

An Investigation of the Barriers to E-business Implementation in Small and Medium-Sized Enterprises

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Abstract—E-business technologies, whereby business transactions are conducted remotely using the Internet, present unique opportunities and challenges for business. E-business technologies are applicable to a wide range of organizations and small and medium-sized enterprises (SMEs) are no exception. There is an established body of literature about e-business, looking at definitions, concepts, benefits and challenges. In general, however, the research focus has been on larger organizations, not SMEs. In an attempt to redress the balance of research, this paper looks at e-business technologies specifically from a small business perspective. It seeks to identify the possible barriers that SMEs might face when considering adoption of the e-business concept and practice as part of their business process change initiatives and implementation. To facilitate analysis of these barriers a conceptual framework has been developed which outlines the key conceptual and practical challenges of e-business implementation in SMEs. This is developed following a literature survey comprised of three categories: characteristics of SMEs, issues of IS/IT use in SMEs and general e-business adoption and implementation issues. The framework is then empirically assessed against 7 SMEs who have yet to implement e-business or whose e-business efforts have been unsatisfactory. Conclusions from the case studies can be used to verify the framework, and set parameters for further larger scale empirical investigation.

Keywords—Business process change, disruptive technologies, electronic business (e-Business), electronic commerce (e-Commerce), ICT adoption, small and medium-sized enterprises (SMEs).

I. INTRODUCTION

THE Internet and web-based technologies have reshaped the business world at an unprecedented pace. E-business has dramatically changed how business processes are designed, implemented and enhanced, altering industry structures and shifting the balance of power between corporations and their suppliers and customers [1]. E-business can be seen as a mechanism that is able to break down the barriers of distance and to enable businesses to move to more distant markets without having a physical presence. This reduces the costs of buying and selling goods and services [2]. With the rapid growth of both the Internet and web-based technologies, much of the emphasis has been on the development of e-business concept, its models and the implementation, particularly in the large business domain.

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There has been less emphasis on the relatively lower uptake of such technologies in small and medium sized enterprises (SMEs). A number of issues have arisen such as the lack of resources, the size of the company and the high setup costs associated with e-business. Current e-business literature does not address much of the challenges and concerns of e-business adoption within SMEs [3]. Despite a wealth of initiatives and government-led schemes, there remain significant uncertainties as to how smaller businesses can benefit from the electronic environment [4]. This research is therefore aimed at gaining a better understanding of the potential issues preventing SMEs from utilizing the Internet and related technologies to enhance their businesses. Understanding the views and opinions of the SMEs is critical as they are the backbone of the economy. Assessing risks and potential inhibitors of e-business adoption and implementation in the SME sector would help increase success and aid SMEs to realize the full potential of e-business. A qualitative research method has been chosen to explore the issues outlined in the conceptual framework. The method of collecting data was through the use of telephone interviews which were carried out with 7 chosen SMEs situated in the inner and outer London regions.

II. KEY CONCEPTS OF E-BUSINESS

A. E-Business

The rapid growth of the Internet has made way for organizations of all types and sizes to utilize e-technologies to enhance their business processes and functions. Electronic business methods have enabled companies to link their internal and external data processing systems more efficiently and flexibly, to work more closely with suppliers and partners and to better satisfy the needs and expectations of their customers [5].

There is a no universally agreed definition of e-business and as a result the term “e-business” is used interchangeably with “e-commerce” and other similar terms [6], [7]. E-commerce has been defined by the OECD as the ‘sale or purchase of goods or services, whether between business, households, individuals, governments and other public or private organizations, conducted over computer mediated networks’ [8]. There have been varied definitions of e-business. One of the earliest definitions came from IBM in 1997, where they first defined e-business as, ‘a secure, flexible and integrated approach to delivering differentiated business value by

combining the systems and processes that run core business operations with the simplicity and reach made possible by internet technology' [9]. Another definition given by [10] centers around the conduct of e-business on the Internet. In this sense, e-business is not just buying and selling but is also about servicing customers and collaborating with business partners. In e-business, information and communication technologies (ICT) are used to develop and enhance business processes of any organizations, either for a profit, non-profit or governmental entity, operating over a computer-aided network.

B. E-business Models

An e-business model depicts the way of conducting electronic business over the Internet. An e-business model aims to 'use and leverage the unique qualities of the Internet and the World Wide Web' [11]. Four commonly adopted e-business models are:

1) Business-to-Business (B2B)

B2B is the exchange of products and services between business organizations. It is the electronic support of business transactions between companies and covers a broad spectrum of applications that enable an enterprise or business to form electronic relationships with their distributors, resellers, suppliers and other partners [12]. B2B transactions take place within supply chains and Cullen and Webster [13], in their study of a series of focus groups, identify various forms of B2B including individual trading where a single supplier sells to other business organizations and collaboration where the products being sold are supplied as a result of collaboration. SMEs need to go digital and enhance their e-business skills because they are essentially part of the supply chain network [14].

