

Cultural Barriers in the Adoption of Emerging Technologies

Jenine Beekhuyzen

Liisa von Hellens

Mark Siedle

Griffith University

Brisbane, Australia

j.beekhuyzen@griffith.edu.au; l.vonhellens@griffith.edu.au; m.siedle@griffith.edu.au

Abstract

Access to communication technology continues to be a global problem. Countries are digitally divided on the access and availability of such technologies. Even in developed countries, minority groups are disadvantaged in terms of technology use because of limited ability to utilize the emerging technologies or access to such technologies. This paper reviews the literature of technology adoption across different national cultures and discusses the technology adoption within small and medium sized enterprises (SME). The Australian situation is compared and contrasted with other countries and a research agenda is suggested.

1 Introduction

Even though technology is becoming more pervasive, there are still more people in the world without access to technology than with. Many people that do have access to technology find the experiences of their interactions difficult, cumbersome and unhappy due to the complexity of such technology. Conversely, even though certain cultures may be somewhat resistant to change, technology can be an overwhelming force under certain sociological and economic conditions (Mejias, Shepherd, Vogel & Lazaneo, 1997).

Recent advancements in technologies, such as Personal Digital Assistants (PDAs) and wireless seem to be of minor importance to many cultures for a number of reasons, such as, language differences, cost of adoption, or simply lack of telecommunications infrastructure within the countries themselves. What is 'old' and 'redundant' technology for some countries is found to be of vital importance to others, with differing cultural opinions surrounding the reason for particular technology adoption. It is the suggestion that such differences in opinions can shape a country's dependence on technology itself, and is the reason certain cultures are unlikely to adopt such recent advancements such as wireless communications and web-specific e-commerce technologies. Similar divides are evident across different organisational settings. For instance, the technology adoption patterns of many Small and Medium Enterprises (SME) could be compared with that of the poorer countries.

In terms of technology adoption, this paper presents the current situation that a particular group of minorities face. To put this in context, technology adoption is considered within SMEs. SMEs are a group with little access to new and emerging technology and this paper presents the Australian SME situation within the global context.

SMEs across a selection of western nations were explored, with cultural issues contributing to the success or failure of systems being identified. Several key differences were found regarding technology spending, information sharing, telecommunications, user involvement and a host of other issues. By determining the way in which different cultures evaluate the usefulness and/or usability of technologies based on their perceptions, this paper intends to provide relevant information that may assist future efforts to improve technology usefulness and adaptability across different cultures.

The literature suggests that SMEs are slow adopters of technology, often purchasing long after release and regularly dealing with handed down technology from other companies. These issues could have negative influences on technology adoption. This issue is speculated to be of rising importance due to the increasing supply and demand for more efficient and effective Internet communications technologies. Such technologies may prove to have unknown cultural implications for foreign and native business partners communicating for the first time or on an increasing

basis. Further studies have the opportunity to extend on this research and provide cultural-specific technological solutions that may in turn, be of benefit to countries where technology is inhibiting productivity or communications.

2 The Context: Small and Medium Enterprises - SMEs

The growing marketplace for SMEs is creating a space for multiple players to work in similar markets producing an often-competitive environment. The competition can be fierce and SMEs must have an ability to dynamically respond to rapidly changing markets. The strength of this ability plays a significant role in an organisation's growth and success. The multitude of barriers for success suggest that SMEs are not able to enjoy many benefits of being wired to the global network, and are handicapped in participating fully in society's economic, political and social life.

It seems there is a push for SMEs to be connected to the digital marketplace, and this is evidenced by the number of initiatives targeting small and medium-sized enterprises around the world. Within Australia, there are a number of grant and funding programs to encourage these activities, such as the Small Business Enterprise Culture Program and the Financing Innovation Growth (FIG) Program. In the UK, the UK Online's SME targets exemplify the conventional wisdom view of a homogeneous small business sector, within which firms take an ordered, sequential progression on the route to Internet technology adoption (Martin & Matlay 2001). Also in the UK is the Small Business Research Portal, which provides references to information about SMEs across the world (<http://www.smallbusinessportal.co.uk/ngovt.htm>).

