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THE CONTEXT OF INFORMATION TECHNOLOGY AND ELECTRONIC COMMERCE ADOPTION IN SMALL/ MEDIUM ENTERPRISES: A GLOBAL PERSPECTIVE

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Abstract

The literature that deals with Information Technology (IT) adoption in Small/Medium Enterprises (SMEs) has raised significant issues over recent years. How IT is accepted and used within SMEs is fundamental to this literature. The nature of IT adoption and diffusion has also been mainly dealt with from an ontologically objective, rational, Western, process focused perspective that has been predominantly positivistic in research orientation. For example, academics and practitioners have generally based their opinions about the adoption of IT in SMEs in line with what larger (predominantly Western economic) businesses find important, such as IT utilisation for competitive advantage. Many structuralist frameworks and models have been developed over the years to support and rationalize this view (Porter (1985)). Researchers have also made assumptions as to the cross-cultural suitability of various types of IT such as those utilized within an Electronic Commerce (EC) environment. The validity of these assumptions is especially critical in today's business climate, given the hype that surrounds the use of EC technologies and approaches for conducting global business transactions. This paper begins by examining the general nature SMEs, as well as some facts about SMEs from around the globe. It then goes on to examine the nature of technology adoption through the Bunker & Dean (1997) disciplinary model that moves away from the objective, rational, Western process oriented view of technology adoption and diffusion by focusing on a more subjective view of business context and resultant skills and business processes. The paper then looks at small business attitudes to the adoption and use of IT and EC technologies through the results of an internationally administered SME web survey. Finally it is argued that data from this survey suggests that IT and EC adoption theories may be based on incorrect assumptions that when critically evaluated, necessitate further research into this area.

Keywords: SMEs, electronic commerce, culture, context, globalisation, skills

Small/Medium Enterprise (SME) Character and Context

Within the US economy SMEs have created most of the new jobs since the 1980's (Hitt et al (1999)). SMEs account for over one third of the Australian labour market (ABS 1999). They employ an estimated 3,119,600 million people in Australia and form an important backbone to the Australian economy. Yet in the US and here in Australia they are exposed to the greatest amount of impact from technological and economic change (Hitt et al (1999)). Over the years, the nature of SMEs has been investigated in governmental committees as well as by various research initiatives. SMEs tend to be more risky than their larger counterparts (Brigham & Smith (1967), Walker (1975), Delone (1988)), subject to higher failure rates (Cochran (1981)), keep inadequate records of transactions (Rotch (1967)) and are not miniature versions of larger firms, but quite unique in their own right (Barnett & Mackness (1983)). In looking at the character of SMEs we can see that they are more influenced by individual contextual characteristics than their larger counterparts.

Meredith (1994) suggests that any definition of an SME must include qualitative components as well as quantitative measures. The quantitative component should examine tangible financial measures, while the qualitative component should reflect less tangible factors such as, mode of operation as well as organisational procedures.

> 'small business is one in which one or two persons are required to make all the critical decisions (such as finance, accounting personnel, inventory, production, servicing, marketing and selling decisions) without the aid of internal (employed) specialists and with the owners having knowledge in one or two functional areas of management' (p 31)

Reynolds et al (1994) document many characteristics that make up the organisational environment in which a small business operates. These include such issues as: small management team, strong owner influence, centralised power and control, lack of specialist staff, multi-functional management and informal and inadequate planning and control systems. Lack of control over the business environment, narrow product/service range, heavy reliance on few customers, leadership - personal but not task oriented and product dedication rather than customer orientation are also important to most SMEs. As these factors would tend to indicate, the many contextual characteristics of an SME and the environment in which it operates, can make the development of an SME typology a difficult task.

