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An Exploration of Factors that influence the ability of Small and Medium Sized Enterprises to Engage in Electronic Commerce: preliminary findings from 34 Australian case studies

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Abstract

Previous research by Chau and Turner (2001b) proposed a Four Phase Model of E-Commerce Business Transformation. This model adapted the work of Venkatraman (1994) to explore the relationship between the degree of organisational transformation and potential benefits derived from SME e-Commerce. This paper reports in detail on the factors that influence SMEs ability to co-ordinate changes to organisational processes and derive benefit from e-Commerce. Examination of the qualitative data collected indicates factors both internal and external to the organisation influence SMEs' ability to perform e-Commerce enabled business transformation. The paper discusses the nature of these internal factors (organisational and technological) and external factors (nature of supply chain, level of service provided by third party organisations, industry influence and government assistance).

Keywords

INTRODUCTION

In previous research by the authors, a Four Phased Model of EC [e-Commerce] Business Transformation (Chau and Turner, 2001b) was developed from preliminary data analysis of 34 SME case studies. These multiple case studies investigated the uptake and utilisation of EC by a broad range of SMEs from seven different industries including agriculture, retail trade, hospitality, education, communication and manufacturing. These businesses varied in age from start-ups to one business that had been operating for more than 80 years. The analysis of the utilisation of EC by these SMEs revealed that there were at least four phases of SMEs' utilisation of EC (Chau, 2001). These phases emerged not as distinct stages of EC adoption but rather as transitional states in the use of EC that SMEs may establish themselves at directly or migrate to from other phases.

This phased model concurred with the findings of Venkatraman's (1994) original research into IT business transformation that showed organisations do not evolve along a set of neat stages of IT enabled business transformation. Venkatraman's (1994) five level framework of IT enabled business transformations acknowledged benefits to an organisation are achieved when investment in IT services are matched by corresponding changes to organisational processes. This framework was tested and validated across a range of organisations, although these were predominantly large corporations.

By exploring the relationships between degrees of organisational transformation and potential benefits to be derived from EC, the *Four Phase Model of EC Business Transformation* model illustrates that increased value from EC accrues to those SMEs capable of re-aligning business structures and processes. From the case studies it also emerged that there are two distinct strategic perspectives adopted by SMEs in relation to the use of EC: experimental and strategic. This model is re-presented in brief here to ensure clarity in an examination of factors that influence the ability of SMEs to engage in these types of e-Business transformations. For further details of the model see, Chau and Turner (2001b).

Position P0:   Conventional SME utilising no web-based EC.

SMEs in this phase may adopt basic EC banking functions such as electronic funds transfer (EFT), EFT point of sale (EFTPOS), phone banking and electronic bill payment (BPAY). They have not however incorporated any web-based EC.
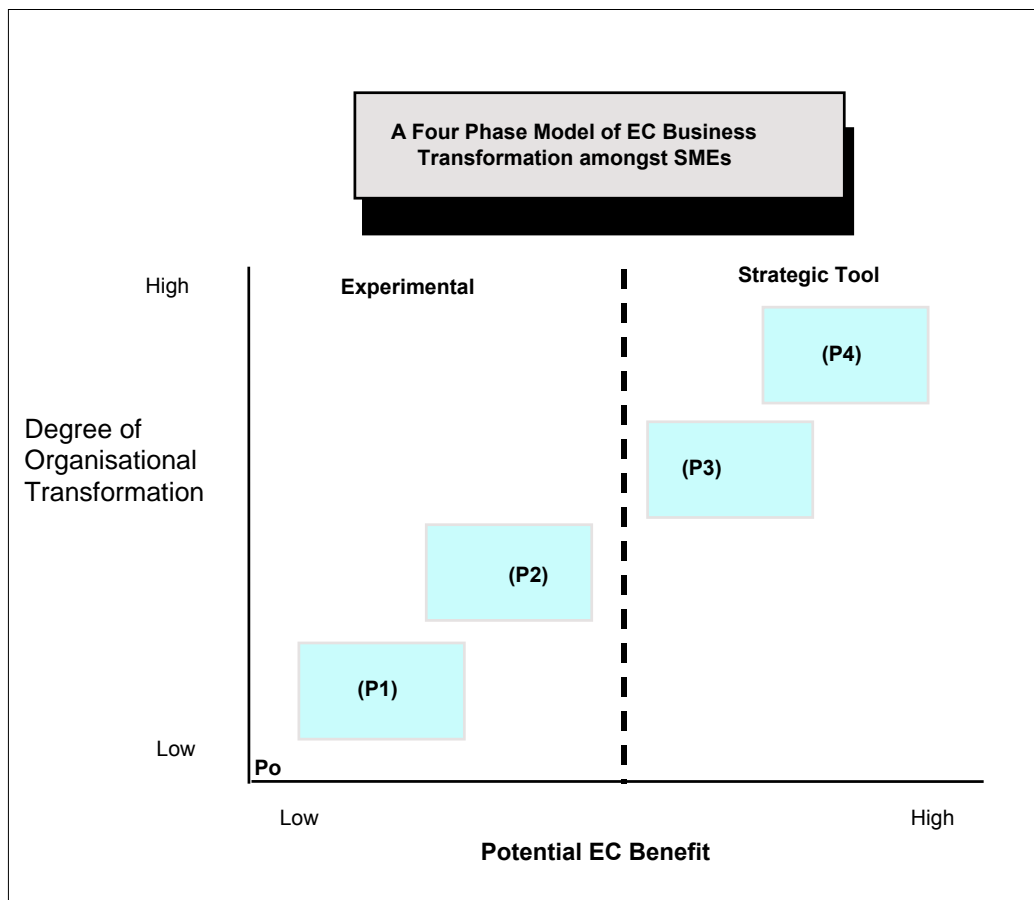

Figure 1: A Four Phase Model of EC Business Transformation

Phase P1:   SMEs incorporate a static web presence.