2) Business-to-Consumer (B2C)

This is about businesses selling to the general public through an electronic device. B2C, or commerce between companies and consumers, involves customers gathering information, purchasing tangible goods (e.g. books or consumer products) or intangible goods (e.g. electronic material such as software and e-books) [15]. B2C reduces transaction costs by increasing customer access to information electronically and allowing consumers to find the most competitive price for a product or service online. Although B2B always comes first in terms of sales volume, B2C is the most recognizable form of e-business.

3) Consumer-to-Consumer (C2C)

Consumer-to-Consumer (C2C) provides a way for consumers to sell merchandise to each other over an online platform; the typical example of this is eBay. Before the arrival of eBay, people would tend to use car boot sales and classified adverts to sell their unused products or old merchandise. With the introduction of online auction sites, people would no longer need to go outside to bid for merchandise but can stay indoors to purchase and bid for merchandise on these websites [16].

4) Consumer-to-Business (C2B)

Consumer-to-Business (C2B) is an e-business model in which consumers (individuals) demand products and services from companies [17]. This business model is a complete reversal of the traditional business model where companies offer goods and services to consumers (B2C). A consumer in this form of e-business specifies his project with requirements and budget online while companies review them and bid on the project. One example of this model is Priceline.com, where bidders or customers set their prices for items such as airline tickets or hotel rooms and a seller decides whether to supply them. Another example is ratedpeople.com where consumers post their DIY projects for local tradesmen to bid.

III. CONCEPTUAL FRAMEWORK OF THE BARRIERS TO SMEs ADOPTING E-BUSINESS

Fig. 1 is a conceptual framework illustrating the barriers which may prevent SMEs considering and adopting E-business. The four categories identified - SME characteristics, ICT/IT adoption, E-business adoption issues and E-business implementation issues - are described in further detail below.

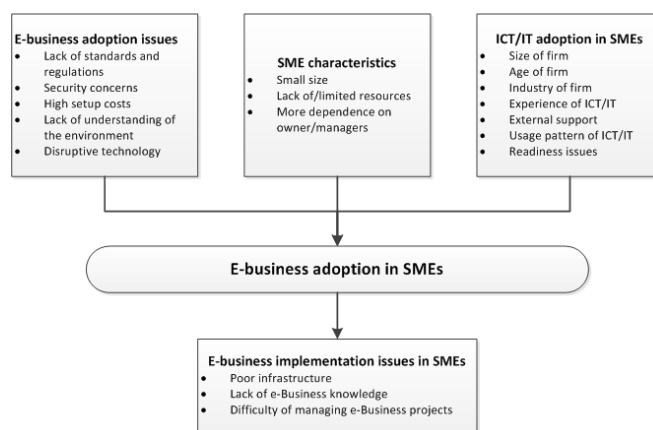


Fig. 1 Conceptual framework of the barriers to SMEs adopting e-Business

A. SME Characteristics

Small and medium-sized enterprises (SMEs) make significant contributions to national economies [18] and they are also estimated to account for 80% of economic growth [19]. The EU definition of SMEs is as follows:

"The category of micro, small and medium-sized enterprises and is made up of enterprises which employ fewer than 250 persons and which have an annual turnover not exceeding 50 million euro, and/or an annual balance sheet total not exceeding 43 million Euros" [20].

As SMEs are not able to exploit the economies of scale in the same way as larger firms, they make use of other benefits such as having flat hierarchies and being flexible [21]. It is also recognized that as SMEs are small, they are less likely to have management problems and also a less frequent change of managers compared to larger firms. The particular characteristics of SMEs will have an impact on their consideration of e-Business, and on the likelihood of

successful implementation if they adopt an e-business format. Three specific characteristics are discussed below.

1) Small Size of SMEs

Small size is the main characteristic that identifies SMEs. Being small means they have relatively small structures. Their operations are on a smaller scale; some of SMEs only have a handful of staff. In some ways it can be an advantage when it comes to specialization and filling niche markets with products. However, size could become an issue when SMEs need to expand and acquire funds for the business. Reference [22] finds significant correlations between the business size of an SME in terms of the number of employees and the level of internet adoption. Their study shows that smaller SMEs are less likely to adopt e-business technologies than larger SMEs. Another study also confirms that a firm's size is critical for the performance of its business and larger SMEs tend to have better success in business and wider access to finance [23].

2) Lack of/Limited Resources in SMEs

SMEs normally have limited resources and are often on tighter financial constraints. The scarce resources SMEs have result in fewer options in conducting business and acquiring assets and technology. As shown in [19], limited resources are a distinguishing characteristic of SMEs and constitute a barrier for them to compete in the global e-business market.

