



E-Business Adoption in SMEs: Some Preliminary Findings from Electronic Components Industry

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ABSTRACT

The lack of anticipated engagement in e-business by Small and Medium sized Enterprises (SMEs) is a rising concern to the UK government and service providers alike. This article is based on the e-adoption model to examine the current practice of e-business technology adoption in SMEs and the driving forces for and against the adoption. Through interviews with 40 owner managers in the electronic components industry, the article reveals that most of the small firms in this industry are at the lower level of the “e-adoption ladder”—predominantly using the Internet and e-mail. SMEs in this industry have not yet widely engaged in online transactions. The current level of adoption is driven by both internal and external factors, including operational benefits, industry common practice, and peer pressure. External forces such as a lack of push from suppliers and customers and a lack of strategic vision of using advanced e-business technology for competitive advantages have determinant effects on the level and scale of e-adoption in SME sector. The e-adoption ladder model is modified by incorporating the influential factors identified within this study. The findings have many implications for researchers, service providers, and policy makers.

Keywords: e-adoption model; e-business; e-commerce in SME; electronic components industry; Internet application

INTRODUCTION

The Internet is described as the SME's gateway to global business and markets (Liikanen, 2001), and e-business technologies are expected to allow SMEs to gain capabilities that were once the preserve of their larger competitors. These new technologies offer the potential for creating entirely new ways of working, giving rise to a new breed of SMEs whose

management and employees use a more flexible and more effective way of working. E-business is expected to become a key driver in the way companies across the globe conduct business. However, whether these new technologies are put to efficient use by SMEs and what driving forces that push SMEs up the adoption ladder remains a question that attracts considerable attention of researchers and policy makers

(Fillis, Johannson, & Wagner, 2004; Parish, Kibblewhite, Woodley, & Richardson, 2002; Ramsey, Ibbotson, Bell, & Gary, 2003).

Studying e-business adoption in the SMEs sector is of particular importance. This is because SMEs are regarded as significantly important on a local, national, or even global basis and have a history of continual growth. SMEs play an important part in the UK economy with 3.7 million firms employing over 12 million people, which generates 55% of UK employment. These firms contribute approximately 51% to the UK GDP with an annual turnover of over one trillion pounds sterling (Dixon, Thompson, & McAllister, 2002). However, studying e-business adoption in SMEs is a challenge since SMEs are not miniature versions of large firms; they are unique in their own right (Barnett & Mackness, 1983). This includes a small management team, strong owner influence, multi-functional management, limited ability to obtain financing, and a lack of control over the business environment. In addition, SMEs rely on an environment in which structures and processes must remain simple, flexible, and adaptable (Carmichael, Turgoose, Older Gary, Todd, 2000). Firm and managerial factors are merged due to the high locus of control exerted by the key decision makers (Boone, De Brabander, & Hellemans, 2000). These unique characteristics affect Internet technologies adoption in SMEs. Research suggests that there is a correlation between the size of a business and the level of IT adoption (McDonagh & Prothero, 2000). The typical microenterprise exhibits much lower rates of e-business activities than larger firms when excluding smaller high-technology firms (Smyth & Ibbotson 2001). Large organizations are inclined to adopt the click and mortar model by integrating offline and online business or spin-off online operations. In contrast, small and medium-sized firms lack a general pattern on adoption of Internet technologies (Chavez, Leiter, & Kiely, 2000). The extent of adopting Internet technologies may vary widely among small and medium sized enterprises (Kula & Tatoglu, 2003). This creates great demands and

challenges to construct a clear picture of the level of e-business adoption in the SME sector.

Research into the level of adoption of e-business technologies in the SMEs sector reported very contradictory results, which exacerbates the current situation of confusion. For example, Smyth and Ibbotson (2001) reported from a multiple industry survey that an extremely low adoption rate was found in Ireland and Northern Ireland. Daniel, Wilson, and Myers (2002) found 50% of e-business adoption in UK SMEs. The statistics of the European Observatory for SMEs show that most SMEs are not using the Internet and the World Wide Web (WWW) for commercial transactions despite the allure of e-business benefits (Ramsey et al. 2003). A multi-industry survey conducted in the North and South of Ireland by Ramsey et al. (2003) revealed that only 33% of the firms had a Web site, 10% of the firms used Web sites to generate online orders, and none of the Web sites could facilitate online payments. However, in a study of the adoption of e-commerce in the UK electronics industry (Parish et al., 2002), a relative high level of adoption of Internet technologies has been reported (i.e., 85% the firm (larger than 100 employees) buy online, and 43% of the firms sell online). The disparity of those empirical findings reflects a lack of consensus and the complexities in gaining a holistic view of e-business adoption in the SME sector.

In view of this, this study aims to reveal the current level of adopting e-business technologies by SMEs in a specific industry, rather than to construct a holistic picture of the whole SME sector cross multiple industry. Based on the E-Adoption Ladder (DTI, 2001) and the E-Adoption Staircases (Allcock, Webber, & Yeates, 1999), which are the theoretical underpinning of this study, this study examines the driving forces that put SMEs up the e-adoption ladder and the barriers that hold SMEs up in climbing up the ladder. Such a study is not a pioneer as far as the topic is concerned, but the novel method of this study will generate findings that are appropriate to construct an accurate picture

of the level of e-business adoption in a particular industry, based on which practical solutions can be postulated to improve the effective usage of e-business technologies. The findings will be useful to verify the e-adoption models.

