construct reliability (CR): it should higher than 0.7.

Variables	KMO	Bartlett's test of sphericity	Eigenvalue	Total variance explained (%)	Cronbach α
IT infrastructure	0.723	111.4*	2.564	78.19	0.77
Internet skills	0.763	78.9*	2.415	77.16	0.69
CEO's knowledge	0.873	66.2*	2.158	54.63	0.73
Adoption cost	0.648	99.4*	1.369	80.11	0.71
Willingness and capabilities of supply chain partners	0.719	87.3*	1.964	81.26	0.78
Competitive pressure	0.761	36.8*	2.367	72.26	0.74
Government support	0.622	67.9*	1.894	66.14	0.78
Consumer readiness	0.878	69.2*	2.336	69.19	0.75
E-business adoption	0.731	76.3*	1.942	71.01	0.73

Note: *$p < 0.01$

Table II. Estimation of unidimensionality and reliability

Variables	χ^2	df	Normed χ^2	CR	VE (%)	RMSEA	CFI	GFI
IT infrastructure	15.45*	6	2.58	0.67	55.6	0.086	0.94	0.98
Internet skills	8.91*	3	2.97	0.76	67.9	0.095	0.99	0.94
CEO's knowledge	16.17*	9	1.80	0.73	71.0	0.093	0.97	0.93
Adoption cost	9.94*	4	2.49	0.82	74.3	0.087	0.96	0.95
Willingness and capabilities of supply chain partners	7.81*	8	1.12	0.73	63.2	0.093	0.96	0.96
Competitive pressure	9.44*	3	3.15	0.72	57.5	0.097	0.97	0.93
Government support	23.41*	13	1.80	0.68	58.2	0.093	0.97	0.91
Consumer readiness	7.15*	2	3.58	0.68	61.3	0.092	0.93	0.90
E-business adoption	12.64*	7	1.81	0.79	78.9	0.089	0.92	0.92

Note: *$p > 0.05$

Table III. Estimation of the goodness of fit

- Variance extracted (VE): it should higher than 50 per cent.
- RMSEA: it should be less than 0.1.
- CFI/GFI: they both should be higher than 0.9.

5.2 Hypothesis testing

5.2.1 Regression analysis. In order to test the explanatory power of the proposed conceptual framework, multiple regression analysis was used. The regression model that was tested is the following:

$$E-\text{business adoption} = \alpha + \beta 1(\text{ITI}) + \beta 2(\text{ISK}) + \beta 3(\text{FSZ}) + \beta 4(\text{FSC}) + \beta 5(\text{CEOK}) + \beta 6(\text{ACOST}) + \beta 7(\text{WCS}) + \beta 8(\text{CPE}) + \beta 9(\text{GS}) + \beta 10(\text{CR}) + \varepsilon$$

The initial regression analysis provided a satisfactory predictive power for the above model (explaining 65 per cent of the total variance of the dependent factor), but four factors were found to have an insignificant impact on e-business adoption (CEO knowledge, adoption cost, willingness and capabilities of supply chain partners, competitive pressure). Hence, these factors were eliminated from the model and the analysis was repeated. The adjusted model included six independent and one dependent factor:

$$E-\text{business adoption} = \alpha + \beta 1(\text{ITI}) + \beta 2(\text{ISK}) + \beta 3(\text{FSZ}) + \beta 4(\text{FSC}) + \beta 9(\text{GS}) + \beta 10(\text{CR}) + \varepsilon$$

The regression analysis for the above model provided an adjusted R^2 equal to 0.710, meaning that the six independent variables explain 71 per cent of the variance of the dependent variable. The Durbin-Watson index was 2.110, indicating that there is no autocorrelation among the variables and close observations have a tendency to be different (Manly, 2000). Moreover, the significance of the F-value was at 0.000 level, indicating that the independent variables are appropriate to test the regression model created. Finally, the Tolerance and variance inflation factor values are within the acceptable limits, indicating that there is no collinearity among the variables of the study.

Table IV summarises the β values of each one of the significant factors included in the model. The constant (intercept) is 1.802 and it is statistically significant (sig. $= 0.000$). All β values for each of the six variables are also statistically significant (sig. < 0.05), thus, fully supporting *H1-H4*, *H9* and *H10*. On the other hand, *H5-H8* are rejected by the empirical analysis.

The factors with the highest weights found to be "firm size" and "firm scope" (0.712 and 0.569, respectively). Additionally, the weights for "governmental support", "consumer readiness", "IT infrastructure" and "internet skills" are also quite satisfactory (0.238, 0.270, 0.313, and 0.312, respectively). On the other hand, "CEOs knowledge", "willingness and capabilities of supply chain partners", and "competitive pressure" appeared to have the lowest weights (0.099, 0.039 and 0.002, respectively). Moreover, "adoption cost" has a negative weight (−0.016), as it was expected, indicating that the cost of e-business

Variables	Unstandardized β	SE	Standardised β	Sig.
Constant	1.802	0.049		0.000
IT infrastructure	0.313	0.030	0.425	0.000
Internet skills	0.312	0.083	0.307	0.014
Firm size	0.712	0.204	0.270	0.002
Firm scope	0.569	0.122	0.182	0.010
Government support	0.238	0.112	0.160	0.019
Consumer readiness	0.270	0.022	0.114	0.005
Hypotheses				Result
H1: IT infrastructure → e-business adoption (sig. = 0.000)				Supported
H2: Internet skills → e-business adoption (sig. = 0.014)				Supported
H3: Firm size → e-business adoption (sig. = 0.002)				Supported
H4: Firm scope → e-business adoption (sig. = 0.010)				Supported
H5: CEO's knowledge → e-business adoption (sig. = 0.078)				Rejected
H6: Adoption cost → e-business adoption (sig. = 0.195)				Rejected
H7: Willingness and capabilities of supply chain partners → e-business adoption (sig. = 0.098)				Rejected
H8: Competitive pressure → e-business adoption (sig. = 0.141)				Rejected
H9: Government support → e-business adoption (sig. = 0.019)				Supported
H10: Consumer readiness → e-business adoption (sig. = 0.005)				Supported