These initiatives are often targeted at particular industries, with a recent focus on biotechnology SMEs by the European Commission. A biotech project 'NATIBS' is just one of the projects being funded through Economic and Technical Intelligence actions (ETIs), with specific support for the SME sector. "ETIs are designed to promote innovation within SMEs, disseminate information on scientific developments, and promote best practice"(European Commission 2005). In the global space of SMEs, there has been commitment by as many as 50 countries across the world to the OECD Bologna Charter on SME Policies (OECD 2000).

Taken from the literature on SMEs, MacGregor, Bunker & Waugh (1998) and Yap, Soh & Raman (1992) suggest that SMEs have the following characteristics:

- Small management team
- Strong owner influence
- Limited resources
- Centralised power and control
- Lack of specialist staff
- Multifunctional management
- Lack of control over business environment
- Limited market share
- Low employee turnover
- Reluctance to take risks
- Lack the necessary expertise
- Avoid sophisticated software or applications

3 Technology Adoption within Small and Medium Enterprises (SMEs)

Technology adoption within SMEs is affected by several factors, often being influenced by at least one (and often many) of the factors presented by MacGregor et al (1998). Raymond & Magnenet (1982) long ago suggested that SME characteristics, such as their limited resources and firm's dependency on a few key individuals often creates important challenges for development and implementation of information technology; in Beekhuyzen & Bernhardt's 2005 paper discussing the importance of our human resources and the invisibility of other necessary resources in this context, this still rings true. In line with these studies, Thong and Yap (1995) identified characteristics of the firm as well as characteristics of new technologies adopted. In terms of an SMEs CEO, they believe that SMEs that are likely to adopt new IT will usually have a CEO with a positive attitude, and who is innovative and knowledgeable about IT.

According to a number of studies, (Matlay, 2000; Culkin and Smith, 2000), it is the responsibility of the small business owner/ manager to recognise opportunities and threats within their chosen target market. These studies suggest that “the reactive or proactive approach of owner/managers to rapid technological changes in the marketplace is crucial to ICT adoption and implementation” and that “managerial commitment and perceptions of ICT benefits are key features in this process” (Poon and Swatman, 1997). Within the context of SMEs, there is often a need to respond very quickly to the changing needs of a very dynamic environment and industry. Organisations lacking this leadership are disadvantaging themselves. Management skills and relevant experiences become vitally important to the decision-making process relating to the timely adoption of new technology (Collins-Dodd, 1999).

According to Yaptengco, the largest barrier to adopting new technology is the cost of investing in an IT system, “because IT is never cheap, most SMEs cannot afford to implement an integrated IT system” (Ramos 2003). Another barrier presented by Yaptengco is the lack of understanding of existing laws covering IT issues. Her opinion is that issues such as Intellectual Property (IP) are not fully understood by most SMEs, thus, leaving them with their IPs unprotected without them knowing it.

3.1 Barriers to technology adoption

Through exploring the trends of technology adoption (or non-adoption) within SMEs, we can attempt to identify specific cultural barriers that may impede technology adoption across different cultures. This can result in further disadvantages to SMEs located in those countries.

3.1.1 SMEs in Italy

In 2002, a report from the office of the Italian Minister for Innovation and Technology suggested that e-commerce is one of the most important areas of the B2B sector, “especially as regards transactions among small and medium-sized enterprises (SMEs), which will be able to benefit considerably from innovation in their production processes and marketing activities” (MIT and Technologies 2002). In the same study, Italian SMEs were referred to as, “constitute(ing) the backbone of Italy's industrial system as regards both quantity (number of such companies, turnover and total employees) and quality (the specifics of their output and organisational structures).

A group of three separate studies by Scupola (2003) into SMEs and technology adoption in Italy found a number of barriers to the adoption of e-commerce, electronic data interchange (EDI) and other internet-related technology devices such as PDAs. These barriers include:

- Organisational readiness, such as financial and technological resources of the firm
- External pressures divided into competitive pressures and suppliers upgrading to newer technology (that SMEs are then forced to comply with)
- Perceived benefits of the technology - for instance the reputation of the brands of PDAs and the different benefits that each provides.