DEFINITIONS OF E-BUSINESS AND SME

The terms “e-business,” “e-commerce,” and “Internet commerce” are often used interchangeably. Fillis et al. (2004) define e-business as companies that utilize e-technology in their business operations, but exclude sending and receiving text-based e-mail messages. Stone (2003) states that e-business is not just the World Wide Web (www); it involves technology (e.g., intranets, portals, content management, middleware, mobile) to enhance profitability. The UK Department of Trade and Industry (DTI) specifies e-business as the integration of all the activities within the internal processes of a business through ICT (Information Communication Technology). The activities include full integration of information and communication technologies (ICTs) into a firm’s operations and potentially include redesigning its business processes around ICT or completely reinventing its business model. In this article, e-business refers to the incorporation of Internet technologies into entire enterprise’s operations and management.

The term SMEs is commonly referred to as Small- and Medium-sized Enterprises, but these firms can differ significantly in terms of employee numbers. The European Union’s definition of SMEs suggests that a small business includes 10-99 employees, and that a medium sized business includes 100-250 employees. A microenterprise includes less than 10 employees (Ramsey et al., 2003). A study of Internet adoption in Turkey by Kula et al. (2003) defines SME as one that employs less than 100 persons. In this study SMEs refers to VAT (Value Added Tax) registered companies in the UK with employee numbers between 10 to 250. This is a working definition defined and used by the UK Department of Trade and Industry (DTI).

MODELS OF E-ADOPTION/ GROWTH

With increasing attention to e-business application, a number of e-business growth / adoption models have been developed (e.g., DTI e-business adoption ladder (DTI 2001)); British library staircase of Internet engagement model (Allcock, 1999); The stage of growth for e-business maturity (SOGe) model (McKay, Prananto, & Marshall, 2000; Prananto, McKay, & Marshall, 2003); SMEs stages of adoption and use of e-commerce OUBS model (Gary, 2003); and the IBM model of stages and states of e-business (Stone, 2003). Gary (2003) suggests that ICT adoption is driven by two theories. One is social network theory where adoption is encouraged by the everyday influences that shape opinions, attitudes and behavior coming from individual expectations, peer pressure, and the business milieu in which firms operate. The second is technology determinist—a rational process where the benefits of simple ICT applications attract small firm owners. The owners move to another stage of business development and become aware of the benefits of more advanced ICT applications.

In this chapter, the e-adoption Ladder and the British Library Staircase models are used to inform the investigation, because the former focuses on the increasing e-business technology complexity along with incremental steps of adoption, which is related to the objective of revealing the level of usage of Internet technologies. The latter considers the driving forces that push firms up the adoption stairs or hold up their adoptions, which is related to the objective of examining the factors driving or inhibiting the adoption. The two models thus are reviewed next.

The “E-Adoption Ladder”

Martin and Matlay (2001) suggest that there are different levels of e-business in SMEs, known as “e-adoption.” In the UK DTI benchmarking study report, e-adoption is defined as incremental tiers or steps and can be represented in the form of an “e-adoption ladder” with each stage increasing in level of

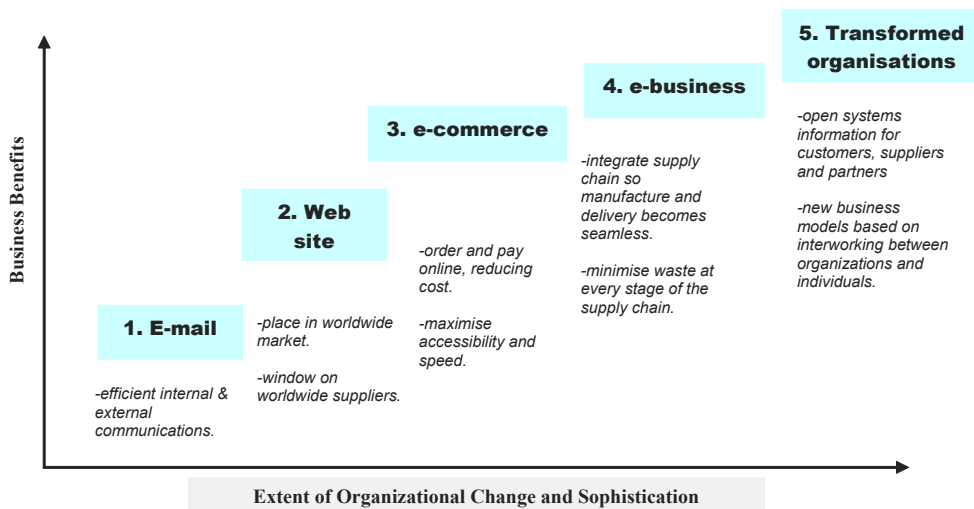
sophistication as depicted in Figure 1. The first two stages involve acquiring basic ICT skills and technology to operate e-mail for messaging and simple brochure Web sites for online marketing. The e-commerce stage involves online interaction between a business and its customers, or a business and its suppliers, for the placement of an order and online payment processing. The e-business stage allows integration of the supply chain. The final stage enables open information sharing between customers, suppliers, and partners based on which existing business processes are radically transformed or new business models are formed. The adoption ladder emphasizes e-business technology adoption along with organizational change. The final three stages require advanced technology and a wide range of specialist business skills and expertise in areas such as management, strategy, and marketing. Criticism of the adoption ladder concentrates on the linear progression and technology sophistication aspects. Gary (2003) commented that the adoption ladder is a

simple technology stage model, which provides a useful sense of technological progression, but it is too linear to fully describe processes that are often non-linear and very complex. Ramsey et al. (2003) argued in line with Gary (2003) that the e-adoption ladder assumes a linear progression from being less mature to increased sophistication over time. Ideally, the organization will move through the stages of using e-commerce purely for informational purpose, then transactional, and ultimately progress to having a strategic e-focus. They speculate that the majority of SMEs may have very low-level requirements and/or follow a non-linear/discontinuous path. In reality, the diffusion and assimilation of Internet commerce by SMEs is likely to follow a “zig-zag” path based on a “trial and error” approach (Poon, 2002; Poon & Swatman, 1999).