Table IV.
Regression model coefficients and hypothesis testing

adoption is an inhibitor of the adoption procedure. Thus, the linear regression model can be presented as follows:

$$E-\text{business adoption} = 1.802 + \overbrace{0.313(\text{ITI}) + 0.312(\text{IS})}^{\text{technological aspect}} + \overbrace{0.712(\text{FSZ}) + 0.569(\text{FSC})}^{\text{organisational aspect}} + \underbrace{0.313(\text{GS}) + 0.270(\text{CR})}_{\text{environmental aspect}}$$

5.2.2 SEM. To further support and enhance the results provided from the logistic regression analysis, the "SEM technique" was, also, used. The model that was examined included only the six independent variables that were found to be statistically significant in the regression analysis. The mean score of the variables of each of the three dimensions of the TOE framework were used, since the model included three independent factors (technological, organisational and environmental context) and e-business adoption, as the only dependent factor.

The estimation of the structural model was conducted with the Maximum Likelihood Estimation method (Kelloway, 1998). The Covariance Matrix was used as the table of entry. Finally, the extraction of the Standardized Completely Solution was requested. To evaluate the fit of the overall model, the χ^2 value ($\chi^2 = 57.26$ with 25 degrees of freedom) and the p-value ($p = 0.0645$) were estimated. These values indicate a good fit of the data to the overall model. Moreover, the RSMEA index (0.088) the CFI (0.97) and the GFI (0.98), all indicate a very good fit. Additionally, the CR and the VE measures for all constructs were satisfactory.

Results can be seen in Table V and Figure 3. As it was also indicated by the regression analysis, the dimension of organisational context has the highest impact on

e-business adoption ($r = 0.51$), while technological context, also, has a strong impact ($r = 0.40$). On the other hand, environmental context has a small and statistically insignificant impact on e-business adoption ($r = 0.11$, $p > 0.05$).

5.3 Analysis of the empirical results

The main finding of the study are summarised below:

- Firm size, firm scope, IT infrastructure and internet skills are the most important e-business adoption drivers of SMEs, with firm size being the most significant. These findings are partially consistent with the findings of Zhu *et al.* (2003). According to Zhu *et al.* (2003), the most significant drivers for e-business adoption in European countries are the level of technology, firm scope and size, consumer readiness and competitive pressure.
- On the other hand, Jeon *et al.* (2006) have found that governmental support is the most significant adoption determinant for Korean SMEs, while Durbhakula and Kim (2011) concluded that e-government development, e-participation, and government policy and vision have a statistical significant effect on e-business development.

  In the present study, government support does not seem to have similar significance. These contradictive results may be attributed to the different context of each study. More specifically, Jeon *et al.* (2006) argued that the role of government is essential in enhancing e-business initiatives from SMEs in emerging economies, like Korea. Therefore, it can be concluded that the level of economic development of each country is responsible for the different significance of government support. Certainly, Greece, a developed country (member of the EU and the Euro zone) has different characteristics from Korea. It seems that companies operating in developed countries are in a better position to adopt e-business practices without government assistance. The study of Durbhakula and

Path	Effect	*t*-value	Result
Technological context → e-business adoption	0.40	2.22*	Accepted
Organisational context → e-business adoption	0.51	3.11*	Accepted
Environmental context → e-business adoption	0.11	1.36	Rejected

Note: *$p < 0.05$

Table V. Results of the structural equation modelling technique

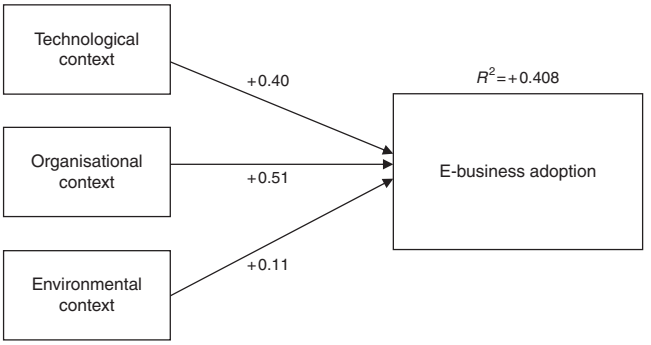

Figure 3. Structural equation modelling (SEM) results

Kim (2011) does not shed more light on that issue, since it was conducted in a sample of 61 countries (most of which were developing) and, therefore, its results may be attributed to that fact.

Certainly, it would be quite interesting for future international studies to compare the effect of government support between different countries with different level of economic development. Moreover, it would also be interesting whether other single-country studies investigate the impact of government support on e-business adoption, so as comparison between countries may finally be conducted:

- 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 of the SMEs. From these variables, the adoption cost is an inhibitor of the adoption decision, though with a small impact. These results are consistent with the findings of similar studies. For example, Jeon *et al.* (2006) found that CEO knowledge is not an important determinant of e-business adoption and Zhu *et al.* (2003) concluded that willingness and capabilities of the supply chain partners and competitive pressure are the least important environmental drivers.
- Government support and consumer readiness were found to be statistically significant in the regression analysis that was conducted, but the results of the SEM analysis were non-conclusive. These findings raise questions about their significance in the e-business adoption process.
- The TOE framework, introduced by Tornatzky and Fleischer (1990), was proved to be suitable for the study of e-business adoption by SMEs. Moreover, the organisational drivers were proved to be more important than the technological and the environmental drivers. In a similar study, Chang (2010) proved that 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.* (1995), Premkumar and Ramamurthy (1995), Chau and Tam (1997), Kuan and Chau (2001) and Zhu *et al.* (2003), proved that the TOE framework is an appropriate tool for describing the IS adoption decision.