IT Development, Adoption and Use in Context – Bunker & Dean (1997)

SMEs, have been the subject of many studies on information technology uptake and use over the years (DeLone (1988), Yap et al (1992), Neergaard (1992), Chen (1993), MacGregor & Bunker (1995), Chatfield & Alston (1997), Bergeron et al (1998), Raymond (2001)). As stated previously, many of these studies have been conducted from an ontologically objective, rational, Western, process focused perspective that has been predominantly positivistic in research orientation. This is reflected in the world-view, which underpins the creation, adoption and use of Information Technology (IT) and associated systems tools through our understanding of the discipline of IT. It is generally accepted that IT researchers and practitioners regard themselves as part of a legitimate emerging discipline (Galliers (1994)). This emerging discipline has, up until the last few years maintained an objective, rational, Western economic, process focussed view which has also subsumed SME research as discussed above. This has been evidenced in the orientation of the many conferences and journals within the area. What then, is the implication of the values and context of IT and EC tool creation and what of the assumed skills required for the successful use of such technology? If we look at the example of Checkland & Scholes (1990) soft systems methodology for building information systems, it is evident that this conceptual tool is built around the idea of challenging paradigms or world views ("Weltanschauungen") in order to build effective information systems. We only have to look at the cultural origins of the Internet to understand the effect of the Western business worldview (rational, economically driven, free market, English language oriented, defined and structured) on its operation. These assumptions guide and shape the Internet's structure and use by organisations throughout the world, and it is this structure, which may lock out cultures that do not see the world and its business operation from the perspective of these underlying assumptions. To further extend this idea we can build on the disciplinary model of Bunker & Dean (1997). Their general model of a discipline is in four parts (see figure 1). By arguing the idea of tools being the visible sign of paradigmatic assumptions that underpin a discipline, they find that four entities play a role: the tool Maker, the tool User, the Scholar and the Inheritor of the discipline.

The tool-Maker is the entity responsible for the physical manifestation of the tool. The tool User takes the tool and applies it for the advancement of practice or theoretical purposes. The Scholar studies tool making and use and attempts to understand the domain of knowledge and skill that enhances the tool creation and use. The Inheritor learns from the creation, use and understanding of the tool. Each of these roles can be discrete in nature or combined in an individual. These four roles interact within a context that encompasses and reflects cultural factors that influence the way the tool is being built, used, studied or understood. Context plays an important role in the application of this model to IT as it is context, which defines the paradigmatic assumptions, which underpin the discipline. The economic, historical, technical, and social values within the culture are focussed in skill sets for tool making, use, inheritance and scholarly activities.

If we apply this model to the adoption and use of IT and EC within SMEs, then tool-Makers can be IT vendors or in limited cases in-house developers. Tool-Users can be organisational staff members, Scholars can be academics studying the environment and Inheritors can be students, organisational staff members or anyone who learns through the application of IT and EC in SMEs. This list is by no means exhaustive. Academics, vendors, developers, organisational staff members and students could also, simultaneously, be tool-Makers, Users, Scholars and Inheritors. As we can see by these examples, any entity can take on any or all of these roles in almost any combination. The roles themselves have in-built assumptions but are not necessarily discrete in nature.