The Staircase of Internet Engagement

Based on information needs rather than a technology push and considering SME sec-

Figure 1. The e-adoption ladder (Adapted from Cisco led Information Age Partnership study on e-commerce in small business (DTI, 2001))



tor characteristics, the British Library adopted a four stages staircase model (Allcock, et al. 1999), which is depicted in Figure 2.

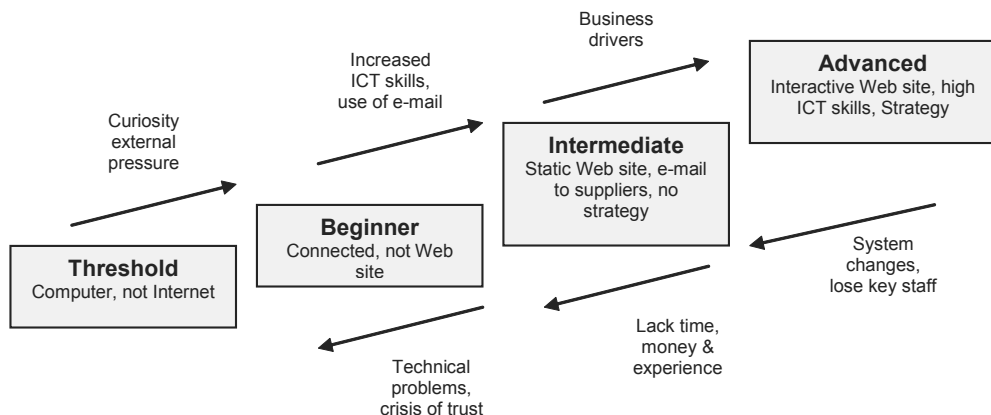
The model shows four stages and technology sophistication, but it is different from the adoption ladder in that the model includes non-technology driving forces (e.g., external pressure, increased ICT skills, business driver). These forces may push SMEs up the stairs, but influential factors (e.g., lack of resource and skills, system changeover, etc.) may send the firm down the stairs. Gary (2003) positively commented that the British Library Staircase model takes the perspective of the SMEs owner-managers, linking technology evolution to their capability to learn, to manage new ICT knowledge, and to introduce business changes. Related to this staircase model, Fillis, et al. (2004) developed a conceptual model of factors that impact on e-business adoption in small firms. The model consists of three tiers of influence factors including macro-factors (e.g., globalizations, competition, government policy, etc), industry/sectoral factors, and micro level firm/managerial factors. Fillis et al. (2003) argue that macro-level factors are the drivers

behind technological change. They emphasize that specific industry and sectoral factors will influence SMEs demand for e-business. At the firm level, resource-based issues (i.e., e-business competencies, managers' attitudes and benefits are highlighted as the main factors driving e-business adoption). This model is useful in informing the research design of this study.

METHODOLOGY

This study chooses the electronic components manufacturer and supplier industry as the source for sampling. There are three reasons: firstly, according to Ramsey et al. (2003), this industry has been under researched relative to other industry sectors such as retail chain, services or the travel industry. For example, the highest Internet presence is in the hospitality/leisure sector and the lowest is in agriculture and transport sectors. Secondly, the aforementioned studies are primarily multiple industry-based and country-specific surveys, which lead to disparity in findings. The aggregated findings on the level of e-business adoption of multiple industries are inconclusive due to industry sectoral differences. This is evident

Figure 2. The staircase of internet engagement (Allcock, et al. 1999)



from Fillis et al. (2004) who argue that specific industry and sector factors will influence the demand for e-business technologies in SMEs, and Internet usage will not be consistent across SMEs in every business sector. They explain that e-business is not appropriate for all firms across all industry sectors. Specific sectoral circumstances may mean that more traditional methods of securing business will still dominate. Thus, an accurate national or international picture of e-business adoption in SMEs is difficult to construct due to macro, industrial, firm and owner manager differences. An industry specific study can produce more accurate results showing the level of e-business adoption and the driving forces that are appropriate to that industry. Lastly, according to Executives from Business Link (a UK government enabled support agency providing business solutions to SMEs), specialist manufacturers are more likely to be pro-e-business, and would adopt future technologies if they have not already done so. The electronic components industry fits well into this category.

The approach for data collection conforms to both qualitative and quantitative techniques. The target population is small to medium sized enterprises in the electronic components manufacturers and suppliers industry. This is a typical SME manufacturing sector in the UK.

With the help of the Southampton and Fareham Chamber of Commerce and Industry, which maintains close contacts with regional SMEs, 40 companies in the South of England have been contacted and chosen to participate in the study. The selection process assumed that there is no pre-knowledge as to the usage of Internet technologies within those firms, thus the sample is framed in random nature, although its size is relatively small.

The primary method is a structured interview with managing directors, which was conducted during April and May 2004. A questionnaire was used during the one to one interviews. In the case where managing directors were not available for an interview, a substitute such as sales director, IT director, or finance director was interviewed. Interviewing owner managers or directors for this topic is based on the consideration that investment in Internet technology is a major strategic decision of owner managers for small and medium firms. Ramsey et al. (2003) used a similar approach in their study. We echo their view that due to the dynamic nature, e-business decision-making is based largely on the intuitive competencies of the entrepreneurial owner/managers. Most of the interviews lasted approximately half an hour. A number of standard questions were asked at each interview, this is to ensure that minimum

Table 1. The profile of the sample

Number of Employees	Managing Director	Sales Director	Finance Director	IT Director	Production Director	Marketing Director	Total (%)
10-49	20	2	1	0	1	1	62.5%
50-99	5	3	0	0	0	0	20.0%
100-149	3	0	0	0	0	0	7.5%
150-199	0	0	0	2	0	0	5.0%
200-249	0	0	0	1	1	0	5.0%
Total (%)	70%	12.5%	2.5%	7.5%	5%	2.5%	100%