6. Conclusions

6.1 Methodological issues

The present study was motivated by specific gaps that were recognised in the literature of the field: lack of focus on SMEs, especially on those operating in Europe; use of many different approaches, since various different conceptual frameworks have been proposed; development of these frameworks without the use of appropriate practical background; use of many different research factors that predict e-business adoption (making comparisons and general conclusions quite impossible).

In order to cover these gaps, the present study used an extensive literature review and qualitative data (focus group sessions with managers of SMEs) in order to develop a conceptual framework that investigated the antecedents of e-business adoption. Moreover, this framework was tested with the use of a newly developed structured questionnaire (quantitative data) on a sample of SEMs operating in a European country (Greece).

That twofold approach (collection of qualitative and quantitative data) offered certain advantages: focus groups offered practical knowledge concerning the factors

with the most significant impact on e-business adoption, while the quantitative research revealed which of these factors are actually significant. The contribution of the study lies on this enhanced approach. More specifically, it offers the necessary ground for comparison and replication, while offering an operationalisation of several research factors. Its robust conceptual framework may be replicated from future empirical studies, while other scientists may employ its twofold approach as a basis for their future empirical investigation.

6.2 Conclusions from the focus group sessions

Two focus group sessions were conducted in two different geographical areas of the country. All companies were randomly selected. In total, 14 managers, from the 35 that were initially invited, actually participated (seven in each session). In both cases, a detailed conversation was conducted on the basis of the list of factors that were identified by the literature review analysis (see Table AI). After long and fruitful discussions, each focus group chose the ten most important factors from the provided list, while the two groups agreed, with minor exceptions, in the same list of factors. These factors were used in the development of the proposed conceptual framework of the study.

6.3 Conclusions from the empirical survey

The aim of the present study was to investigate the main drivers of the e-business adoption decision by small and medium-sized companies. A structured questionnaire was designed and used to collect the appropriate data. CEOs of 600 companies located in Greece (randomly selected using data from the Chamber of Commerce) were used as key informants. In all, 161 valid questionnaires were returned (26.84 per cent return rate).

Logistic linear regression methods were initially used to analyse the data. It is found that the proposed conceptual framework explains 71 per cent of the variance of e-business adoption. Firm size, firm scope, governmental support, consumer readiness, IT infrastructure and internet skills were found to be the most important e-business adoption drivers. 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.

More analytically, it was found that the e-business adoption rate by SMEs is relatively low. From the 161 participating companies, only 74 were implementing e-business practices. On the other hand, 87 companies still process their sales and orders via traditional means, such as telephone and/or fax. The general e-business adoption rate is approximately 46 per cent. In an industrial sector basis, the results indicate a high e-business adoption level by technological companies (71 per cent).

These results clearly demonstrate that SMEs seem to miss the train of technological evolution. This can be attributed to a number of reasons. First, in times of financial recession, it seems that companies are struggling to generate the necessary capital that would help them invest on new technologies, failing to do so on most of the times. Second, SMEs are usually run by people of middle level education, who hesitate to take investment risks, since they are not able to understand their indirect benefits. Another reason is the lack of technological expertise, by both managers and employees. This could be explained by the relatively small internet penetration found in the study and by the fact that highly expertise employees tend to work for larger companies. Finally, the support provided by the government is characterised as quite poor.

6.4 Managerial implications

E-business is becoming a powerful tool that helps companies create better backward and forward relationships and develop a competitive advantage (Zhu *et al.*, 2006). E-business adoption can provide substantial benefits to companies including increased revenues, operational efficiency, customer satisfaction and relationship development (Ifinedo, 2011; Nguyen, 2013). A thorough understanding of e-business antecedents is critical for companies that wish to exploit these advantages. The present study adds to the limited empirical work done in this area, within the context of SMEs.

The present study failed to verify the relationship between government support and e-business adoption. Therefore, it seems that policy makers should support and promote e-business adoption by SMEs more efficiently. Towards this direction, the government should vote for more supportive business and tax laws to stimulate e-business, remove existing barriers, provide companies with infrastructure and subsidies, and enhance internet penetration. Maybe, such a bundle of measures would raise the significance of government support in future studies conducted in the same context.

Moreover, it was found that the most significant e-business adoption facilitator is the size of the company. This finding technically means that as the number of employee's increases, the company has the tension to adopt innovative organisational technologies, such as e-business. Accordingly, it can be assumed that as a company gets bigger, it tends to adopt and implement more efficient IT systems and, therefore, reap the benefits of e-business. From a managerial standpoint, the empirical results suggest that managers and company owners should support their efforts for growth and profit maximisation along with e-business adoption.

Firm scope has also been found to have a significant effect on e-business adoption. It seems that as the scope of an organisation gets bigger, the need for implementing e-business practices becomes more significant. Managers who are planning to implement strategies that will increase the scope of their organisation should bear in mind that such a strategy should be built on e-business. E-business practices are able to support internal coordination, reduce search costs and inventory holding costs and create synergies between different divisions and strategic business units (Chopra and Meindl, 2001; Shapiro and Varian, 2013; Zhu *et al.*, 2003).

Moreover, the empirical results indicated that IT infrastructure (hardware) significantly affects e-business adoption. Therefore, organisations should invest in building the necessary technological base for exchanging information both internally and externally. Such investments may seem as cost centres, but are actually tools for future development. Actually, the present study found that adoption cost is not a significant inhibitor of e-business adoption, something that implies that companies that have implemented e-business strategies did so without considering the initial investment cost. Finally, since internet skills were found to be important facilitators of e-business adoption, companies should offer incentives that will motivate employees to use information technologies (communication with internal and external vendors, browsing the internet and the intranet for acquiring information, communicate via video-conferencing, etc.).

In general, the present study argues that organisational and technological factors are more significant for e-business implementation that environmental factors, like supply chain collaboration, competitive pressure and government support. These findings have implications both for companies and the Greek government (or any other government of a country with similar characteristics). Managers and company owners should focus on their company's technological readiness (technological context), in order to create a compatible business structure ready to accept innovative IT systems.