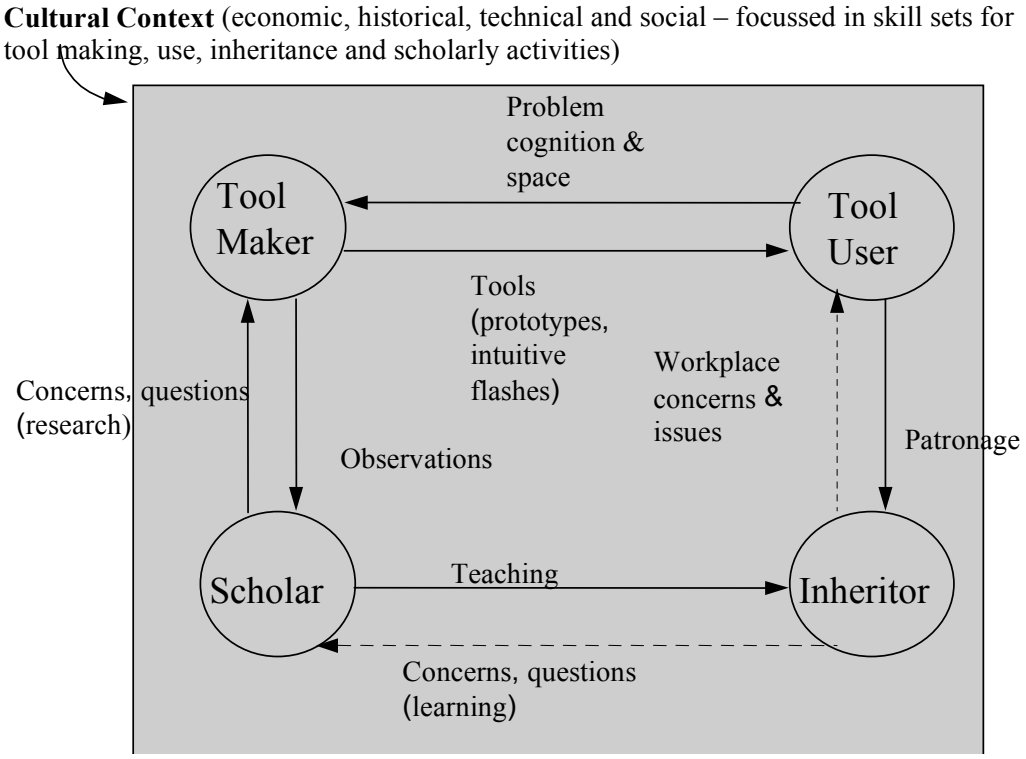

Figure 1. The Disciplinary Model - Bunker & Dean (1997)

The Bunker & Dean (1997) model analyses 4 roles in the process of tool creation and use and this gives us greater insight into the roles of tool making and use as well as highlighting how tools are used, studied and inherited within a context from a subjective viewpoint i.e. oriented towards the subject (adopters) rather than the object (technology). An analysis of the contextual requirements of the development and adoption of IT and EC use within SMEs will serve to highlight the underlying values and assumptions of the worldview of the tool maker, which in turn affects the skills required to effectively make, use, inherit and study these tools by the user (or recipient of the technology in this case the SMEs in this study).

The it is the inbuilt presumption of this model that the context of IT and EC tool development and adoption influences the structure and intended use of these tools as well as the skill sets required for effective use. It is these subjective contextual elements and the resultant skill and process focus that have the potential to impact and limit true global technology adoption and use of these tools. If we recall the previous Internet example then the potential limitations and resultant problems associated with a tool created within one context that is attempted to be adopted and diffused within another context become obvious.

Adoption of IT and EC Technologies in Small/Medium Enterprises

In light of the Bunker & Dean (1997) model we can see that there are also marked subjective cultural contextual differences between small firms and their larger counterparts when we consider the adoption of IT (Barnett & Mackness (1983)), primarily in their skills, resource and process focus base. Most small firms avoid sophisticated software or applications (Khan & Khan (1992)). This view is supported by studies carried out in the United Kingdom by Chen (1993) while Cragg & King (1993), Holzinger & Hotch (1993), MacGregor & Bunker (1999 + 2000) and DelVecchio (1994) suggest that small firms often lack the necessary expertise to utilise IT effectively. A number of studies examining the adoption of computer technology in the SME environment (Doukidis et al (1992), Neergaard (1992), Yap et al (1992)) have found that small business managers use vendor expertise in the identification of hardware and software as their first critical step towards computerisation. The vendor becomes the surrogate IT department for the SME. Swanson (1988) suggested that failure of the vendor to understand the nature of small business operations or the level of skill of the personnel who will be using the technology, often leads to dissatisfaction or abandonment of IT by a small businesses.