Table 2. Usage of e-business technology

e-business technology	Responses	% (N=40)
Internet	40	100%
E-mail	40	100%
Broadband Technology	27	67.5%
Intranets/Extranets	13	32.5%
Wireless Technology	8	20 %
EDI	7	17.5%
Instant Messaging	4	10 %
Video Conferencing	4	10 %
Other (Voice Operated Internet Protocol)	1	2.5%

Table 3. Purposes and functionality of the Web site

Purpose	No of Responses	% (n=40)
Display information on product or service	34	85.0%
Increase information exchanges and communication	33	82.5%
Improve marketing/advertising	31	77.5%
Reach wider audience	29	72.5%
Increase profits	17	42.5%
Because everybody else has one	12	30.0%
Sell products and services over the Web	5	12.5%
Create a 365/7 service	3	7.5%

Table 4. Benefit of adopting e-business technologies

Main improvement / benefits	No of Responses	% (n=40)
Reduced cost	29	72.5
Faster response rate	28	70.0
Share and exchange information more effectively and quickly	28	70.0
Improved marketing and communication	23	57.5
Access to more information	18	45.0
Increased profit by enabling online purchasing	1	2.5

consensus can be tabulated in data analysis. The interviewees were invited to discuss the topics and their concerns relevant to the study without prompting them with directions or constraints. Each interview was recorded with the consent of the interviewee. Copies of the interview transcriptions were given to each interviewee shortly after the interview. Where appropriate, they could add any extra information as appropriate. Due to the qualitative nature of data and the small size of sample, statistical tests are not used to analyze the data.

RESULTS AND DISCUSSION

Profile of Sample Companies and Interviewees

To understand the context of the responses, the sample companies were broken down by the number of employees and the position of the interviewees. Table 1 shows the profile of the companies.

The table shows that the majority of interviews (62.5%) were conducted with companies with less than 50 employees, thus the sample may be biased towards small manufacturing firms. Seventy percent of interviewees are managing directors, and the rest are all at director level. Most of the companies were that established in the 1980s with a few new companies established in the 1990s.

Position in the Ladder—The Level of Adoption of E-Business Technology

The adoption of e-business technology in those SMEs is examined in light of the e-adoption ladder. Table 2 shows the extent of usage of these technologies in this industry.

The data shows that all the companies interviewed have access to the Internet. E-mail has been widely used by small and medium firms. Sixty-eight percent of the firms are using broadband, which enables fast access to the Internet and e-mail and 20% uses wireless access. One third of the companies used Intranets for internal communication and an Extranet to link to suppliers. However, using instant messaging,

video conferencing, and other tools for business are low in these firms.

A further enquiry on the level of complexity of the firms' Web site and the primary purposes of the Web site reveals that 88% of Web sites are static (i.e., displaying information about the company and products). Fifteen percent of the Web sites have only one Web page showing contact details. Only five companies (12%) enabled customers to buy products online, and those five companies are medium-sized companies with employees over 100. The primary purposes of using the Web site are discussed with the managers, which are summarized in Table 3. The data shows that the top four (over 70%) usages of Web sites are related to Internet marketing and information communication, which suggests that the Web sites are predominantly used as a marketing and communication tool. It is worth highlighting that only 12.5% of the Web sites offer an online buying or selling e-commerce function. This is in contrast to some of the findings mentioned earlier where higher level of e-business applications was reported (Daniel et al. 2002; Parish, et al. 2002; Stone, 2003). It also differs from Ramsey et al.'s (2003) finding that there was no indication (0%) of high-level functionality—the ability to buy and pay for service/product online.

The high-level usage of Web sites and e-mails confirms many findings reported in other similar studies. For example, Kula et al. (2003) report the ranking of Internet application usage from the highest to lowest level are: e-mail, browsing company homepages, and market and product searches. They suggest that Internet applications are principally concerned with external communications and gathering information for market and product research. Ramsey et al. (2003) reported that owner managers perceive e-mail as an important function for their business. Managers interviewed in this study acknowledged that the reasons of high-level usage of Internet and e-mails are the great benefit as compared to other means (i.e., using the Internet and e-mail can increase the response rate of receiving and sending information, which in turn reduces the cost of postage).

Table 5. Managers' awareness of e-business function

e-business function awareness against adoption ladder	Responses	%
On e-business ladder		
Doing business over the Internet involving procurement, supply chain	3	7.5
On e-commerce ladder		
Doing business over the Internet including taking orders and selling	10	25.0
On Internet ladder		
Using Web site for marketing, information gathering, or something to do with the internet	20	50.0
Under the ladder		
Do not know e-business function	7	17.5

Other benefits include sharing information, improving marketing and communication, and access to a wide range of information. It needs to note that only four managers regard an additional benefit being increased profits through interactive Web sites, which enable customers to purchase components and parts over the Internet. Only five medium-sized companies actually sell products on the Web. This is in line with Lymer, Nayak, Johnson, and Spaul's (1998) findings that the main Internet tools identified as available for small business were a Web site, e-mail, access to online information, and networking. Even though one third of the firms acknowledged using intranet and/or extranet, the main benefit is enabling information communication and sharing, not online buying or selling. Referring to the e-adoption ladder, firms in this particular industry widely adopt the most common Internet technologies (e-mail and Internet) that constitute the first and the second levels of the ladder. This firmly positions the SMEs in this industry on the lower two ladders. The adoption of broadband (68%) and wireless technology (20%) shows the firms attempt to maximize accessibility and speed. Even though these technologies are used, there is little sign to show that the firms are moving up to the full e-commerce stage. This adds to criticism over the e-adoption model that technology complexity may not necessarily lead to a higher degree of e-commerce/or e-business adoption.