This study identified the expected e-commerce related barriers and benefits; however, it also highlighted that market availability of related technologies is a factor that greatly influences the adoption and implementation of e-commerce. (Scupola 2003) According to Scupola, this was not the only unexpected result. The study further indicated that the SMEs of Southern Italy never stated once that the cost of e-commerce adoption and implementation was an issue. This therefore suggests that if management of these SMEs saw opportunities for things like competitive advantage, cost savings, or increased productivity through more streamlined business operations, the company would be more than happy to invest in e-commerce, because they could clearly see the medium-long term benefits (Scupola 2003).

A fear of Internet security threats also became apparent throughout Scupola's (2003) study, with several respondents concerned about their competitors copying their products online: “by putting the collection of products on the internet they offer a service to customers and do a favour to competitors.” This, of course, depends on the market of each SMEs. If the design and quality are very important, yet easily copied, an Internet catalogue business may prove more harm than good.

The final adoption barriers found from Scupola's (2003) study were put forward by several respondent consulting SMEs and included "a lack of competence, knowledge and awareness of the technology and its potential".

The study by Scupola's (2003) also determined what SMEs have found to be the main benefits of internet-related technologies. The most important short-term benefits, in order of importance, were summarised as follows:

- Around the clock improved communication efficiency
- Administrative cost savings
- Savings time

The most important experienced long-term benefits, in order of importance, were summarised as follows:

- A contribution to internationalisation
- Increased market potential

Continuing the benefits, Scupola's (2003) Italian SME study discussed related technologies and how big an influence, direct or indirect, this aspect can have on technology adoption. For example, one of the Italian respondent companies explained how "even though it had developed an online catalogue, the company could not put the available inventories on the Web catalogue because of a lack of other technologies such as scanners and the digital camera and therefore it had to outsource this process."

To understand what is wrong with this process, one must consider this process in terms of time: The sampled products have to be taken to the photographer, processed, developed and then passed on to the web developer who scans them into the SMEs web catalogue and then uploads them to the SMEs website. By this time, a few days have passed and the SME product catalogue may have to change. For a dynamic web catalogue that needs to change as products sell, the process of outsourcing in this fashion fails miserably, and the Italian SMEs seem to be aware of this factor.

Moving away from the technological context, the series of studies in Italy found some large adoption barriers for SMEs coming from an organisational context, specifically, resistance to change. The studies suggest that once a technology-related initiative has been adopted, "the employees' knowledge and relative resistance to change is considered key to its diffusion in the company. One of the Italian SME respondents, for example, explicitly states that the diffusion of e-commerce within the company can start going well only when it gets into the DNA of people." (Scupola 2003)

Finally, the following points are very important for SMEs when considering adopting and implementing technology (from the external environmental context) (Scupola 2003):

- Quality of access to suppliers of technology-related services
- Government intervention
- Pressure from buyers, suppliers and competitors

To explain further, many respondent SMEs desired intervention from the government, in terms of subsidies, financial incentives such as training, tax breaks and so forth, but particularly in terms of informational campaigns and awareness creation. Other companies specified a need for a better screening process of companies applying for state support for electronic systems and training. One point that stood out to me was this: "...as long as the local SMEs do not understand or are unable to write in English, the advantages that the Internet can offer at an international level are very limited." A study by PriceWaterHouseCoopers, cited in Scupola's (Scupola 2003) paper, found that an important factor that prevented many Chinese SMEs from using the internet and certain technology was the English language barrier. Until language and cultural barriers can be overcome with multilingual support, this will continue to be a large adoption impediment.

Public administration was found to be an important change agent to increase the circulation of technology, specifically e-commerce, among SMEs in Italy. It is believed that when large public organisations start using the Internet to replace their current paper-based operations, such as taxes, citizen and company information etc. in this country, e-commerce among smaller SMEs will be more likely to follow (Scupola 2003).