3) More Dependence on Owners-Managers

Small businesses are likely to have a greater reliance on the expertise and motivation of the owner/manager of a firm [24]. SMEs are normally managed and operated by the owner-managers. The entrepreneur of the business leads the company and makes most of the decisions. However, owner-managers' lack of managerial skills and knowledge might prevent SMEs from embracing innovative ideas, such as e-business, or from implementing e-business successfully.

B. ICT/IT Adoption in SMEs

There have been problems with research on SMEs and ICT adoption and the understanding of the relationship between SMEs and ICT is somewhat limited [25]. It is unclear in terms of analysis in relation to the small firms and how it should be seen, which means that there has been some limitation in the understanding of the relationship between SMEs and ICT. In addition, not enough is known about how small firms are responding to the opportunities provided by ICT or whether small firms see the technology as an opportunity at all.

Large organizations commonly use ICT to co-ordinate and connect across different levels and divisions of the company, whereas SMEs often use ICT for less formal communication. Brock [26], in a review of previous literature, suggests that the use of ICT depends on a number of factors. The authors propose that these factors are provisionally determinants of the successful/unsuccessful implementation of SMEs undertaking e-business. These factors are discussed below.

1) Size of Firm

Firm size is one main factor in whether SMEs adopt IT. It has been well established in the literature that small company size links with limited resources and lack of specialist business skills and knowledge in areas such as management, strategy and marketing [27]. The number of employees may play a part in whether a business adopts information technology. For example, if an SME has less than 10 employees, they are less likely to adopt IT compared to larger SMEs who are able to adopt IT technologies but not on the scale that most large organizations can. If an SME is too small to consider IS/IT it certainly would not consider e-business.

2) Age of Firm

Although firm size is expected to be positively related to early and intensive ICT adoption, the arguments with respect to the impact of firm age on ICT adoption are not so conclusive [28]. The definition of firm age is twofold: the number of years a firm has been established and the average age of employees within the firm [26]. It is believed that older SMEs with elderly members of staff are less likely to use ICT to improve business if they are able to survive in their respective markets, and are unlikely to adopt e-business. Conversely, younger firms who would be expected to embrace new technologies are more likely to consider e-commerce practice.

3) Industry Sector of Firm

It is believed that specific industry/sector will have some influence on the SME's demand for e-business, as Fillis et al. argue that e-business is not appropriate for all firms across all industry sectors [27]. For example, in wholesaling and retailing SMEs continue to use more traditional methods to secure business. Firms that are connected to IT-oriented industries would have higher degree of uptake and usage of Internet technologies [18], [29]. Brock asserts that the specific industry the firm operates in would have an impact on the adoption of ICT/IT in SMEs and subsequently the decision to embark on an e-business model [26].

4) Experience of ICT/IT

SMEs often lack both the human and technological resources required to utilize IS/IT and, consequently, e-business. This is because their main emphasis is on daily operation, which makes them unable to spend time studying the benefits of relevant technologies. Packalen's work suggests that employees in small firms tend not to have sufficient IT skills, which acts as a hindrance to adopting ICT/IT within their businesses [30]. The ability of the owner-manager's managerial and IT knowledge and skills may increase the opportunity of IT use amongst SMEs. However, by having a work-force that lacks the required knowledge and expertise in IT, this can reduce the likelihood of adopting more advanced Internet and web-based technologies and relatively more sophisticated work structures if e-business was to be considered. If the firm wishes to implement e-business, specialist workers may need to be recruited [31].

5) External Support

Support from the government through various schemes and other sources, such as SME forums, should be considered as one of the factors mitigating the insufficient knowledge and skills in the adoption of ICT by SMEs. One study has shown that ICT adoption and utilization is predicated on the availability of physical infrastructure, legal and regulatory issues and adequate research. And support can only be put in place by the government [32]. This implies that if SMEs do seek support from the government agencies which regularly hold conferences, forums and one-to-one meetings to provide guidance and support they are more likely to be aware of and adopt e-business and their e-business initiatives are more likely to succeed.

6) Usage Pattern of ICT/IT

SMEs use ICT mainly for operational and administrative support rather than for strategic decision-making. Smaller companies are limited in the way they use ICT/IT within their organizations due to their inability to keep up with the latest technological developments and resources. Most SMEs would only use information systems for basic tasks such as admin and office support [26]. This means that SMEs would be reluctant to consider e-business which involves using internet technologies for external inter-organizational communications. Therefore, the usage pattern of ICT, focusing mainly [or merely] on operational efficiency could constitute a barrier for e-business adoption in SMEs.

7) Readiness Issues

There have been readiness issues for SMEs adopting ICT in the past. A framework has been developed, Stage model of ICT adoption and readiness issues in SMEs, which describes three different readiness levels required for ICT adoption in SMEs [33]. This model is very similar to the e-business adoption ladder adapted from the Department of Trade and Industry (cited in [33]). The model shows that as SMEs grow and gain more confidence, they will aim to achieve further growth and grasp better opportunities. Each of the growth stages have issues which SMEs will encounter according to the framework. One example of the growth stage suggests that as SMEs develop their capabilities and want to adopt new approaches to business, they will come across organizational issues such as required knowledge to expand or divert their businesses.