In terms of the British Library Staircase, there are influential factors that can hold firms up on the adoption ladder. The next section will examine these factors.

PUSHING UP—THE DRIVING FORCES OF E-BUSINESS ADOPTION

Business Benefits

Business driver has been regarded as a main driving force for technology adoption as shown in the Staircase model. Levy, Powell, and Yetton (2002) suggest that SMEs tend to be driven by short-term efficiency and operational benefits to the detriment of strategic, long-term business benefits. Evidence shown in Table 4 confirms this assertion.

The data shows that the vast majority of the owner managers believe their firms gained immediate operational benefits from using Internet technologies, for example, cost reduction, sharing information, improved marketing, and communication. A few managers comment that the cost of postage and postal mail were significantly reduced due to the introduction of using e-mail. Another key benefit is faster responses to customers needs. Carmichael et al. (2000) suggest that the key driver for SMEs to innovate is competition and customer feedback. SMEs realized that they need to remain com-

petitive in order to survive, thus responding to customer feedback is an important weapon of competition. One manager owes the benefits to increased profit due to their interactive Web site enabling customer to purchase components and parts over the Internet. These operational benefits and response to competition needs clearly constitute the main driving forces that push firms up the adoption ladder.

Industry Common Practice or Peer Pressure

Kula et al. (2003) suggest that most SMEs innovate only when they clearly perceive business opportunities for their firms, or because they are under pressure from suppliers and clients. It is interesting to note that one third of the companies interviewed (30% in Table 3) don't have a clear idea about the reasons for having a Web site. Some managers said that it is common to have a company Web site in the industry, as everyone else has one. The reason "everyone else has one" shows the effect of benchmarking or peer pressure from the industry. The finding appears to suggest that peer pressure or industry standard is a main driving force to pushing firms up the ladder of adoption of e-business technologies. However, this could become an inhibitor to adopting new technologies if there is no industry leader or champion to innovate and to demonstrate the strategic advantages of using advanced e-business technologies.

Awareness of E-Business Function

Ramsey et al. (2003) argue that growing awareness and understanding of the benefits of e-commerce among SMEs can positively influence their desire and interest in adopting e-commerce. It is evident from this study that over 90% of the managers have some understanding of the e-business function and its potential, although the degree of understanding vary significantly. Table 5 presents the awareness level against e-adoption ladder. The four categories are based on the responses generated from the structured interviews.

The synthesized data shows that 25% of the managers can relate e-business to buying

and selling over the Internet. A few managers are quoted as saying that:

e-business is buying and selling over the Internet, also including instant messaging, chatting to customers.

e-business is electronic business activities, for example internal and external communications, being able to e-mail customers—current and potential, to buy and sell products.

Conducting business through the Internet using Web Technology, using the Internet to extend business overseas.

Those remarks reflect managers' understanding/awareness of the "e-commerce" function—the third level of the e-business adoption ladder. Three managers can even relate e-business to supply chain for procurement, or to integrate with ERP (Enterprise Resource Planning) system. For example,

Using the Internet for information gathering. The ability to procure electronically. Using ERP systems, portals to place orders, appearing on industry wide Web sites, and placing orders via electronic means.

Using the Internet to process orders and communicate between companies. To make more contacts internationally and to ease the communication between suppliers and customers via digital technology, such as broadband.

Doing everything electronically—the next evolution from the 3rd party stage. Getting suppliers online and clients online and doing every bit of business online. The Web site has 4 stages: static, interactive, transactional, involves the whole Supply Chain.

This shows sufficient awareness of the higher level of e-business sophistication (i.e., the e-business ladder of the adoption model). However, none of the managers indicate that there will be a radical transformation of the

Table 6. Barriers to implement e-business technology

Items as Barriers	Mean	Standard Deviation
Lack of resources to adopt	2.73	1.20
Lack of training to implement these technologies	2.75	1.26
Lack of customer demand	2.80	1.32
Unconvinced of the potential benefits	2.98	1.33
Lack of relevance to the business	3.08	1.35
Cost of enabling e-business technology	3.13	1.14
E-business seen as a greater threat than an opportunity	3.85	1.21
Bandwidth – connecting to the Internet	4.10	0.87

1-Hardest obstacle, 5- Not an obstacle

way of doing business in the industry (further discussion is in Table 7).

It is interesting to note that the combination of the first two categories adds up to 32.5%, which shows that over one third of the managers are aware of the e-commerce/e-business functionality, but actual online selling is conducted within only five companies (12.5%). There must be factors that hold firms up from adopting technology to the level as managers perceived.

Table 5 also shows that half of the owner managers do not relate e-business to online buying, selling, and transforming business process, but regard e-business as the same as online marketing, information searching, a part of customer process, or simply something to do with the Internet. For example:

E-business complements other business channels but cannot replace it. Ten years ago, banks, shops etc. closed many of their physical premises, just to find they were not generating as much business because people were not familiar with using the Internet and were not comfortable. There is no point adopting something new where no one is going to use it. E-business is about making business processes a part of the customer process. It is a way of interacting more technically with the customer.

E-business is a marketing and advertising tool with the ability to promote products and services (e.g., using the WWW to have company information listed on search engines so people can see what you do on a global scale).

Seventeen and a half percent of the owner managers do not know e-business functionality and its potential opportunity. One manager even perceived e-business as

Doing business in Europe (!).

Overall, the findings are in contrast to some of the claims that a lack of understanding of the benefits (Goode, 2002) and the difficulties of evaluating them contribute to the low level of e-commerce adoption in SMEs (Stockdale & Standing, 2004). Our study reveals that the majority of managers' understanding of e-business tends to be consistent with the current level of e-business adoption in their firms.