The study by Scupola (2003) also found that external pressures from competitors and trading partners is likely to force other SMEs to adopt technology, possibly prematurely. One example given was that of an SME with a competitor that had a web catalogue. The SME said that even though they preferred sending CD-ROMs to customers regarding product description (which they had done for years), they were forced to invest in a web catalogue so that their customers had the option; otherwise it was likely that they would go to the web-based competitor for the convenience (Scupola 2003). And not uncommon, trust was found to be major adoption issue. Most SMEs responded with distrust towards IT consultants, which appear to have a pure salesman image in Italy (Scupola 2003).

3.1.2 SMEs in Australia

The Australian Chamber of Commerce and Industry (ACCI) *Survey of Small Business* for the May 2004 quarter indicates that Australian small businesses are travelling well in the current economic cycle. With 3.3 million employees across the small business sector in Australia, this represents a crucially important segment of the national economy (ACCI 2004). The same results report that small business has continued to expand their employee numbers. The primary goal of Harker & Van Akkeren's (2002) Australian study was to understand the mobile data technology needs of SMEs and SoHo (Small Office/Home Office) in a regional setting. They found the following adoption barriers to IT:

- Owner / manager characteristics such as their perceived benefits of PDAs, computer literacy, perceived control, their mistrust of the IT industry and time and financial pressures.
- Return on Investment (ROI) - SMEs make many decisions based on ROI. SMEs need technology that provides fast ROI, for SMEs are concerned with small-medium term survival rather than long term market share like large businesses.
- Firm characteristics, such as organisational readiness (staff, suppliers), market pressures from competitors etc., size, sector and even the structural sophistication of the firm (its current IT infrastructure and need for e-mail, inventory management etc)

According to Harker and Van Akkeren (2002) "Previous studies identify that the marketing of technological innovation to SME owners/managers is a minefield of emotion, attitudes, behavioural intention and perceptions. Coupled with other factors considered important to owner/managers such as cost and technical complexity, plus issues such as computer literacy of the owner/manger, and the size, sector and status of the firm, it would appear that marketers of mobile data technologies have many barriers to overcome." This Australian study found that SMEs will typically go through three phases when determining whether to adopt IT:

- Assessing IT benefits, organisational culture and firm-suited IT
- Assessing internal resources and procedures
- Evaluating external environment, support and services

Harker & Van Akkeren (2002) discuss how Australia's adoption of e-commerce and related technologies is widely varied between states and even more so between regional and city-based firms. This, however, was found not to be the case with mobile technologies, with evidence showing a high adoption across all states and regions in Australia. "Mobile data technologies, which 'marry' mobile phones and e-commerce technologies, are seen as eliminating time and distance as barriers for regional businesses in their adoption of these technologies." (Harker and Van Akkeren 2002)

The paper by Harker & Van Akkeren (2002) also discusses the reasons mobile data technologies are not being adopted by SMEs currently:

- Lack of speed of mobile technologies. They are slow and inefficient
- Lack of standardised IT environment for developing mobile data applications
- Limited bandwidth
- Higher usage costs than most overseas markets
- Increased latency
- Susceptibility to transmission noise and call dropouts
- Limited memory and CPU sizes
- Small monochrome screens
- Erratic connections
- Questionable security and standards

It is therefore a suggestion of Harker & Van Akkeren's study that perhaps adopters are waiting for just some of these problems to disappear before choosing to enter the mobile technology sector.

There was also evidence in this study to suggest that people may not want so many devices to carry: "I find it hard enough to remember to take my bag, my purse, my car keys and get in the car with three kids, let alone three or four other devices!" (Harker and Van Akkeren 2002) Mobile phones have shown their worth as a somewhat 'needed' item in today's society, with a need to get in touch with friends and family easily. A PDA however, lacks this need, except for the businessperson who wants to have a hands-on calendar at their fingertips.

3.1.3 SMEs in Ireland

In 2001, the Chambers of Commerce of Ireland (CCI) announced details of "one of the most ambitious e-Business Training Programmes ever to be launched in Ireland" (CCI 2001). The programme, aimed at small and medium sized companies, sought to deliver training in excess of 4,000 companies across Ireland.