C. E-Business Adoption Issues in SMEs

There are many factors that influence the adoption and successful implementation of e-business. The adoption issues relate to the problems companies may have in taking on ideas, principles, values and methods of e-business technologies. Need to say here that the issues identified below which prevent firms from considering e-Business would equally apply to SMEs.

1) Lack of Standards and Regulations

The first adoption issue arises from the lack of government standards and regulations to govern the intricacies of e-business. The lack of a legal framework to support e-business, for example, regulations for online transactions, digital signatures, arbitration, intellectual property rights, exports and imports, constitutes a barrier to e-business practice [34]. A study by Kaynak et al. indicates that e-business activities raise concerns for governments and regulatory bodies and the lack of legal regulation is cited as one of the most serious limitations of e-commerce [35]. Their study with 237 Turkish SMEs reveals that legal and security issues are highly sensitive for SMEs and urges collaboration of governmental bodies to enact necessary rules and regulations for e-business internationally.

2) Security Concerns

Many organizations are hesitant in embracing e-business mainly because of their concerns about security issues [36]. When a firm uses the Internet, it exposes itself to a range of security risks which fall generally into 3 general categories: client/server risk, data transfer and transaction risk and virus risk. Security and privacy issues are particularly important in the B2C type of e-business [35]. The main concerns regarding e-business adoption can be related to all types and sizes of companies in various areas such as payment security, viruses and confidentiality. Security in the forms of integrity and availability of information assets are the main barriers to internet use in SMEs [37], [18]. These problems discourage small firms from taking up this technology and way of doing business [38].

3) High setup costs

E-business applications, particularly very complicated ones, can be expensive [39]. There are connection costs to the Internet, cost of the hardware and software infrastructure and maintenance costs [40]. Many SMEs do not have the required financial resources for these and other additional investments which may be needed [38]. The investments may not be cost effective and the company may have to consider outsourcing some of its activities.

4) Lack the Understanding of the Environment

SMEs are unaware of the potential of IS/IT to enhance their business and how e-business applications can help them engage with the global digital economy [38]. While larger companies have embraced e-commerce at unprecedented pace, SMEs, many of them operating as part of the supply chain network with larger firms, are slowly catching up to become "e-SMEs" [41]. There is a lack of understanding of the Internet amongst SMEs [4]. Some SMEs may wrongly believe that the internet will be a substitute for all their operations. Some occupy small and clearly defined niche markets and feel that there is no need for the global connectivity through the Internet.

5) Disruptive Technology

E-business, like e-commerce, is not just another technology

that has sustained and enhanced business practice; it is an innovation that has disrupted traditional ways of doing business [42]. Bower and Christensen introduce concepts of disruptive and sustaining technologies for innovations, those that initially tend to degrade performance but promise greater long-term potential [43]. They argue that technological changes that “damage” established companies have two characteristics. The first is that they present a different package of performance attributes which tend not to be valued by existing customers. Secondly, the performance attributes that current customers do value, improve at such a fast degree that the new technology can invade those established markets. Most current e-business practices cannot match the traditional business models in some key performance attributes, such as privacy and security in B2C commerce and the robustness and capacity of the dedicated electronic data interchange systems in B2B commerce. This may constitute a barrier for SMEs when considering e-business because they are naturally more reluctant to change.

D.E-Business Implementation Issues in SMEs

The implementation issues are the difficulties which might be encountered by SMEs when putting ideas and concepts into practice.

1) Poor infrastructure

IT infrastructure comprises hardware, software, suppliers and distributors dealing with web servers and enterprise resource planning systems. Poor levels of technology infrastructure such as slow internet connection, hardware and software malfunction could be barriers for e-business adoption [44]. Tousseu’s work reveals that lack of IT infrastructure is becoming an issue in some developing countries and that over 80% of the SMEs studied did not have a broadband connection [45]. Another study found that there were frequent power outages of up to a day [33]. Poor telecommunications, including transmission facilities connecting a country’s domestic network to the Internet, may inhibit the growth of e-market.

2) Lack of e-Business knowledge

One study shows that the notion of e-business was poorly understood amongst their interviewees [46]. Even though participants were familiar with the term, they gave very different accounts of what the term meant. For example, e-invoicing, which all interviewees were familiar with, was treated as a separate technology and often only associated with other e-business technologies when questioning possible links between the organization’s conceivable future e-business objectives.

3) Difficulty of managing e-Business projects

The difficulty of managing e-business projects is another factor identified as an implementation issue for e-business. Pesonen and Smolander’s study concludes that e-business projects fail due to improper requirement setting [46]. Two of the organizations in their study expressed great concerns over

the matter and had appeared wary of starting e-business initiatives due to the difficulty of e-business management.