In order to succeed in this effort, managers should keep in mind that technological readiness (context) implies both a high-quality IT infrastructure and skilful employees. On this direction, companies should:

- establish a sufficient telecommunications infrastructure to support e-business processes;
- acquire integrated IS applications in different business areas;
- use various security technologies in order to protect data on the internet;
- follow industrial standards in order to exchange information with trading partners; and
- assist employees to acquire technological skills (internet, intranet, e-mail, video-conferencing, browsing, etc.).

6.5 Research implications

The present study proposed an enhanced conceptual framework that examined vital issues concerning e-business adoption, providing valuable outcomes for academics (research implications). In summary, the following implications are being highlighted:

- The use of both qualitative and quantitative data are highly proposed. Using the opinions of experienced practitioners in order to gather practical information and develop the conceptual framework of the study seems like a sound methodological path. More future studies should adopt that approach.
- Additionally, future studies should include government support in their research models, since more clarity of this issue is certainly needed. The present study failed to support that relationship, while previous studies (conducted mostly in developing countries) found empirical support (Durbhakula and Kim, 2011; Jeon *et al.*, 2006). Future studies should investigate whether other factors (e.g. country) differentiate that relationship.
- In order to gain a holistic understanding of the subject under examination, the focus of the present study was only on e-business adoption decision and the drivers that affect that decision. Therefore, the implementation process and the adjustments that are necessary for e-business adoption were not examined. These two factors are significant, especially for SMEs where financial resources are limited. Therefore, future studies should include these factors in their analysis.
- Moreover, the present study was conducted with a sample of companies located in Greece. A replication study may be conducted among companies of other countries, so as to make a comparison between the results.
- Finally, future research using meta-analytic approaches could examine the antecedents of e-business adoption in SMEs.

References

Ajzen, I. (1991), "The theory of planned behaviour", *Organizational Behavior and Human Decision Processes*, Vol. 50 No. 2, pp. 179-211.

Annual Report on EU SMEs 2010/2011 (2011), *Are EU SMEs Recovering?*, Ecorys, Rotterdam and Cambridge.

Auger, P. and Gallaugher, J. (1997), "Factors affecting the adoption of internet-based sales presence for small businesses", *The Information Society*, Vol. 13 No. 1, pp. 55-74.

Barnes, D. and Hinton, C.M. (2012), "Reconceptualising e-business performance measurement using an innovation adoption framework", *International Journal of Productivity and Performance Management*, Vol. 61 No. 5, pp. 502-517.

Barney, J., Wright, M. and Ketchen, D.J. (2001), "The resource-based view of the firm: ten years after 1991", *Journal of Management*, Vol. 27 No. 6, pp. 625-641.

Berg, B.L., Lune, H. and Lune, H. (2004), *Qualitative Research Methods for the Social Sciences*, Pearson, Boston, MA.

Bertschek, I. and Fryges, H. (2002), "The adoption of business-to-business e-commerce: empirical evidence for German companies", Discussion Paper No. 02-05, Centre for European Economic Research, Mannheim.

Bordonaba-Juste, V., Lucia-Palacios, L. and Polo-Redondo, Y. (2012a), "Antecedents and consequences of e-business adoption for European retailers", *Internet Research*, Vol. 22 No. 5, pp. 532-550.

Bordonaba-Juste, V., Lucia-Palacios, L. and Polo-Redondo, Y. (2012b), "The influence of organizational factors on e-business use: analysis of firm size", *Marketing Intelligence & Planning*, Vol. 30 No. 2, pp. 212-229.

Chang, H.-L. (2010), "A roadmap to adopting emerging technology in e-business: an empirical study", *Information Systems and E-Business Management*, Vol. 8 No. 2, pp. 103-130.

Chau, P. and Tam, K. (1997), "Factors affecting the adoption of open systems: an exploratory study", *MIS Quarterly*, Vol. 21 No. 1, pp. 1-21.

Chong, A.Y.-L., Ooi, K.B., Bao, H. and Lin, B. (2014), "Can e-business adoption be influenced by knowledge management? An empirical analysis of Malaysian SMEs", *Journal of Knowledge Management*, Vol. 18 No. 1, pp. 121-136.

Chong, A.Y.-L., Ooi, K.-B., Lin, B. and Tang, S.Y. (2009), "Influence of interorganizational relationships on SMEs' e-business adoption", *Internet Research*, Vol. 19 No. 3, pp. 313-331.

Chopra, S. and Meindl, P. (2001), *Supply Chain Management: Strategy, Planning, and Operation*, Prentice-Hall, Englewood Cliffs, NJ.

Chwelos, P., Benbasat, I. and Dexter, A.S. (2001), "Empirical test of an EDI adoption model", *Information Systems Research*, Vol. 12 No. 3, pp. 304-321.

Coltman, T.R., Devinney, T.M. and Midgley, D.F. (2007), "E-Business strategy and firm performance: a latent class assessment of the drivers and impediments to success", *Journal of Information Technology*, Vol. 22 No. 2, pp. 87-101.

Croom, S.R. (2005), "The impact of e-business on supply chain management. An empirical study of key developments", *International Journal of Operations and Production Management*, Vol. 25 No. 1, pp. 55-73.

Davis, F.D. (1989), "Perceived usefulness, perceived ease of use, and user acceptance of information technology", *MIS Quarterly*, Vol. 13 No. 3, pp. 319-340.

Del Aguila, A. and Padilla, A. (2008), "Organizational factors affecting internet technology adoption", *Internet Research*, Vol. 16 No. 1, pp. 94-110.

Durbhakula, V.V.K. and Kim, D.J. (2011), "E-business for nations: a study of national level ebusiness adoption factors using country characteristics-business-technology-government framework", *Journal of Theoretical and Applied Electronic Commerce Research*, Vol. 6 No. 3, pp. 1-12.

Economist Intelligence Unit (2009), "e-Readiness rankings 2009", available at: graphics.eiu.com/pdf/E-readiness%20rankings.pdf (accessed 6 March 2015).