According to Egan, Clancy & O'Toole (2003), 99.4% of enterprises in Ireland are SMEs and they account for just less than half of the total enterprise employment in Ireland. That suggests a staggering number of small businesses that could be benefiting from innovative technologies. Their study states that many SMEs are "gearing up at the front-end of their business process through the use of e-commerce tools such as e-mail and having a webpage" (Egan et al. 2003). This study explored whether these e-commerce initiatives were continued further to back-end support, such as a web catalogue, EDI and so forth. The results were very disappointing in this regard. It became clear that 91% of respondents use a PC and 73% use e-mail, the presence of the really beneficial e-commerce technology, such as web catalogues for online selling, online banking and EDI were basically non-existent.

In regard to respondents' use of email, responses suggested that the companies in the primary sector who adopted e-mail did so mainly due to the influence of dominant suppliers (67%) who they rely upon for production inputs (Egan et al. 2003). When asked about their promotional web pages, SMEs replied that use of this technology was a reactive response primarily due to customers asking if they had a website. In a further study, customers were found to be the key driver (over 86% of the time) for an SME to adopt e-mail and company web pages. Perhaps this suggests that these businesses have been driven to adopting technology and have implemented it without much motivation or knowledge about how it could make their business more productive (Egan, et al. 2003).

The SME industry in Ireland appears to have been under-informed about the benefits of technology "most of the SMEs in the audited companies were only realising low-level benefits from the use of e-commerce tools." (Egan et al., 2003). To overcome adoption barriers in Ireland, this study noted the following:

- A concentration on benefits and direct-costs involved will be crucial elements to winning adopters in the future.
- Need for simpler systems
- Robust systems

3.1.4 SMEs in the US

There is evidence from Kawamoto (2004) to suggest that as the latest technology advances, both consumers and business users want less in a handheld, in order to simplify these somewhat complex machines. The study found that the two main functions needed or wanted from PDAs included voice and personal information management (PIM) capabilities, as apposed to devices that included many other integrated functionality that was really not necessary to SME business operations. As Kawamoto (2004) states:

"The manufacturers aren't asking users the right questions. They're asking people if they want just one device instead of three. Of course people are going to say yes. What they're not asking is, how many devices are you willing to carry? We found people are usually willing to carry three."

The same report from Kawamoto (2004) found that people are more likely to adopt portable devices as the size and complexity of using the devices decreases, "People aren't really interested in video clips on their phone or portable

media storage, but PIM makes sense to them ...as long as all their devices can communicate with each other and work together, then they're willing to own several devices."

Kawamoto's (2004) study argued that people aren't just willing to own several devices, but they would actually prefer to keep them separate, again, for the simplicity factor: phone calls should stay with mobile phone and PIMs should stay with PDAs. When a mobile phone rings, a business user can get out their PDA to take notes and check their schedule. If the PDA was the phone, as some articles suggest is the movement within industry, things may become more difficult than anticipated. User needs must come first before technological innovation. Innovation should be driven from user needs.

Simes (2002) acknowledges a technology adoption problem with SMEs and concludes that the problem can be resolved firstly through the creation of a nationwide database of SMEs and secondly by using this database in an awareness campaign to speed up the adoption of information and communication technology (ICT) by SMEs. This conclusion was reached by recommendations given from a study taken of SMEs in Metro Manilla, Cebu and Davao. The survey also recommended "the development of e-government to increase citizens access to government services as well as the enhancement of network infrastructure server to facilitate usage of ICT by SMEs." (Simes 2002)

This same survey by Simes (2002) found that only 22.7% of SMEs surveyed used electronic handheld devices, such as Palm Pilots, Pocket PCs etc, for business purposes. Further, SMEs were found to mainly use ICTs for research and communication and seldom for business related e-commerce, such as inventory management and so forth, with an average of 15 hours per month of internet usage.

The study concluded that SMEs lack of ICT adoption is due to their "lack of awareness and knowledge of the other benefits in the areas of promotion, sales and procurement" with respect to what e-commerce and PDAs could provide (Simes 2002). Simes' (2002) study indicates both external and internal barriers to ICT adoption among SMEs. The external barriers are unfavourable economic environment, high cost of ICT and security concerns, whereas the internal barriers include poor internal communications infrastructure within SME firms, lack of ICT awareness and knowledge, and inadequacy of ICT-capable and literate manager / workers.