The likely barriers to SMEs considering and adopting e-business, as outlined in the conceptual framework (Fig. 1) and discussed above, will serve as the basis for the empirical investigation of the case study.

IV. RESEARCH QUESTIONS AND METHODOLOGY

Although there is a body of literature about e-business and e-commerce, research into the barriers to adopting and successful implementation of e-business in SMEs is a relatively new area [3], [4]. Since SMEs are normally considered the backbone of the economy it is important to look into the reasons why many of them have not taken up the opportunities of e-business given the rapid growth in the online business arena.

Three specific research questions are set out below:

- 1) *What are the inherent characteristics of SMEs which may constitute barriers to e-business adoption?*
- 2) *What are the factors inhibiting ICT/IT adoption in SMEs which also prevent SMEs from considering e-business?*
- 3) *What are the likely e-business implementation issues that also affect the successful implementation of e-business in SMEs?*

The main purpose of the study is to explore the issues outlined and discussed above. The qualitative method has been adopted focusing on the meanings, traits and defining characteristics of events, people, interactions, settings/cultures and experience. As one leading proponent of qualitative methods explains, “Quality refers to the what, how, when and where of a thing – its essence and ambience” [47]. Case study has been chosen as the research methodology and interviews with owner-managers of selected SMEs are the main research instrument to gain empirical data for analyzing the key barriers of e-business adoption and implementation in SMEs. There are two types of SMEs in the present research: SMEs who have yet to consider e-business and those who have had some experience in e-business but where the implementation has been unsuccessful. The questions for the interviews were developed to address the issues of SMEs adopting and implementing e-business, as outlined in the conceptual framework and discussed in the literature review above.

Seven SMEs took part in the study. The geographical scope of the SMEs was set to be within the Greater London region. Invitation emails were initially sent out in early February 2014 and the interviews were completed by the 22nd of April 2014. Interviews were conducted over the telephone. Telephone interview is an effective and economical way of collecting data where the sample to be contacted are all accessible via the telephone [48]. The types of questions used were mostly semi-structured in order to explore issues so that a level of detail could be obtained from the interviewees. There were also ‘open-ended’ questions which enabled case firms to reflect and provide a more comprehensive or additional details than structured questions [49]. The interviews were tape recorded which allowed the researchers to concentrate on the process of the interview [50] and after the interview to easily produce the

transcripts which were sent back to the interviewees to check for accuracy.

V. FINDINGS & DISCUSSION

Of the 7 SMEs interviewed for the case study, 4 were based in inner London and 3 were based in outer London. A summary of the background details of the case firms is shown in Table I.

TABLE I
 FIRM PROFILES

SME	Industry	Number of Staff	Year formed	Experience of E-business	Interviewee
A	Computer software	120	1997	Yes	Technical Director
B	Property development/Real estate	50	1974	No	Business Development Director
C	Information technology	100	1988	Yes	Customer Care Specialist
D	Information technology	54	1991	No	Marketing and Events Manager
E	Telecoms /IT	250	1990	Yes	Human Resource Manager
F	IT consultancy & development	200	2007	No	CEO
G	Healthcare	90	1994	Yes	Marketing Director

As seen, the case companies are predominantly medium-sized with no firms falling below the employee size of 50, considered small by the EU definition. It can also be seen that the majority of the companies interviewed operate in the IT or IT-related industries, the exceptions being firms B and G working in the real estate and healthcare respectively.

A. SME Characteristics

1) Small Size

It has been suggested that the smaller firm size prohibits SMEs from adopting e-business and successful implementation of e-business [22]. Contrary to this, all the case SMEs point out that firm size has not been an issue for them to consider e-business. It should be noted that all the firms in the research are medium-sized companies and therefore this finding does not rule out the possibility that small or micro-sized firms, with employees less than 5, may still find it hard to bust their time and energy to implement e-business.

2) Lack of/Limited Resources

SMEs tend not to have the resources to adopt an e-business strategy mainly due to their lack of human and financial resources [19]. Firm B confirms this view, stating that they would have difficulties finding the required time and resources to adopt e-business. The respondent for Firm B advises that the cultural shift from conventional ways of conducting business to online buying and selling would be a factor to assess when considering e-business. In the same vein, Firm D admits that they may not have the necessary resources for e-

business, although they might consider hiring external specialists to steer the initiative. With support from external sources, firms A and F found no resourcing issues but raised concerns with charges and problems forming relationships with their business partners.

3) More Dependence on Owners/Managers

SMEs do not possess the required capabilities to compete with larger companies and rely primarily on the ability of the owner-managers [24]. It is argued, therefore, that the decision to embrace the e-business concept is dependent of whether the owner-manager has the vision and is willing to undertake the innovative approach in changing the ways of doing business. Dependence on owners is evident since more than half the case firms confirm that key decisions are made by one individual, the managing director of the firm. Firms A and G who adopt a more team-based structure, on the other hand, made the decision jointly among staff to develop e-business initiatives. The issue of over reliance on owner-managers can be further explored to determine the key criteria in determining whether the firm is in a position for e-business.