Where larger businesses will call upon the technical expertise of the IT department to supplement vendor support, there is a heavy reliance by an SME on the vendor, prior and subsequent to purchase. Vendor support and ability affect the overall level of small

business management's satisfaction with computer technology. A recent study (MacGregor & Bunker (2000)) also suggests that the level of vendor expertise and support can significantly affect a small business' ongoing ability to adopt new systems and to manage staff responsible for IT. There may be a genuine desire by small business managers to require requisite knowledge of IT but most small businesses have tended to rely on vendors for the necessary background knowledge to adopt computers.

Within the area of Electronic Commerce (EDI) it is interesting to note that while most researchers advocate the adoption of this type of IT in the small business environment, most provide examples from large businesses (Pletsch (1994), EDI World Institute (1995), Tuunainen & Saarinen (1997)). Not only are the examples questionable to the SME marketplace, but also few authors highlight the problems, which arise when small business adopts such technology.

Huttig (1994) suggests that in order for a small business to successfully adopt EDI there is a need to develop computerised outsourcing and to establish a system of control and management. Evans-Correia (1994) and Udo & Pickett (1994) consider the major hurdle for small businesses is the lack of technical, financial and administrative resources to comply both with EDI and the subsequent organisational partners. Higgins (1995) suggests that one of the problems is security while Buchanan (1995) points to the high set-up cost as a disincentive to EDI use. Tuunainen and Saarinen (1997) also discuss most of the above issues in their study of SME suppliers to the Finnish automotive industry. Pureo & Campbell (1998) discuss a number of IT/EC adoption inhibitors for SMEs. Cost, skepticism about consultants and vendors, web accessibility and unfamiliarity, lack of knowledge, lack of understanding of vendor advice, security, payments and technical details all contribute to the critical areas of concern that SMEs have with the adoption of EC technologies within the business.

This study highlights that SMEs are very important to the health of most Western economies and that their rate of IT adoption forms the basis of their effective and profitable operation. With the awareness that EC technologies are now playing a major role in the adoption of IT in both large and small organizations, a study was conducted of SME's IT and EC adoption around the globe.

Global Adoption and Use of IT and EC in SMEs

It is now widely acknowledged that the Internet has impacted how SMEs conduct their business operations by revolutionising the dynamics of international commerce and facilitating cross-border information flows and transactions (Quelch & Klein, (1996)). The Internet has been pushed as an enabler of globalisation, allowing some SMEs to achieve rapid growth and internationalisation (Ellsworth and Ellsworth, (1997)). Global market focus and the advent of EC have brought about many new opportunities and challenges for SMEs (Raymond, (2001); Nielson & Morris, (2001); Quelch & Klein, (1996)). The Internet has been touted as a means to reduce global advertising costs whilst increasing advertising efficiency, eroding the competitive advantages of scale economies, decreasing information dissemination and communication costs by abolishing geographical and temporal barriers and facilitating SMEs to reach a critical mass of customers. In order to achieve this low cost access to global markets and customers, SMEs have had to invest in and acquire EC. In line with the above assumptions this study attempts to look at EC acquisition by SMEs, in particular the criteria used by SMEs for EC adoption, and how contextual factors affect the adoption of these technologies.

Research Approach

A web survey was constructed around various known approaches to IT and EC uptake in SMEs (see table 1). It was the intention of this study to gather a large amount of data via a survey to conduct some high level descriptive statistical analysis on global adoption and use of IT and EC, so as to determine whether there was some pattern of adoption. This would then be the basis of further in-depth qualitative research. To facilitate this initial research objective, 400,000 emails were sent out to global SMEs by a US based e-mail marketing company. Of the 400,000 companies contacted only 82 responded. This response rate not only highlights the value (or lack thereof) of the email medium for tasks of this kind e.g. attitudes towards spamming and security issues as well as the unsolicited nature of the request to answer the web survey, it also points to a self selection of the respondents i.e. only those businesses utilizing the technologies thought their opinion important enough to complete the survey. There is also an issue regarding the comprehensiveness of the email address list due to the location of the marketing company and its access to truly global information i.e. it was a US company. Due to the significance of these issues associated with the way the survey was conducted, and the number of responses obtained, it was decided that statistical analysis and any attempt at generalisability of the survey results would be spurious at best, and so the research team analysed this data set from a more contextual viewpoint by looking at a descriptive analysis of percentage responses by various business characteristics (Miles & Huberman (1994)). This was done in order to ascertain whether any of these characteristics might have some influence on the adoption and use of IT and EC within SMEs.