Holding UP—The Influential Forces For E-Business Non-Adoption

The barriers that hold companies back from adopting e-business technology are discussed with the directors through a structured question. The question adopted several measurements appeared in literature, and used 5 likert scale in order to identify the most influential

inhibitors that hold-up firms in climbing up the adoption ladder. The results are summarized in Table 6.

Lack of Resources and Training

Limited resources (e.g., financial, time, management, training, personnel) are often highlighted as major factors impacting the decision to adopt e-business. Lawrence (2002) argues that resource limitations such as time and capital coupled with preferences for traditional mechanisms to do business, inhibited firms from gaining benefits from introducing e-commerce technology. In this study, lack of resources has been seen as a main obstacle to adopting e-business technologies. This refers to limited personnel, training, and expertise. Managers explained that being small companies, the employees have to train themselves on how to use the functions of the technologies that the company has adopted, i.e. how to use the Internet and how to access information and how to use search engines to obtain higher numbers of hits. As the usage of complex e-business technology is minimal in these firms, formal training is not required by the users, nor is such training provided by the firm.

SMEs have been seen as spending little on technology, therefore they do not use the optimum solutions for much of their business. As a result, they are unable to invest in new technology that could actually help put them on the fast track. However, this study shows that the cost of enabling e-business technology appears not to be a barrier to these firms as shown by the mean score (3.13). This supports the arguments that financial resources do not affect the decision on whether or not to adopt Internet technologies (Mehrtens, Cragg, & Mills, 2001), and that cost is not a main concern when making e-business decisions (Ramsey et al. 2003).

The Industry Nature and Tradition

Some managers commented that e-business technologies are not relevant to the industry and there is no demand from customers for using these technologies. Managers explained that the nature of the industry requires regular face-to-face or telephone contact when describing

electronic components. Another reason is that people are used to using traditional methods such as phone or fax. They feel more comfortable continuing to use these technologies, as opposed to investing in new technologies, which may require considerable training. This suggests that the nature of the industry, the common practice, and the traditional way of doing business impose a significant impact on the adoption of new technologies. Ramsey et al.'s (2003) addresses the unique nature of an industry in relation to utilization of Internet technology. They assert that each day the owner manager is more preoccupied with "fire-fighting" to realize and fulfill customer orders, where there is a heavy reliance on face-to-face contact. The service is highly tangible and is not really suited to the e-business environment. The high level of intangibility of the service/product mix can be viewed as one of the major impediments to future utilization of Internet commerce by this particular business.

Lack of Push from Supply Chain (Customer Demand)

Fillis et al. (2004) speculate that there may be a sense that business is dictated mainly by the end customer, supplier or distributor who does not want to embrace e-business technology, instead preferring conventional, traditional methods. The data in Table 6 shows that the SME managers in this industry feel there is a lack of demand from customers to use online selling and buying. This implies that the downstream supply chain (could also be from the upstream chain) demand has a notable impact on the level and scale of adopting advanced e-business technologies.

Lack of Vision and Industrial Champion

The vision and attitude of the owner managers towards IT adoption are identified as an influential factor by Chong, (2001) and Levy and Powell (2002). Successful companies that embrace IT and Internet technologies are often ones in which the visionary owner takes on the role as innovation champion of IT

Table 7. The future outlook of e-business

Views	Number	% (N=40)
"Use e-business technology together with conventional business methods"	31	77.5%
"Consider using minimal e-business technology in the future"	7	17.5%
"No intention to use e-business in the future"	2	5.0%
"Rely entirely on e-business technology and become a purely online business"	0	0.0%

adoption. However, many managers of SMEs prefer the comfort of what they perceive as familiar over indulging into any new venture. They are reluctant to "think outside the box" in order to seek new business solutions (Cyert & March, 1992). In this study, some managers don't perceive (or are not convinced by) the potential strategic benefits of being the first to utilize new technologies. Some managers do not perceive the relevance of using new technologies to their business, although they understand the online buying and selling functions offered by the technologies. A lack of vision and risk taking may be speculated as the reason leading to the current situation. We echo Gary's (2003) argument that whether the adoption is driven by business demand or technology push, the owner managers need to be personally ready before moving on to the next stage and that the process involves learning and new knowledge.

In summary, a lack of resources, and a lack of vision of the potential benefits are influential factors that are internal to the SMEs, whereas the industry common practice and a lack of push from supply chain constitute external factors. These factors hamper SMEs in proactively adopting e-business technologies (i.e., holding up the firms on the adoption ladder/staircase). Other internal factors, such as Internet access, bandwidth, and cost appear not to be critical obstacles in adopting e-business technologies in those firms.

A Forward View of E-Adoption Pattern

Regarding the importance and the future of adopting e-business technology, 65% of the managers interviewed think e-business tech-

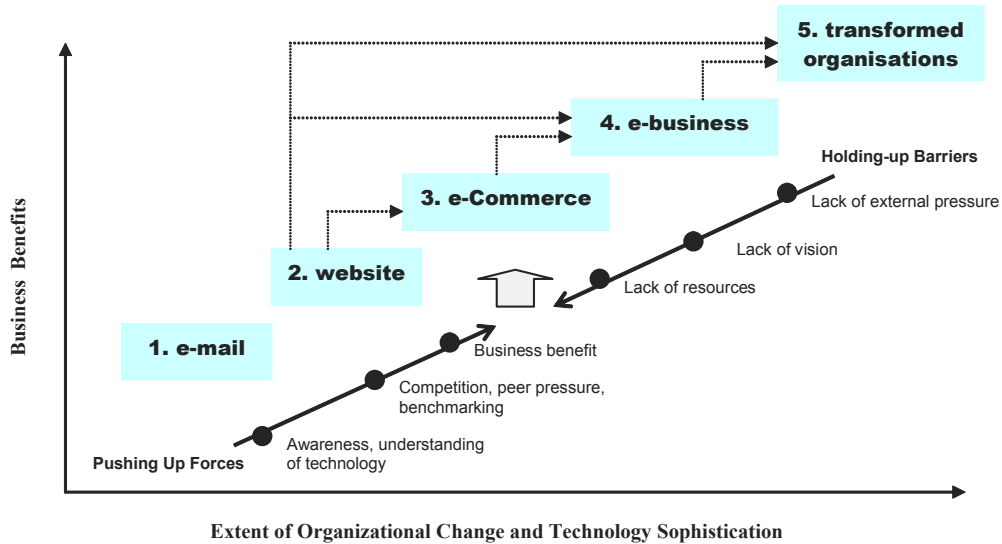
nology (predominantly Internet and e-mail) is important to their companies. Table 7 shows managers' perceptions of the future of adopting e-business technology within their firms.