B. ICT/IT Adoption in SMEs

1) Size of Firm

Many authors (e.g. [27]) argue that firm size is a determining factor as to whether SMEs are more likely to deploy ICT/IT for competitive advantages. The findings of the study suggest that all case firms are heavily involved in IT use because, understandably, they need to use computer-based systems to operate the business. There is certainly a degree of bias here since all the case organizations are relatively IT-based. There are differing opinions, though, to the proposition that technically oriented SMEs are more likely to adopt e-business or their e-business initiatives are more likely to be successful. For example, Firm B is a software company but they are not particularly interested in e-business. The Business Development Director of the firm comments, "We probably don't rely on it as much as other companies which may be in the industry as us and offer the same products and services that we do. We are so well known in the market in which we serve so we get a lot of business from word-of-mouth rather than over the web".

2) Age of Firm

Firm age, in the sense of both how long the firm has established and the average age of staff, is a factor of how likely the firm is to make use of ICT/IT, and subsequently, e-business [26]. The assumption is that older SMEs with more elderly employees are more reluctant to use information systems to enhance their work skills and make necessary changes to adopt e-business. Firms A and B confirm that this should not be the case as they always recruit people with a good level of IT skills required for the job. On the other hand, Firm C does have a concern with elderly employees having problems with new technologies. The respondent comments, "We have had a couple of problems with older employees not being able to utilize some of the e-technologies we use within

the business; maybe not as first as they started learning but then they moved on from there”.

3) Industry of Firm

Another factor proposed by Brock that would affect the adoption of ICT/IT in SMEs is the specific industry the firm operates in [26]. It is argued that firms in sectors such as wholesaling and retailing may struggle to grasp IT technologies. The case firms have different views on this point. Firm F stresses that the decision to go online is irrelevant of what industry they are in; the suppliers play a part in the decision-making because there are extra charges in using e-business applications on their side. Firms B and D also point out that the use of IT, or the decision to upgrade to new technologies has nothing to do with what they do as a business. Similarly, firm A attributes their e-business practice to “being more customer-focused with regards to buying and saving labor costs amongst their employees”. Firm C, on the other hand, developed their e-business ideas because of a need to expand their capabilities and outperform competitors.

4) Experience of ICT/IT

The level of experience in IT may determine how likely SMEs will embrace new technologies and train their staff to use them. Authors such as Packalen and Jones et al. indicate that the lack of IT experience in SMEs may prove to be a barrier in the adoption of e-business systems [30], [31]. Firm B is the only respondent who confirms this. There is undoubtedly a level of bias in exploring this issue because most of the case firms are IT-based companies. And as previously mentioned most of the firms would not employ staff without required IT skills.

5) External Support

The likelihood and success rate of ICT adoption in SMEs are dependent on the availability of support from the government and other sources [32]. Relevant areas of development include the physical infrastructure, legal and regulatory issues and the importance of adequate research to support SMEs. Firms D and E confirm that support from the government is important and has been helpful when utilizing information technologies. General guidance on e-business models is available. There are various schemes offered by the government which provide financial incentives for SMEs to get involved. As the Managing Director of Firm F states, “There is a tax rebate which is available to all companies that do research and development, so we do get a tax rebate for the software research development that we do”.

6) Usage Pattern of ICT/IT

Usage pattern of ICT relates to how SMEs utilize IS/IT and in what areas. SMEs are said to be limited in the way how they use IT within their organizations and mainly use it for basic tasks such as admin and office support [26]. All the participative firms appear to disagree with the notion of such limitation of IT use within their firms. Although most of the case firms have standardized IT systems it is felt that they are sufficient for running their companies for daily business

activities and for long-term business objectives. The IT infrastructures in these firms are a mixture of back-up, recovery and disaster management programs. Firms E, F and G have network servers in use and there is evidence to show these firms are starting to incorporate cloud into their IT infrastructure. As the CEO of Firm F comments, “Most of our infrastructure is in the cloud, we have servers we have backup and recovery and production functions which are all in the cloud”.

7) Readiness Issues

The ‘readiness’ issue argues that as SMEs achieve growth and gain experience they will seek more opportunities with the aid of ICT [33]. The findings are somewhat different from what has been suggested in the literature. Firms A and F have not considered e-business simply not because they are not ‘ready’ to implement but because e-business is not a critical success factor for the industries they operation in. Firm F is ready for e-business but cannot find the right partners to work with. It should be noted that for the case firms who have implemented e-business, the technologies had been available for many years but the real motivation to initiative their e-business efforts have been business process change, need to better productivity and an increasing demand from the clients.