Survey Instrument

A web-based survey was developed for small business managers to complete. Respondents were asked business context questions such as their nationality and the size (in terms of personnel employed) and type of business (in terms of the market sector). Respondents were also asked skill related questions such as the number of years experience the business had with computers, the most important factor which influenced their purchase of their computer technology as well as the major business influence on their choice of computer technology. They were also asked for the process focus of their business by defining the type of electronic commerce they were using and the major use of the computer technology within the business as well as the major reason for adopting electronic commerce. These questions utilised pull-down menu constructs such that preset responses were attainable. These menu constructs were based on previous research approaches to IT and EC uptake in SMEs, which are described in Table 1 below.

Table 1. Approaches to IT and EC Uptake in SMEs – Web Survey Constructs and Their Research Origins

Type of Business
- Customer Service
- Professional
- Industrial
- Finance

Based on categories suggested in earlier studies (see Illawarra Business Directory 1993, MacGregor & Bunker 1995)

Most important factor used in the purchase of computer equipment
- Better record keeping
- Ease of use
- Gaining strategic advantage
- Increased productivity
- Streamlining work procedures
- Better client service

Based on categories suggested in earlier studies (see Neergaard 1992, Fink & Tjarka 1994, MacGregor & Bunker 1996 + 2000)

Major influence on computer equipment choice
- Home experience
- Vendor/consultants
- Peer pressure
- Management requirement
- Staff requirement

Based on categories suggested in studies (see Yap et al 1992, Tait & Vessey 1988, Igbaria 1993, Biers 2000, Samborn 2000, Rosenberg 2000, Stafford 2001)

Type of Electronic Commerce
- EFTPOS
- EDI
- Internet Commerce
- Web Based Advertising

Based on categories suggested in studies (see Thelwall 2000)

Major Reason for Adopting Electronic Commerce
- Better Customer Base
- Better Inventory control
- Increased revenue
- Streamlining work procedures
- A combination of the above

Based on categories suggested in studies (see EDI World Institute 1995, MacGregor et al 1996, Stickel 1998, Wang et al 2000, Cunliffe 2000)

Research Method

A New York media company was employed to target SME's. A short message was sent using e-mail by the media company indicating the nature of the survey that was being undertaken, together with a web site address at which the questionnaire could be read and answered.

The media company was paid to distribute 400,000 email messages from their list of SME's. Only 82 replies were obtained. 12% were from Australia, 8% from Canada, 60% from the US, 10% from the UK and 10% from other Western countries (predominately European). The response rate was less than statistically significant so data was only examined using comparisons of percentage responses to questions to determine whether the contextual, skill and business process issues had any influence on SME reasons for the adoption and use of IT and EC in these businesses. This analysis was done in order to obtain an overall view of the circumstances of these businesses and their decision to use IT and EC.