In response to these barriers, the use of a national database is suggested to monitor SMEs e-commerce actions as well as government incentives, such as the introduction of free ICT training and award programmes for SMEs. Banks were also noted as a potential ICT awareness incentive for SMEs: "Initiatives such as lower borrowing rates, broad credit extension facilities, technology transfer from big business and discounts on business solution software packages and software licenses can also do a lot in encouraging SMEs to adopt and use ICT and e-commerce." (Simes 2002)

A Californian study into SMEs and small office / home office (SoHo) by Trott (2004) looked into broadband and business and came to one clear conclusion: These small businesses prefer reliability and consistency over speed and cheap prices: "Once quality is assured, they'd rather have faster service than cheaper service." (Trott 2004)

This study further explained that cost was not an issue for SMEs / SoHo, and again argued that reliability is the number one consideration for these businesses, followed closely by speed. Voice over Inter Protocol (VoIP) was also mentioned as a future positive incentive for SMEs and SoHo to adopt ICT: "Increasing speed of access and the ability to handle heavier data are the most likely drivers of SMEs and SoHos. Throughout the next few years, VoIP applications promise substantial cost savings." (Trott 2004) Please note, this article also discusses satellite internet access. Although there seems to be a lack of demand for such technologies in Australia, the mobile telephone companies are closely observing the uptake of voice of IP and are engaged in joint research projects (ref to Nokia's research collaboration with universities).

Savvas (2003) notes that compared to enterprise resource planning (ERP) or other supply chain systems, the start-up costs of mobile solution can be considered modest for SMEs. It was also noted that because e-business technology is relatively new, SMEs that plan carefully can reap the benefits of first-mover advantages, at a relatively cheap price. Savvas' (2003) research concludes that for SMEs and SoHo, "it is wireless LAN, rather than souped-up mobile handsets, that hold the greatest promise."

The latest of the IEEE 802.11 standards will be “pitched” at the markets of SME and SoHo, as it is believed that SMEs will be content with wired equivalency protocol (WEP). The latest version “g”, offers the speed of its predecessor 802.11a, the unlicensed spectrum of its other predecessor 802.11b “giving the users the best of both worlds”. Presently however, the “g” standard is yet to receive security approval from the Wi-Fi Alliance industry body (Savvas 2003).

3.2 Identified cultural differences in technology adoption

Many papers have been published on the cultural differences in technology adoption (see http://web.idrc.ca/es/ev-30723-201-1-DO_TOPIC.html). The results from an extensive study of SMEs carried out by Grover, Segars & Durand (1994) have identified the following cultural differences in technology adoption:

Technology Spending	As a percentage of sales, technology spending is not found to be a largely differing factor across cultures. However, with regard to spending associated with systems success, very different results among countries started to emerge. The U.S. for example, had a clear association with budget and market success, whereas French and Korean respondents showed no such relationship, thus emphasising the competitive nature of the U.S. and their need to justify investment in tangible terms.
Centralised versus Decentralised Environments	A significant difference was observed within the number of centralised environments between the various countries. Korea for example, had a larger percentage of centralised environments compared to the U.S. and France, who reported a higher percentage of distributed environments.
Hardware & Telecommunications	Overall, U.S. and French firms mirrored each other in regard to deployment of hardware and telecommunication activities. It is believed that despite the vast differences in architecture and telecommunications activities of Korean respondents, higher levels of success of their Western counterparts may be incentive for Korean companies to change their ways and follow in the footsteps of U.S. and French firms.
Innovation/Risk taking	Innovation and risk taking is encouraged in 37 percent of U.S. firms, 38 percent in French firms and only 14 percent in Korean firms. However, all countries noted significant overall firm and performance impacts associated with risk taking. “In particular, system usage was particularly higher in all countries that encourage risk taking.
IS and Strategic Planning Integration	Formal integration of IS and strategic planning was reported by only 44 percent of Korean respondents as apposed to much higher 74 percent and 78 percent respectively for U.S. and French firms. It is believed that these findings are the result of Korean firms adopting a more formalised structure, which are slower to change. (As apposed to the participative structure found in U.S. and France, which is believed to allow an easier transition in terms of integrating plans of top-level management and functional-level management).
Information Sharing	Information sharing between departments was found to be significantly higher in France (59 percent), as apposed to the U.S. (35 percent) and Korea (28 percent).