C. E-business Adoption Issues in SMEs

1) Lack of Standards and Regulations

Lack of standards and regulations may prevent organizations from undertaking an e-business initiative [35]. The absence of relevant laws governing e-business practice, from the global market perspective in particular, may prevent SMEs from embarking on e-business technologies. There are different views from the case firms who have attempted e-business. The IT Director of Firm A indicates that they have not encountered any significant problems; their business is generally regulated and protected by other legislations. Firm E, on the other hand, raises a concern. When asked whether the lack government laws would affect their e-business, the Human Resources Manager pointed out, “Yes I would suppose so. There are data protection laws around things like using the information in the cloud. We have to be very careful about the information we would be putting in the cloud because data protection laws don’t necessarily cover that”. Other firms, such as firms B and D, are not conscious of whether they should be or there are any regulations about e-business.

2) Security Concerns

Many authors (e.g. [36]) have argued that security concerns would prohibit organizations from embracing e-business technologies. There is a variety of security measures within the case firms to cover areas such as data backup and disaster management. Basic encryption technologies and the username and password type of verification methods are commonly used in these firms. In general, all of the case firms who have implemented e-business believe that their current security procedures are appropriate enough to safeguard their e-business, a viewpoint also agreed by firms D and F who have

not implemented e-business. Only Firm B pointed out that they would not consider e-business owing to security concerns.

3) High Setup Costs

High setup costs of e-business applications may act as impediments to adoption [40]. This would be the case in particular in SMEs because they are normally on a tighter financial budget. The findings from the study appear to prove the contrary. All case organizations state that costs were not particularly an issue for them when considering e-business. Firms E and F explain that e-business actually helps them save money. Although there is expenditure on resources and maintenance, across the business the benefits of adopting e-business seem to outweigh the initial setup costs.

4) Lack of Understanding of the Environment

The lack of understanding of the environment could be another barrier that could prohibit SMEs from adopting e-business. Stockdale and Standing's work suggests that some SMEs may have difficulties in understanding the Internet and e-commerce and believe that it would be a substitute for all their operations [4]. However, the case firms seem to prove that this is not the case. Most of them are familiar with the general environment of today's market place where the Internet plays a major role in sales and communication. Firm A emphasizes that the Internet has been vital for their business and without it they would not have reached where they are now, while Firm B uses the Internet to showcase their products to potential customers. Firms E and F describe social media as being a major tool in how they approach and recruit people. As the Human Resources Manager at Firm E notes, "We market our company website through social media. It's where we do most of our recruitment. We find people on job boards, LinkedIn. It's where we do an awful lot of research. We have a strategy consulting branch of the company, so they would be doing a lot of information building online".

5) Disruptive Technology

E-business is said to be a technology which has disrupted the traditional ways of doing business. Both sets of SMEs were asked to comment on the impact e-business might or have had on their firms. Despite other issues as discussed above, there are some positive views from case firms about adopting the e-business concept. Firm A states that e-business has been vital to their business. They have been able to expand their business without recruiting extra people. E-business has enabled Firm F to break the geographical boundaries allowing them for greater coverage in the international and European markets. Similar to Firm A, internet-based services allowed the company to expand their business which they would not have been able to achieve without e-business. It should be noted that these firms are IT-based and therefore adopting new technologies is not unusual for them and the impact of disruptive technologies and novel business models would be relatively small. Both firms were looking to link up with their clients electronically and indicated that big data was the next

area they would next look into as part of their e-business endeavor.

There were some concerns from the case firms when asked whether e-business as disruptive technology would have an impact on their businesses. Firm F has been focusing their efforts on a newly developed customer relationship management system within the sales department which can be accessed easily for better tracking. As an IT consultancy company this is far more important rather than embarking on a full e-business project. Another factor to be considered is that the 'disruptive' technologies derived from e-business may have an impact not on the firm itself but their clients. Firm F points out that their customers are generally concerned about web frauds and only about 50 per cent of them would prefer the invoices to be sent electronically. Having implemented e-business Firm G assessed the results of their e-business efforts to be limited, stating that e-business is not 100 percent for what they do as a business. As the Marketing Director comments, "There have been changes but I would say at the end of the day it's about making sure that the people have the right skills in what they do and adapt themselves over time. We have had to enter into additional supplier agreements and we have to sell our software differently, with or without e-business."

D. E-Business Implementation Issues in SMEs

1) Poor Infrastructure

Infrastructure problems such as poor internet connection and hardware and software malfunction can be a barrier for e-business adoption [44]. There were some infrastructure problems, some minor technical glitches and odd server going down, amongst the case organizations who have implemented e-business but were not considered to be a significant factor. The question was also asked to the firms who have not attempted e-business to obtain their opinions as to whether their current IT infrastructure is suitable for e-business. Similar findings are evident in these firms. For example, Firm B believes that their IT systems are advanced but are unsure whether e-business fits in their current market. Firm F also confirms that their current IT systems are sufficient to implement e-business but there is a concern. As the CEO explains, "It would make it much safer for us, if it is out there in the cloud. If everything was in the cloud we would be able to work from everywhere. We wouldn't have to worry about people accessing VPNs into the building".