Analysis of Results

The data was firstly examined to determine how nationality of the respondent, size of business, number of years using computers or the type of business indicated any noticeable differences in the important factors identified when purchasing computer technology. The results showed that the type of business, size of business or number of years using computer technology did not seem to be a major or different influence in the purchase of computing equipment. The nationality of the respondent, however, indicated vastly different reasons for purchase of IT (see table 2)

Table 2. Major Reason for Purchase of Computer Technology Subdivided by Nationality of Respondents. Percent of Respondents Within Nationality

PURCHASE REASON NATIONALITY	Better Record Keeping	Ease of Use	Strategic Advantage	Increased Productivity	Streamlining Work Procedures	Better Customer Service
Australia	14	14	28	28	14	0
Canada	33	16	50	0	0	0
USA	37	10	5	24	5	18
UK	0	40	0	10	40	0
Other	14	28	0	42	14	0

Australian businesses stated that gaining strategic advantage and increased productivity were important. US businesses stated that increased productivity and better record keeping were critical while Canadian businesses felt that gaining strategic advantage and better record keeping were critical. UK business felt that streamlining of work procedures and ease of use of IT was important while other businesses focused on increased productivity as an issue.

Table 3 deals with reasons for adopting EC by nationality and factors which include better inventory control, increased customer base, increased revenue, streamlining business processes, if other no reason indicated (mixture of previous 4).

Table 3. Major Reason for the Adoption of Electronic Commerce Percent of Respondents by Nationality

ADOPTION REASON NATIONALITY	Better Inventory Control	Better Customer Base	Increased Revenue	Streamlining Work Procedures	Combination
Australia	0	0	0	55	45
Canada	0	20	0	20	60
USA	0	18	28	12	41
UK	0	16	16	16	48
Other	14	42	14	0	28

Australian businesses stated that streamlining work procedures and a combination of all factors were important. US businesses stated that increased revenue and a combination of factors were critical while Canadian businesses felt that a combination of factors were critical. UK and other businesses felt that a better customer base and a combination of factors were important.

At this stage in the analysis it is interesting to note the marked differences in justification for IT V EC (see also table 2).

Reasons for adopting EC were then looked at by type of business (table 4).

Table 4. Major Reason for the Adoption of Electronic Commerce
Percent of Respondents by Business Type

ADOPTION REASON BUSINESS TYPE	Better Inventory Control	Better Customer Base	Increased Revenue	Streamlining Work Procedures	Combination
Customer Service	0	20	8	16	52
Financial	0	0	11	22	66
Industrial	11	33	11	33	11
Professional	0	19	33	11	37

Customer service, financial (also increased revenue) and professional businesses stated that a combination of factors were most important. While industrial businesses rated better customer base and streamlining work procedures as most relevant.

The data was then examined to determine whether nationality of the respondent, size of business, number of years using computers or the type of business was related to the major influence on computer equipment choice. The results showed that only size of the business had a major influence on the reasons given for the selection of equipment (see table 5).

Table 5. Major Influence on Computer Equipment Choice
Percent of Respondents by Business Size

IT CHOICE INFLUENCE BUSINESS SIZE	Home Experience	Vendor/Consultant	Peer Pressure	Management Requirements	Staff Requirements
1-5 staff	55	9	11	11	11
6-10 staff	0	20	0	40	40
11-20 staff	0	60	20	0	20
>20 staff	12	12	0	38	38

Smaller SMEs (1-5 staff) showed a marked influence of home experiences on the choice of computing equipment while those businesses with 6-10 staff and more than 20 staff indicated that management and staff requirements were critical to equipment choice. Interestingly those businesses with 11-20 staff felt that vendor/consultant advice was important.

The data was then examined to determine whether nationality of the respondent, size of business, number of years using computers or the type of business influenced the type of electronic commerce adopted by the business. The results showed that the type of business, the size of the business and the number of years involved with computers were influential regarding the type of electronic commerce adopted (see tables 6,7 & 8).

Table 6. Type of Electronic Commerce Adopted
Percent of Respondents by Business Type

EC ADOPTION TYPE BUSINESS TYPE	EFTPOS	Internet Commerce	EDI	Web Based Advertising
Customer Service	7	37	4	52
Financial	12	0	12	75
Industrial	40	40	20	0
Professional	11	37	5	46

Customer service, financial, and professional businesses were high adopters of web advertising, while customer service, professional businesses and industrial businesses also adopted Internet commerce approaches. Industrial businesses were focused on EFTPOS use.