4 Next Stage of Research

This paper presents only the initial stages of this exploratory research into the complex phenomena of technology adoption within small and medium enterprises so details of actual data collection and analysis are not yet complete. However, the following stages are planned for 2005.

We plan to survey a representative sample of SMEs in Australia on their uptake and use of new technologies in their workplace. This survey will be followed up with detailed qualitative face-to-face interviews with representatives from the surveyed group. These interviews will attempt to uncover and confirm some of the reasons why females are slow to adopt technology and how this affects the productivity and efficiency of their SME. Approximately 20 people will be included in the interview process.

In addition, non-intrusive observations will be carried out with the participants identified for interviews. The observations will consist of the researcher following people around their working environment to see how they currently carry out their regular work (technology and non-technology dependant). It is hoped the insights gained through the observation process could identify areas where new technologies would be of benefit. It is also anticipated that the observations will result in an understanding of how new technologies might impact on the organisation, and why they are not being incorporated into the organisation at an earlier stage.

User-Centred Design (UCD) as a field of study provides the context for this research and is discussed further in Vredenburg, Isensee & Righi (2002). UCD is being used in longitudinal research projects based at the Smart Internet Technology Cooperative Research Centre (SITCRC) in Australia. The main objective of this centre is to develop product innovations that utilise Internet technologies. Among the target group of the SITCRC's technology developments is the SME sector in Australia.

The use of User Centred Design principles, utilising personas and scenarios will help to identify possible successful technologies by giving a deeper understanding of how a user for instance a female small business owner will interact with a particular technology (e.g. mobile device such as a PDA) in a specific organisational context such as IT small business. The development process of any systems and products for the small business sector includes: formulating the design concept of the products, participating actively in the detailed product design, providing an evaluation framework to assess the usability/usefulness of the artefact/products (action research/co-design), and performing the usability testing (iterative design) (Burke, Castro, Singh & Turner, 2002). The approach to development in this project includes the application of User Centred Design methodologies that has been tested within a number of contexts and is discussed further in Beekhuyzen, von Hellens, Morley, & Nielsen (2003) and Astbrink & Beekhuyzen (2003).

Initial stages of the user studies involve identifying user requirements and comparing them to discussions in the current literature. This will also include an analysis of possible technology solutions in relation to particular user groups. Culture is widely cited in the information systems literature as a possible barrier to technology adoption. The early stages of the project will also explore the cultural environments of the case sites and how they may influence the introduction of new technology and practices.

References

- ACCI (2004) Small Business: Identifying Trends and Conditions within the Small Business Sector. May
- ACCI (2004) 2004 Pre-Election Survey Small Business Priorities: Taxation, Economic Management and Workplace Relations, <http://www.acci.com.au>
- Astbrink, G. and Beekhuyzen, J. P. (2003) *Synergies of Universal Design and User-Centred Design*, Proceedings of the International Conference on Human Computer Interaction (HCI), Crete, 22-27 June
- Beekhuyzen, J., L. von Hellens, M. Morley, and S.H. Nielsen (2003) Searching for a methodology for Smart Internet Technology Development. in 11th International Conference on Information Systems Development.. Melbourne, Australia.
- Burke, J., M. Castro, S. Singh, and T. P., (2002) SITCRC User Needs Project * Phase 1 Overview., User Needs Project, User Environment Program, SITCRC: Melbourne, Australia
- CCI (2001). CCI Launches multi-million pound Training Initiative. Chambers of Commerce from Ireland [online] <http://www.chambersireland.ie/index.asp?locID=80&docID=79>
- Collins-Dodd (1999) The Impact of Export Orientation on Export Performance of High-Tech SME's." Academy of Marketing Science Conference, Miami, May
- Culkin, N. & Smith, D. (2000) An emotional business: a guide to understanding the motivations of small business decision takers, *Qualitative Market Research: An International Journal*, vol. 3, no. 3, pp. 145-157
- Egan, T, Clancy, S, O'Toole, T. (2003) The Integration of E-Commerce Tools in the Business Processes of SMEs, *Irish Journal of Management*. January