Ellis-Chadwick, F., Doherty, N. and Hart, C. (2002), "Signs of change? A longitudinal study of Internet adoption in the UK retail sector", *Journal of Retailing and Consumer Services*, Vol. 9 No. 2, pp. 71-80.

EU Commission (2003), "Commission recommendation of 6 May 2003 concerning the definition of micro, small and medium-sized enterprises", available at: http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2003:124:0036:0041:en:PDF (accessed 12 January 2010).

Gale, J. and Dolphy, A. (2005), "Introduction: toward understanding e-business transformation", *Journal of Organizational Change and Management*, Vol. 18 No. 2, pp. 113-116.

Gattignon, H. and Robertson, T.S. (1989), "Technology diffusion: an empirical test of competitive effects", *Journal of Marketing*, Vol. 53 No. 1, pp. 35-49.

Ghobakhloo, M., Arias-Aranda, D. and Benitez-Amado, J. (2011), "Adoption of e-commerce applications in SMEs", *Industrial Management & Data Systems*, Vol. 111 No. 8, pp. 1238-1269.

Ghosh, S. (1998), "Making business sense of the internet", *Harvard Business Review*, March-April, pp. 126-135.

Grahovac, J. and Miller, D.J. (2009), "Competitive advantage and performance: the impact of value creation and costliness of imitation", *Strategic Management Journal*, Vol. 30 No. 11, pp. 1192-1212.

Grant, R.M. (2003), "Strategic planning in turbulent environment: evidence from the oil majors", *Strategic Management Journal*, Vol. 24 No. 6, pp. 491-517.

Harindranath, G., Dyerson, R. and Barnes, D. (2008), "ICT adoption and use in UK SMEs: a failure of initiatives?", *The Electronic Journal Information Systems Evaluation*, Vol. 11 No. 2, pp. 91-96.

Harrison, D.A., Mykytyn, P. and Riemenschneider, C. (1997), "Executive decisions about adoption of information technology in small business: theory and empirical tests", *Information Systems Research*, Vol. 8 No. 2, pp. 171-195.

Hertzog, M.A. (2008), "Considerations in determining sample size for pilot studies", *Research in Nursing & Health*, Vol. 31 No. 2, pp. 180-191.

Hsieh, C.T., Lai, F. and Shi, W. (2006), "Information orientation and its impacts on information asymmetry and e-business adoption: evidence from China's international trading industry", *Industrial Management & Data Systems*, Vol. 106 No. 6, pp. 825-840.

Iacovou, C.L., Benbasat, I. and Dexter, A.S. (1995), "Electronic data interchange and small organization: adoption and impact of technology", *MIS Quarterly*, Vol. 19 No. 4, pp. 465-485.

Ifinedo, P. (2011), "Internet/e-business technologies acceptance in Canada's SMEs: an exploratory investigation", *Internet Research*, Vol. 21 No. 3, pp. 255-281.

Jeon, B., Han, K. and Lee, M. (2006), "Determining factors for the adoption of e-business: the case of SMEs in Korea", *Applied Economics*, Vol. 38 No. 3, pp. 1905-1916.

Kelloway, K. (1998), *Using LISREL for Structural Equation Modeling: A Researcher's Guide*, SAGE Publications, London.

Kirs, P. and Bagchi, K. (2012), "The impact of trust and changes in trust: a national comparison of individual adoptions of information and communication technologies and related phenomenon", *International Journal of Information Management*, Vol. 32 No. 5, pp. 431-441.

Kitsos, C., Korres, G.M. and Hatzikian, Y.C. (2005), "Innovation activities in Greece: a statistical and empirical approach", *Proceedings of the 18th Greek National Convention*, pp. 459-465.

Koellinger, P. (2008), "The relationship between technology, innovation, and firm performance – empirical evidence from e-business in Europe", *Research Policy*, Vol. 37 No. 8, pp. 1317-1328.

Kuan, K. and Chau, P. (2001), "A perception-based model for EDI adoption in small business using a technology-organization-environment framework", *Information and Management*, Vol. 38 No. 8, pp. 507-521.

Kwon, T. and Zmud, R. (1987), "Unifying the fragmented models of information systems implementation", *Critical Issues in Information Systems Research*, Vol. 4 No. 2, pp. 227-251.

Larsen, K.T. (2003), "A taxonomy of antecedents of information systems success: variable analysis studies", *Journal of Management of Information Systems*, Vol. 20 No. 2, pp. 169-246.

Lesjak, D. and Vehovar, V. (2005), "Factors affecting evaluation of e-business projects", *Industrial Management and Data Systems*, Vol. 105 No. 4, pp. 409-428.

Liamputtong, P. (2011), *Focus Group Methodology: Principle and Practice*, Sage Publications, London.

Lin, H.-F. and Lee, G.-G. (2005), "Impact of organizational learning and knowledge management factors on e-business adoption", *Management Decision*, Vol. 43 No. 2, pp. 171-188.

Lin, H.F. and Lin, S.M. (2008), "Determinants of e-business diffusion: a test of the technology diffusion perspective", *Technovation*, Vol. 28 No. 3, pp. 135-145.

Lopez-Nicolas, C. and Merono-Cerdan, A.L. (2011), "Strategic knowledge management, innovation and performance", *International Journal of Information Management*, Vol. 31 No. 6, pp. 502-509.

Lucchetti, R. and Sterlacchini, A. (2004), "The adoption of ICT among SMEs: evidence from an Italian survey", *Small Business Economics*, Vol. 23 No. 2, pp. 151-168.

Lumpkin, G. and Dess, G. (2004), "E-Business strategies and internet business models: how the internet adds value", *Organizational Dynamics*, Vol. 33 No. 2, pp. 161-173.

Luqman, A. and Abdullah, N.K. (2011), "E-business adoption amongst SMEs: a structural equation modeling approach", *Journal of Internet Banking and Commerce*, Vol. 16 No. 2, pp. 1-20, available at: www.arraydev.com/commerce/jibc/2011-08/AzyaneeLuqman.pdf (accessed at 24 May 2012).