The dominant view is to adopt e-business technology in conjunction with conventional methods of doing business (i.e., the "clicks and mortar" pattern). None of the firms interviewed are considering transforming into a purely online business. This has been emphasized by the managers that the industry requires regular face-to-face or telephone contact with customers and employees prefer to adhere to the traditional way of doing business. It is noted that 17.5% consider using e-business technology to a minimum level and 5% firms never intend to use e-business technologies. It appears that industry common practice has a strong influence on these SMEs. This situation may not change significantly in a short period of time, as 67.5% of the managers interviewed are satisfied with the e-business technology adopted, and less than a quarter (22.5%) of the managers expressed dissatisfaction, unless significant pressure and push from external stakeholders, particularly from suppliers and customers emerge.

MANAGERIAL IMPLEMENTATIONS

Although some of the findings tend to be common to all SMEs (e.g., lack of resources), some findings are unique in the context of this study. These distinct findings have implications in providing guidance on practical application of e-business technologies in SMEs and in developing e-adoption models. Firstly, industry common practice, peer pressure, and customer

Figure 3. An e-adoption ladder with influential factors



push need to be recognized as major external forces that influence the level of adoption of e-business technology in SMEs. Even though this study is not aimed to scientifically test whether external forces outweigh internal forces, its results indicate that external forces tend to be a strong influential factor in affecting the level and scale of e-technology adoption in this particular industry. The findings approve that most SMEs are followers in their sector in terms of adopting technology. It can be envisaged that an industry champion/or leader who demonstrates strategic benefits of adopting advanced technologies, together with a strong demand from suppliers or customers could influence many SMEs moving up to the higher level of the adoption ladder, although there are internal resource constraints. This implies that the pattern of adopting e-business technologies may not be linear as depicted in Figure 1 (i.e., SMEs may not necessarily move from Internet level to e-commerce level and then to e-business level).

It is possible that many SMEs in the electronic components industry may engage in business process change based on an intranet-based supply chain infrastructure while conducting online buying and selling. This is a non-linear path of adopting e-business technology. Based on such speculation, the e-adoption model may need to be modified to include a non-linear path with consideration of the driving forces from a firm's internal and external environment. Figure 3 depicts such a model.

Secondly, owner managers need to develop a strategic vision, and the industry needs a champion to lead. As far as the SMEs in the electronics components industry is concerned, there needs to be an external push as well as an internal business driver to make small firms proactively engage in adopting advanced e-business technologies. This could be achieved by inspiring owner managers with immediate benefits and strategic (competitive) advantages of using e-business technologies. The key to

success is to provide a cost/time saving as well as flexible learning opportunity for the owner managers who are busy in managing daily business and seeking new business opportunities. Thirdly, the IT industry that provides e-business solutions needs to articulate explicitly the potential and added value of technologies to owner managers. The products and services need to be tailor-made to suit the unique needs of SMEs, and vendors' support and training should be prioritized to SMEs clients, due to the significant lack of expertise, specialist knowledge, and resources in the SME sector. Lastly, the e-business environment and infrastructure need to be continuously improved to facilitate e-business application in SMEs. This includes easy Internet/broadband access, government incentives for SMEs, secure order processing and payment systems, distribution infrastructure supporting online transactions, online taxation and legislation. These are generally uncontrollable factors to SME managers but they could pose direct impact on the level of adoption as external forces.

CONCLUSION

The findings of this study shed light on some of the issues concerning the engagement of e-business in SMEs. SMEs in the electronic components industry are at the lower ladder of adopting e-business technology. The technologies used are predominantly e-mail and Internet, and are used primarily as an additional marketing tool to display company's products and services information, rather than as an e-commerce platform to enable online transactions and organizational transformation. The problems underpinning the low adoption of sophisticated e-business technology lie not in Internet access, cost and managerial understanding, but in the external forces including industry/sector practice, lack of push from supply chain, as well as internal factors such as lack of resources, expertise and strategic vision to lead. Even though half of the owner managers are aware of e-business functions, awareness of e-business strategic benefits can be further improved. As far as this industry is

concerned, a push from external forces could quickly change the picture of the level and the scale of e-business adoption. The findings also suggest that e-business adoption may not follow a linear path and the adoption pattern may be specific to each industry/sector.

The findings reported in this study need to be interpreted with caution due to the limitations of the unique industry selected and the small sample size. However, the findings are useful in raising the question as to whether there exists a general pattern or model of e-business adoption that can fit all SME sectors. It also opens a door to examine if external forces have more influence than internal forces in the SME sector. Aggregated findings on the level of e-business adoption from multiple industry-based studies neglected sector difference, and the results are not consistent to generate a common adoption pattern/model. Therefore, further study of a similar nature in specific industry needs to be conducted, so that the unique needs and problems related to that industries/sectors in adopting e-business technology can be appropriately addressed, and the findings generated from different industry/sector can be compared in the context of developing an e-business adoption model.