- European Commission (2005) Helping early stage biotech SMEs to innovate, EUBusiness [online]
<http://www.eubusiness.com/topics/SMEs/biotech.2005-02-24/view>
- Grover, V., Segars, A. H. and Durand, D. (1994) Organisational practise, information resource deployment and systems success: a cross-cultural survey, *Journal of Strategic Information Systems*, **3**, 85-106.
- Harker, D. & Van Akkeren, J. (2002) Exploring the needs of SMEs for mobile data technologies: the role of qualitative research techniques, *Qualitative Market Research: An International Journal*, June 2002, vol. 5, no. 3, pp. 199-209(11)
- Kawamoto, D. (2004). More want less in a handheld: Report, ZDNet Australia. Accessed: 19/1/05
<http://www.zdnet.com.au/news/software/0,20000061733,20282437,00.htm>
- MacGregor R.C., Bunker D.J. & Waugh P. (1998) Electronic Commerce and Small/Medium Enterprises (SMEs) in Australia: An Electronic Data Interchange (EDI) Pilot Study, Proceedings of the 11th International Bled Electronic Commerce Conference, Slovenia, June.
- Martin, L.M. & Matlay, H. (2001) Blanket Approaches to Small Firm Support; some lessons from the DTI adoption ladder, *Journal of Internet Research*, Winter.
- Matlay, H. (2000) 'Industry-Higher Education Collaborations Within Small Business Clusters: Evidence from UK Case Studies', *Industry and Higher Education*, 14, 6, pp.386-393.
- Mejias, R. J., Shepherd, M. M., Vogel, D. R. and Lazaneo, L. (1997) Consensus and Perceived Satisfaction Levels: A Cross-Cultural Comparison of GSS and Non-GSS Outcomes within and between the United States and Mexico, *Journal of Management Information Systems*, **13**, 137-161.
- MIT (2002). Italian Action plan for the information society - e-Commerce, Minister for Innovation and Technology, [online] http://www.innovazione.gov.it/eng/soc_info/politiche_governo/e_commerce_eng.shtml
- OECD (2000) The Bologna Charter on SME Policies, Organisation for Economic Co-operation and Development [online] http://www.oecd.org/document/17/0,2340,en_2649_201185_1809105_1_1_1_1,00.html
- Poon S.P.H. and Swatman P.M.C. (1997) Small Business Use of the Internet: Findings from an Australian Case Study, *International Marketing Review*, Vol. 15, No. 5, 385-402.
- Raymond, L and Magnenet, T.N., (1982) Information System in Small Business: Are they Used in Management Decision? *American Journal of Small Business* 16 (4) pp.20-27.
- Savvas, A. (2003). What's in IT for you? *Computer Weekly*. Sutton: 57.
- Scupola, A (2003) The Adoption of Internet Commerce by SMEs in the South of Italy: An Environmental, Technological and Organizational Perspective, *Journal of Global Information Technology Management*, No. 6, Vol. 1, 2003.
- Simes, J. B. (2002). SMEs adoption of ICT sluggish. *Computerworld Philippines*. Metro Manila: 1.
- Thong, J.Y.L and Yap, C. S., (1995) CEO Characteristics, Organizational Characteristics and Information Technology Adoption in Small Business. *Omega*, *International Journal of Management Science* 23(4), pp. 429-442
- Trott, S. (2004). SME and SoHo: Broadband Business Success Niches. *Via Satellite*. Potomac. **19**: 1.
- Vredenburg, K., S. Isensee, and C. Righi, (2002) *User-Centered Design: An integrated approach*, New Jersey: Prentice Hall.
- Yap, C.S., Soh, C.P.P., and Raman, K.S., (1992) Information systems success factors in small businesses, *Omega*, *International Journal of Management Science*, 20(5), pp. 597-609