Manly, B. (2000), *Statistics for Environmental Sciences and Management*, CRC Press, London.

Molla, A. and Licker, P.S. (2005), "eCommerce adoption in developing countries: a model and instrument", *Information and Management*, Vol. 42 No. 6, pp. 877-899.

Nguyen, H.O. (2013), "Critical factors in e-business adoption: evidence from Australian transport and logistics companies", *International Journal of Production Economics*, Vol. 146 No. 1, pp. 300-312.

Olatokun, W. and Bankoleb, B. (2011), "Factors influencing electronic business technologies adoption and use by small and medium scale enterprises (SMES) in a Nigerian municipality", *Journal of Internet Banking and Commerce*, Vol. 16 No. 3, pp. 1-26, available at: www.arraydev.com/commerce/JIBC/2011-12/WoleOlatokun_Acceptedv02.pdf (accessed 24 May 2012).

Oliveira, T. and Martins, M.F. (2010), "Understanding e-business adoption across industries in European countries", *Industrial Management & Data Systems*, Vol. 110 No. 9, pp. 1337-1354.

Ongori, H. (2009), "Role of ICT adoption in SMEs: evidence from Botswana", *Research Journal of Information Technology*, Vol. 1 No. 2, pp. 79-85.

Pai, J.C. and Yeh, C.H. (2008), "Factors affecting the implementation of e-business strategies. An empirical study in Taiwan", *Management Decision*, Vol. 46 No. 5, pp. 681-690.

Palmer, R. (2002), "There's no business like e-business", *Qualitative Market Research, An International Journal*, Vol. 5 No. 4, pp. 261-262.

Pan, M.J. and Jang, W.Y. (2008), "Determinants of the adoption of enterprise resource planning within the technology-organization-environment framework: Taiwan's communications industry", *Journal of Computer Information Systems*, Vol. 48 No. 3, pp. 94-102.

Papazafeiropoulou, A. and Pouloudi, A. (2000), "The government's role in improving electronic commerce adoption", *ECIS 2000 Proceedings*, available at: http://goo.gl/xVwkJK (accessed 6 March 2015).

Parker, C. and Castleman, T. (2009), "Small firm e-business adoption: a critical analysis of theory", *Journal of Enterprise Information Management*, Vol. 22 Nos 1/2, pp. 167-182.

Pavlou, P.A. and El Sawy, O.A. (2010), "The 'Third Hand': IT-enabled competitive advantage in turbulence through improvisational capabilities", *Information System Research*, Vol. 21 No. 3, pp. 443-471.

Pileidou, M. (2008), "The challenge of e-business for Greek SMEs", Postgraduate thesis, University of Macedonia, available at: http://dspace.lib.uom.gr/bitstream/2159/3770/2/PilidouMsc2008.pdf (in Greek language) (accessed 12 January 2011).

Porter, M.E. (1979), "How competitive forces shape strategy", *Harvard Business Review*, Vol. 4 No. 1, pp. 137-145.

Porter, M.E. (2011), *Competitive Advantage of Nations: Creating and Sustaining Superior Performance*, The Free Press, New York, NY.

Premkumar, G. and Ramamurthy, K. (1995), "The role of interorganizational and organizational factors on the decision mode for adoption of interorganizational systems", *Decision Science*, Vol. 26 No. 3, pp. 303-336.

Rantapuska, T. and Ihanainen, O. (2008), "Knowledge use in ICT investment decision making of SMEs", *Journal of Enterprise Information Management*, Vol. 21 No. 6, pp. 585-596.

Ritter, T. and Gemunden, H.G. (2004), "The impact of a company's business strategy on its technological competence, network competence and innovation success", *Journal of Business Research*, Vol. 57 No. 5, pp. 548-556.

Rogers, E.M. (2003), *Diffusion of Innovations*, 5th ed., The Free Press, New York, NY.

Sanders, N.R. (2007), "An empirical study of the impact of e-business technologies on organizational collaboration and performance", *Journal of Operations Management*, Vol. 25 No. 6, pp. 1332-1347.

Schumacker, R.E. and Lomax, R.G. (2010), *A Beginner's Guide to Structural Equation Modeling*, Routledge Academic, New York, NY.

Shapiro, C. and Varian, H.R. (2013), *Information Rules: A Strategic Guide to the Network Economy*, Harvard Business Press, Boston, MA.

Simon, S.J. (2004), "Critical success factors for electronic services: challenges for developing countries", *Journal of Global Information Technology Management*, Vol. 7 No. 2, pp. 31-53.

Simpson, M. and Doherty, A.J. (2004), "E-commerce adoption support and advice for UK SMEs", *Journal of Small Business and Enterprise Development*, Vol. 11 No. 3, pp. 315-328.

Spremic, M. and Hlupic, V. (2007), "Development of e-commerce in Croatia: a survey", *Information Technology for Development*, Vol. 13 No. 4, pp. 391-409.

Srivastava, S.C. and Teo, T.S. (2010), "E-government, e-business, and national economic performance", *Communications of the Association for Information Systems*, Vol. 26 No. 1, pp. 267-286.

Steinfield, C., Adelaar, T. and Lai, Y.-J. (2002), "Integrating brick and mortar locations with e-commerce: understanding synergy opportunities", *Hawaii International Conference on Systems Sciences, Big Island, Hawaii, 7-10 January*.

Taylor, M. and Murphy, A. (2004), "SMEs and e-business", *Journal of Small Business and Enterprise Development*, Vol. 11 No. 3, pp. 280-289.

Theodosiou, M. and Katsikea, E. (2012), "Antecedents and performance of electronic business adoption in the hotel industry", *European Journal of Marketing*, Vol. 46 Nos 1/2, pp. 258-283.

Thong, J. (1999), "An integrate model of information systems adoption in small business", *Journal of Management Information Systems*, Vol. 15 No. 4, pp. 187-214.