REFERENCES

- Allcock, S. P. A., Webber, S., & Yeates, R. (1999). Business information and the Internet: Use of the Internet as an information resource for SME. *British Library Research and Information Report*. (136).
- Barnett, R. R., & Mackness, J. R. (1983). An action research study of small firm management. *Management Journal of Applied Systems*, 10, 63-83.
- Boone, C., De Brabander, B., & Hellemans, J. (2000) Research note: CEO locus of control and small firm performance. *Organization Studies*, 21(3), 641-646.
- Carmichael, C., Turgoose, C., Gary, M.O., & Todd, C. (2000). Innovation and SMEs the case of Yorkshire, UK. *Journal of*

- Industry and Higher Education*, 14(4) 244-248.
- Chavez, R., Leiter, M., & Kiely, T. (2000). Should you spin off your Internet business? *Business Strategy Review*, 11(2), 19-31.
- Chong, S. (2001). Electronic commerce adoption by small-medium sized enterprises in Australia and Singapore. *Working Paper*, School of Information Systems, Curtin University of Technology, Perth, Western Australia.
- Cyert, R. M., & March, J. G. (1992). *A behavioral theory of the firm* (2nd ed.). Oxford: Blackwell.
- Daniel, E., Wilson, H., & Myers, A. (2002). Adoption of e-commerce by SMEs in the UK. *International Small Business Journal*, 20(3), 253-270.
- Dixon, T., Thompson, B., & McAllister, P. (2002). *The value of ICT for SMEs in the UK: A critical review of literature*. Report for the Small Business Service Research Programme.
- DTI. (2001). *Business in the information age—international benchmarking study 2000*. (UK Department of Trade and Industry) Retrieved from www.ukonlineforbusiness.gov.uk
- Fillis, I., Johansson, U., & Wagner, B. (2004). Factors impacting on adoption and development in the smaller firm. *International Journal of Entrepreneurial Behaviour & Research*, 10(3), 178-191.
- Gary, C. (2003). A stage model of ICT adoption in small firms. *Workshop in Rimini—Firms and Consumers Facing E-Commerce: Strategies to Increase Its Adoption and Usage*. Open University Business School, UK
- Goode, S. (2002). Management attitudes towards the World Wide Web in Australian small business. *Information Systems Management*, 19(1), 45-48.
- Kula, V., & Tatoglu, E. (2003). An exploratory study of Internet adoption by SMEs in an emerging market economy. *European Business Review*, 15(5), 324-333.
- Lawrence, K. (2002). Factors inhibiting the collaborative adoption of electronic-commerce among Australia SMEs. In S. Burgess (Ed.), *Managing information technology in small business: Challenges & solutions* (pp. 178-192). Hershey, PA: Idea Group Publishing.
- Levy, M., & Powell, P. (2002). SME transformation: Modelling progressions. In S. Wrycza (Ed.), *Information systems and the future of the digital economy, Proceedings of the 10th European Conference on Information Systems*, Gdansk, Poland, June 2002.
- Levy, M., Powell, P., & Yetton, P. (2002). The dynamics of SME information systems. *Small Business Economics*, 19(4), 341-354.
- Liikanen, E. (2001). *eEurope and the role of SMEs*. Paper presented at the European Commission Go Digital Meeting, April 6.
- Lymer, A., Nayak, A., Johnson, R., & Spaul, B. (1998). *UK business and the information superhighway: The impact of the Internet on SMEs*. ACCA Occasional Research Paper, No. 23: The Association of Chartered Certified Accountants.
- Martin, L. M., & Matlay, H. (2001). Innovative use of the Internet in established small firms: The impact of knowledge management and organisational learning in accessing new opportunities. *Qualitative Market Research: An International Journal*, 6(1), 18-26.
- McDonagh, P., & Prothero, A. (2000). Euro-clicking and the Irish SME: Prepared for E-commerce and the single currency. *Irish Marketing Review*, 13(1), 21-33
- McKay, J., Prananto, A., & Marshall, P. (2000). *E-business maturity: The SOGe model*. Paper presented at the Proceedings of the 11th Australasian Conference on Information Systems (ACIS), Dec, 6-8, Queensland University of Technology, Brisbane, Australia.
- Mehrtens, J., Cragg, P. B., & Mills, A. M. (2001). A model of Internet adoption

- by SMEs. *Information & Management*, 39(3), 165-176.
- Parish, A., Kibblewhite, G., Woodley, M., & Richardson, J. (2002). *The UK electronics industry e-commerce initiative—a study of the adoption of e-commerce*. Retrieved from www.intellectuk.org/publications/reports
- Poon, S. (2000). Business environment and Internet commerce benefits—a small business perspective. *European Journal of Information Systems*, 9(2), 72-81.
- Poon, S., & Swatman, P. M. C. (1999). An exploratory study of small business Internet commerce. *Information & Management*, 35(1), 9-18.
- Prananto, A., McKay, J. A., & Marshall, P. (2003). A study of the progression of e-business maturity in Australian SMEs: Some evidence of the applicability of the stages of growth for e-business model. *Proceedings of the 7th Pacific Asia Conference on Information Systems (PACIS)*, July 10-13.
- Ramsey, E., Ibbotson, P., Bell, J., & Gary, B. (2003). E-opportunities of service sector SMEs: An Irish cross-boarder study. *Journal of Small Business and Enterprise Development*, 10(3), 250-264.
- Smyth, M., & Ibbotson, P. G. (2001). *Internet connectivity in Ireland*. Retrieved from www.bankofireland.co.uk
- Stockdale, R., & Standing, C. (2004). Benefits and barriers of electronic marketplace participation: An SME perspective. *The Journal of Enterprise Information Management*, 17(4), 301-311.
- Stone, M. (2003). SME e-business and supplier-customer relations. *Journal of Small Business and Enterprise Development*, 10(3), 345-353.

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