2) Lack of e-Business Knowledge

Contrary to what Pesonen & Smolander suggest, most of the case firms reckon that they have a good understanding of the e-business concept [46]. The firms were asked to rate their e-business knowledge at both the organizational and personal level and they are confident and aware of the new business approach. The Marketing Director at Firm G indicates that, "I use e-business to improve our service and ongoing communication with our clients so I do have a good idea of how it works". This response appears to be consistent with the notion that e-business is not just about buying and selling

online to customers but also collaborating with business partners [10].

3) Difficulty of Managing e-Business projects

The last implementation issue relates to the difficulties of managing e-business projects. E-business initiatives often fail because of unclear or unrealistic requirements [46]. This is especially the case when SMEs' project management skills are relatively poor and are less likely to use project management tools [51]. The findings from the research confirm this. In addition, the service level agreement requires a mutual understanding of the firms and their clients. Firm G is an example of this. As the Marketing Director states, "In providing our software as a service, you have to make sure that all the third parties you are using to provide that service are meeting their service level agreements, that they clearly understand what those agreements are. You need to have a very thorough process to make sure you are asking for what you need and you get what you need, because if you don't specify that upfront it can cause all sorts of problems". Other firms appear to have similar experiences and said that they had to deal with such issues from their past experience and market knowledge. None of them commented the level of project management skills, except Firm F, stating that they are competent in running IT projects but would have problems with e-business simply because of the uncertainties with the current market.

VI. CONCLUSIONS

Although there has been a body of literature on e-business, its models and implementation, there are relatively few studies with a focus on the small and medium-sized enterprises, given the importance of SMEs in the society and economy. There has been some debate over whether SMEs can equally benefit from e-business and what are the issues, problems and concerns that might prevent SMEs from taking up e-business projects. To address the gap in the literature, this research was initiated with an aim to obtain a clearer picture of what constitutes barriers to considering and adopting an e-business model in SMEs. Based on a conceptual framework drawn from issues relating to SMEs' characteristics, their IT/ICT adoption and e-business implementation issues, a set of small business firms were chosen to provide their perception on what e-business is meant or why their e-business endeavors have not been satisfactory. Semi-structured interviews were conducted to gather views from the case firms to discuss and explore the issues outlined in the framework.

The findings show a good perception of e-business amongst the case SMEs. All the firms that have attempted e-business agree that the concept is innovative and important and should be considered as part of their long-term business planning process. Some concerns have been identified among the SMEs who have not considered or been unable to embark on e-business, stating that e-business is not an urgent business objective or not of significant relevance to them.

A number of reasons have been given, such as non-applicability of e-business to their markets, lack of e-business

knowledge and the absence of relevant standards and regulations are all potential barriers to SMEs considering and adopting e-business. Some obvious inhibitors such as the smaller size and lack of human/IT resources do not appear to be much of a concern to the case SMEs. External support, in particular from the government, is critical to SMEs and this might mitigate size and resourcing issues. One factor borne out from the case study is business partners' knowledge which should be added to the list of barriers. It should be noted, again, that the majority of the case firms operate in IT-related industries and have been involved in new technologies. None of them appear to be struggling in the market under current economic climate. On this, the research can be extended to the national context and a wider spectrum of companies.

The research highlights the perceptions and potential barriers of e-business amongst SMEs, which provides a basis for future larger-sample quantitative investigation. The framework can be thus developed to investigate and generalize factors that facilitate or inhibit e-business adoption and performance in SMEs. Future research can address not only on the barriers but on criteria for e-business investment and business process change. To this end, a set of propositions are generated from the framework for further testing, which are summarized in Table II. Once validated and further refined the framework will form the basis of a process and a set of tools and techniques that will assist SMEs that wish to undertake e-business.

TABLE II
FACTORS TO ENABLE/FACILITATE OR INHIBIT E-BUSINESS IN SMES

Classification	Key issues	Potential barrier	No concern	Indeterminate
<i>SME characteristics</i>	Small size			√
	Lack of/limited resources			√
	More dependence on owner-managers	√		
<i>SME ICT adoption</i>	Size of firm		√	
	Age of firm			√
	Industry of firm		√	
	Experience of ICT/IT	√		
	External support	√		
	Usage pattern of ICT/IT		√	√
	Readiness issues		√	
<i>e-Business adoption issues</i>	Lack of standards and regulations	√		
	Security concerns	√		
	High setup costs			√
	Lack of understanding of the environment	√		
	Disruptive technology			√
<i>e-Business implementation issues</i>	Poor IT infrastructure			√
	Lack of e-Business knowledge	√		
	Difficulty of managing e-Business projects			√

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