Thong, J. and Yap, C. (1995), "CEO characteristics, organisational, characteristics and information technology adoption in small business", *Omega: International Journal of Management Sciences*, Vol. 23 No. 4, pp. 429-442.

Thong, J., Yap, C.S. and Raman, K.S. (1996), "Top management support, external expertise and information systems implementation in small business", *Information Systems Research*, Vol. 7 No. 2, pp. 248-267.

Tornatzky, L. and Fleischer, M. (1990), *The Process of Technology Innovation*, Lexington Books, Lexington, MA.

Turban, E., King, D., Lee, J. and Viehland, D. (2004), *Electronic Commerce: A Managerial Perspective*, Prentice Hall, Upper Saddle River, NJ.

Voola, R., Casimir, G., Carlson, J. and Agnihotri, M.A. (2012), "The effects of market orientation, technological opportunism, and e-business adoption on performance: a moderated mediation analysis", *Australasian Marketing Journal (AMJ)*, Vol. 20 No. 2, pp. 136-146.

Wang, Y.M., Wang, Y.S. and Yang, Y.F. (2010), "Understanding the determinants of RFID adoption in the manufacturing industry", *Technological Forecasting & Social Change*, Vol. 77 No. 5, pp. 803-815.

Wu, F., Mahajan, V. and Balasubramanian, S. (2003), "An analysis of e-business adoption and its impact on business performance", *Journal of the Academy of Marketing Science*, Vol. 31 No. 4, pp. 425-447.

Yates, N., Daniel, S., David, S. and Starnes, N. (2008), *The Practice of Statistics*, Freeman Press, New York, NY.

Zhu, K. (2004), "The complementarity of information technology infrastructure and e-commerce capability: a resource-based assessment of their business value", *Journal of Management Information Systems*, Vol. 21 No. 1, pp. 167-202.

Zhu, K., Kraemer, K. and Dedrick, J. (2004), "Information technology payoff in e-business environments: an international perspective on value creation of e-business in the financial services industry", *Journal of Management Information Systems*, Vol. 21 No. 1, pp. 17-54.

Zhu, K., Kreamer, K. and Xu, S. (2003), "Electronic business adoption by European firms: a cross-country assessment of the facilitators and inhibitors", *European Journal of Information Systems*, Vol. 12 No. 4, pp. 251-268.

Zhu, K., Kraemer, K. and Xu, S. (2006), "The process of innovation assimilation by firms in different countries: a technology diffusion perspective on e-business", *Management Science*, Vol. 52 No. 10, pp. 1557-1576.

Appendix

Factors effecting e-business adoption	Corresponding studies
1. CEO characteristics/management support	
CEO innovativeness	Ghobakhloo *et al.* (2011)
CEO knowledge	Ghobakhloo *et al.* (2011)
CEO's attitude towards innovation	Jeon *et al.* (2006)
CEO's IT (e-business knowledge)	Jeon *et al.* (2006)
Management commitment and support	Ifinedo (2011)
Owner-manager characteristics	Olatokun and Bankoleb (2011)
Top management emphasis	Wu *et al.* (2003)/Theodosiou and Katsikea (2012)
2. Information technology/information systems	
Employees' IT (e-business knowledge)	Jeon *et al.* (2006)
ICT infrastructure	Durbhakula and Kim (2011)
Internet penetration	Zhu *et al.* (2003)
Internet skills	Zhu *et al.* (2003)
IS core competence	Pai and Yeh (2008)
IT expertise	Bordonaba-Juste *et al.* (2012a)
IT infrastructure	Zhu *et al.* (2003)
IT knowledge	Bordonaba-Juste *et al.* (2012b)
Organisational IT competence	Ifinedo (2011)
Outsourcing IT activities	Bordonaba-Juste *et al.* (2012b)
Skilled employees	Bordonaba-Juste *et al.* (2012b)
Technical expertise	Lin and Lee (2005)
Technological infrastructure	Olatokun and Bankoleb (2011)
Technological opportunism	Voola *et al.* (2012)
Technological readiness/Technology readiness	Chang (2010)/Durbhakula and Kim (2011)/Oliveira and Martins (2010)
Technology innovation	Durbhakula and Kim (2011)
Technology integration	Oliveira and Martins (2010)
3. Firm characteristics	
3.1. Size	
Business size	Ghobakhloo *et al.* (2011)/Jeon *et al.* (2006)
Firm size	Bordonaba-Juste *et al.* (2012a, b) /Ifinedo (2011)/Oliveira and Martins (2010) /Zhu *et al.* (2003)
Size of enterprise	Olatokun and Bankoleb (2011)
3.2. Sector	
Industry type	Ifinedo (2011)
Sector	Bordonaba-Juste *et al.* (2012b)
3.3. Age	
Age of organisation	Olatokun and Bankoleb (2011)
Firm age	Ifinedo (2011)
3.4. Miscellaneous	
Firm scope	Zhu *et al.* (2003)
Organisation's Characteristics	Olatokun and Bankoleb (2011)
4. External environment	
4.1. Pressure from the competition	
Business competitiveness	Durbhakula and Kim (2011)
Business environment	Durbhakula and Kim (2011)
Competition	Ghobakhloo *et al.* (2011)
Competitive pressure	Bordonaba-Juste *et al.* (2012a)/Oliveira and Martins (2010)/Zhu *et al.* (2003)
Competitive pressure of the industry	Jeon *et al.* (2006)
Competitor orientation	Theodosiou and Katsikea (2012)/Wu *et al.* (2003)
Intensity of competition	Ifinedo (2011)

(*continued*)