Table 7. Type of Electronic Commerce Adopted
Percent of Respondents by Business Size

EC ADOPTION TYPE BUSINESS SIZE	EFTPOS	Internet Commerce	EDI	Web Based Advertising
1-5 staff	9	39	0	48
6-10 staff	42	14	0	42
11-20 staff	0	40	40	20
>20 staff	13	34	7	46

Businesses with 1-5 staff thought that internet commerce and web based advertising were important while those in the 6-10 range felt that EFTPOS web based advertising was more useful. SMEs with 11-20 staff thought that Internet commerce and EDI were critical while those with >20 staff were adopting Internet commerce and web based advertising approaches.

Table 8. Type of Electronic Commerce Adopted
Percent of Respondent s by Years of IT Experience

EC ADOPTION TYPE YEARS EXPERIENCE (IT)	EFTPOS	Internet Commerce	EDI	Web Based Advertising
1-5 yrs	8	60	4	28
6-10 yrs	4	23	19	53
>10yrs	23	23	0	54

Businesses that had limited computing experience were more inclined to adopt internet commerce approaches while those with more experience of IT saw the benefits of web based advertising.

Discussion and Conclusions

It is acknowledged that responses to this survey were overwhelmingly from SMEs operating within Western economies and were in very small numbers. This was probably a result of the mailing house approach taken by the research team. Results of this study, however point to a global pattern of IT and EC adoption (at least in the case of these businesses). Further investigation is required into this area.

While the initial selection and number of respondents limits the validity and generalisability of this study's findings, the study does, however, highlight some interesting differences in the adoption and use of IT and EC within these businesses within the SME and Western business context. Contextual variables such as size, business type and nationality all have a marked influence on the adoption of IT and EC by the businesses that responded to the survey. Skill based variables such as number of years of experience with computers and type of experience with computers also have some influence on the way that these SMEs have adopted IT and EC. Required process outcomes (which may or may not relate to skills which in turn relates to context) and strategic versus operational value of IT and EC to SMEs, also highlight the very different adoption and use of IT and EC even within a supposedly homogeneous Western business context and presumed skill base.

The findings of this study are somewhat at odds with the "one size fits all" approaches that have pervaded the IT adoption literature in general as well as that to do with SMEs in particular. It would seem that even though there are a limited number of responses to this particular survey there are some indications that organisational contextual differences and resultant skill and process orientations make a difference to IT and EC uptake and use within the SME environment. This has some critical ramifications for the study of information technology adoption and electronic commerce approaches used within the global SME environment. If we believe that the Bunker & Dean (1997) model gives us insight into the subjective orientation towards contextual and skill issues affecting the adoption of IT in business, and we then see that the context, skill and process differences are so varied within and across Western business cultures (even with a sample as small as the one in this study), then how are the positivistic, objective, rational and structuralist approaches to technology study and adoption (in this case within SME's) to be interpreted for the effective and successful adoption of IT and EC approaches in a global context? Are these approaches relevant to the study and facilitation of IT and EC use in many different business contexts and cultures? How does this impact the efforts of technology vendors such as Microsoft and their endeavours to sell to the other 80% of the world's population who do not have IT or EC, but may be looking to adopt these technologies to take part in the global marketplace?

Clearly the model proposed by Bunker & Dean (1997) may be an additional way of fleshing out and interpreting information the area of IT and EC adoption and use by SME's in a global environment, (as was attempted in this study), due to its subjective orientation and contextual skill based focus on these issues. These areas clearly need further investigation if we are to better understand the adoption of IT and EC within the SME context in a global environment. The next phase of this study is to conduct a deeper qualitative analysis of SME adoption of IT and EC technology utilising more appropriate data collection approaches such as case studies and ethnographic approaches across multiple cultural contexts.

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