Table AI.
Antecedents of e-business adoption

Factors effecting e-business adoption	Corresponding studies
4.2. Pressure from suppliers	
Pressure from suppliers	Olatokun and Bankoleb (2011)
Pressure suppliers	Bordonaba-Juste *et al.* (2012a)
4.3. Pressure from customers	
Consumer willingness	Zhu *et al.* (2003)
Customer orientation	Theodosiou and Katsikea (2012)/Wu *et al.* (2003)
Customer power	Theodosiou and Katsikea (2012)/Wu *et al.* (2003)
Pressure clients	Bordonaba-Juste *et al.* (2012a)
4.4. Miscellaneous	
Buyer-supplier pressure	Ghobakhloo *et al.* (2011)
Cultural environment	Olatokun and Bankoleb (2011)
Environmental dynamism	Pai and Yeh (2008)
External pressure	Ifinedo (2011)
Normative pressures	Theodosiou and Katsikea (2012)/Wu *et al.* (2003)
Readiness of Market Forces	Chang (2010)
Socio-economic environment	Olatokun and Bankoleb (2011)
5. Perceived benefits from the adoption of e-business	
Perceived benefit of the technology	Olatokun and Bankoleb (2011)
Perceived benefits	Bordonaba-Juste *et al.* (2012a)/Ifinedo (2011)
Perceived benefits and obstacles of e-business	Oliveira and Martins (2010)
Perceived relative advantage	Ghobakhloo *et al.* (2011)
Relative advantage	Luqman and Abdullah (2011)
Relative advantages and benefits	Jeon *et al.* (2006)
6. Cost from the adoption of e-business	
Cost	Ghobakhloo *et al.* (2011)
Cost and Return on Investment	Olatokun and Bankoleb (2011)
Cost of e-business adoption	Jeon *et al.* (2006)
7. Compatibility and complexity	
Compatibility	Luqman and Abdullah (2011)
Compatibility and complexity	Jeon *et al.* (2006)
Complexity	Luqman and Abdullah (2011)
Perceived compatibility	Ghobakhloo *et al.* (2011)
8. Government support	
E-government development	Durbhakula and Kim (2011)
Government policy and vision	Durbhakula and Kim (2011)
Governmental support for e-business	Jeon *et al.* (2006)
9. Support from other vendors	
IS vendor support and pressure	Ifinedo (2011)
Support from technology vendors	Ghobakhloo *et al.* (2011)
Training availability	Lin and Lee (2005)
10. Trading partner collaboration	
Lack of trading partners	Zhu *et al.* (2003)
Readiness of coordination	Chang (2010)
Supply chain readiness	Chang (2010)
Trading partner collaboration	Oliveira and Martins (2010)
11. Knowledge management process	
Information intensity	Ghobakhloo *et al.* (2011)
Knowledge acquisition, knowledge dissemination, knowledge application	Chong *et al.* (2014)
Knowledge level/knowledge acquisition /knowledge application/knowledge sharing	Lin and Lee (2005)
Organisational learning ability	Wu *et al.* (2003)/Theodosiou and Katsikea (2012)

Table AI.

Study	Methodology	Sample	Framework	Statistical analysis
Wu *et al.* (2003)	Survey	US technology firms	Unique approach (firm characteristics, competitive environment)	Regression analysis
Zhu *et al.* (2003)	Data obtained through EcaTT, a German research Institution	14 industries from 8 European countries	TOE framework	Logit regression
Lin and Lee (2005)	Survey (based on the 2003 Common Wealth directory of the 1,000 largest firms in Taiwan)	Taiwanese firms	Unique approach (Organisational learning factors, knowledge management processes)	SEM technique
Zhu *et al.* (2006)	Survey conducted by CRITO in partnership with two professional research firms	Companies from 10 countries and three sectors	TOE framework	SEM technique
Jeon *et al.* (2006)	Survey	Korean SMEs	Unique approach (CEO, e-business, organisational, environmental and country-specific characteristics)	*t*-Tests, linear probability model, logit regression
Hsieh *et al.* (2006)	Survey	International trading companies of China	Unique approach (information acquisition and dissemination)	Partial least squares (PLS)
Pai and Yeh (2008)	Survey	Manufacturing companies of Taiwan	Contingency, organisational and information systems management theory	Multiple regression analysis
Chang (2010)	Survey	Taiwanese PC industry	DOI theory	Discriminant function analysis
Oliveira and Martins (2010)	Survey (data were obtained from the e-Business Watch survey)	Telecommunication and tourism companies from EU27 countries	Combination of the TOE framework and other models	Logistic regression analysis
Ghobakhloo *et al.* (2011)	Survey	Manufacturing SMEs of Iran	TOE framework	Multiple and logistic regression analysis
Ifinedo (2011)	Survey	Canadian SMEs	TOE framework	Partial least squares (PLS)
Luqman and Abdullah (2011)	Survey	Malaysian companies	DOI theory	SEM technique
Durbhakula and Kim (2011)	Data obtained through various databases (e.g. United Nations Global e-Government Readiness Report)	Various sectors from 61 countries	Adaptation of the TOE framework (country characteristics-business-technology-government environment)	Partial least squares (PLS)
Bordonaba-Juste *et al.* (2012a)	Survey (data were obtained from the e-Business Watch survey)	Retailers (from 7 European countries)	TOE framework	Biprobit estimation

(*continued*)

Table AII. Main studies investigating the antecedents of e-business adoption

Study	Methodology	Sample	Framework	Statistical analysis
Bordonaba-Juste *et al.* (2012b)	Survey (data were obtained from the e-Business Watch survey)	Manufacturing and retailing companies from European countries and the USA	Unique approach (IS employees external IT, sector, country)	Correlation analysis, ANOVA
Theodosiou and Katsikea (2012)	Survey	Hotel companies from Cyprus	Unique approach (top management emphasis, organisational learning ability, customer orientation, competitor orientation, adhocracy culture, customer power, normative pressures)	SEM technique
Voola *et al.* (2012)	Survey	Australian firms	Resource-based view (RBV)	Least squares regression
Nguyen (2013)	Survey	Australian transport and logistics companies	Discrete variable investment model	Logistic regression
Chong *et al.* (2014)	Survey	Malaysian SEMs	Unique approach (knowledge acquisition, knowledge dissemination, knowledge application)	Multiple regression analysis

Table AII.

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