SMEs consider EC will have a role in their industry in the future. These enterprises incorporate basic EC initiatives, typically a website providing information on organisational background, email contacts, and information on product and services. These websites tend to be static and require little maintenance.

Phase P2:   SMEs add dynamic and interactive functionality to their use of EC.

SMEs demonstrate an interactive utilisation of EC on their website. Core internal business processes remain unchanged and EC initiatives are performed in addition to the core business. EC applications are not integrated directly into existing information systems and are often run as parallel systems.

Phase P3:   SMEs engage in substantial re-engineering of business processes to accommodate EC initiatives.

SMEs engage in an advanced stage of EC utilisation. These SMEs have an in-depth understanding of their business and what benefits EC technologies can provide. They have a clear EC strategy that links directly to their broader business strategy[1].

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[1] In some of the SMEs these strategies lacked formal documentation (ie. implicit rather than explicit).

Phase P4:   Virtual business enterprises.

SMEs have either restructured their traditional business to trade completely online or are classified as new Internet start-up businesses focusing their core market at the WWW. The use of EC is fundamental to business operations.

The focus of this paper is to explore the factors that influence SMEs ability to engage in e-Business transformations and more specifically influence their ability within any phases to benefit from engaging in EC. The identification of factors that affect SMEs ability to engage in e-Business transformation and derive benefit from EC is an important step in understanding the ability for SMEs to migrate between *Phases* or establish themselves within any given *Phase*. The paper explores these factors in two broad categories – internal and external to the organisation.

METHODOLOGY

An interpretative epistemology combined with a qualitative research design was deployed as the most logical and appropriate approach to capture information about the beliefs, actions, and experiences of SME participants in relation to their use of EC. Yin (1994) and Benbasat *et al.* (1987) have previously discussed the merits of using multiple case studies to provide replication logic and rich descriptions of emergent research areas. Although Yin (1994) supports the use of case research from a positivist view, his belief that case studies can be best used to explore "how" and "why" questions supports an interpretivist approach to using the case study strategy (Walsham, 1995). The interpretative direction of the research aimed to gain a deeper understanding of the phenomenon (Orlikowski and Baroudi, 1991), and the context of the inter-relationships apparent in the research setting.

Conventional techniques were deployed in identifying and selecting SMEs using EC. Forty SMEs were formally approached and thirty-four agreed to participate in the study. Following a detailed review of existing research into IT and EC amongst SMEs a semi-structured question frame was developed to explore the EC utilisation process. Background data was collected on each business, its associated internal and external trading systems and core/ target markets. Managers/ Owners were then asked a series of questions investigating the reasons for adopting EC and the current use of EC within the business. Associated questions addressed problems faced during or subsequent to EC adoption; organisational changes that occurred as a result of EC; benefits received from utilising EC; and, the direct impact of EC on business performance. An appraisal of existing IT/ EC skills and resources was also undertaken along with insights into future EC plans. The development process of EC applications and how these systems were supported and maintained was also addressed. Finally interviewees were asked to outline the incorporation of their EC strategies within existing business structures.

Each of the interviews was transcribed for further data analysis. Interview transcripts were analysed through three levels of coding based on grounded theory techniques. The analysis of the data revealed a range of uses for EC and an array of factors that impacted on the SMEs capacity to conduct EC. These factors can be analysed in two broad categories: factors internal to the organisation and factors external to the organisation.

DISCUSSION

Internal factors influencing SME E-business transformation

In Venkatraman's (1994) research a firm's ability to undergo organisational change internally is influenced by organisational and technological factors. Analysis of the data in this research supports the view that the Internal factors that govern an SME's capability to conduct e-Business transformation can be divided into two core categories; organisational factors and technological factors. In addition the organisational factors emergent from the data analysis can be further divided into factors that relate to *management* issues and the level of *internal resources* available for EC initiatives.

Organisational Factors

Analysis of the data suggests that organisational factors can be segmented into two sections; (i) Managerial Factors and (ii) Internal Resources Factors.

(i) Managerial Factors

The Role of Management

The role of management plays an important role in the implementation and utilisation of EC. Management skills, leadership qualities and strategic direction directly impact on the ability of a SME to engage in EC. Management skills relate to the attributes of the managers of each business. The level of enthusiasm for EC, interest in technology and EC were characteristics that reflect on the level of EC knowledge and understanding possessed by management in the case studies.

Leadership Qualities

The leadership qualities of management emerged as another important factor contributing to the utilisation of EC amongst SMEs. Managers that appeared to be proactive and entrepreneurial with regard to information and communication technologies were key drivers for EC within the organisation.

In all cases the owner/ manager was central to EC adoption and continued utilisation. In Phase 1, business managers acknowledge the potential value of EC but use it in a minimal manner. Regardless of SME size Phase 1 enterprises regard EC as contributing a minor but useful role in day-to-day business operations as a support tool. In Phases 2, 3, and 4 management identify economic value as justification for using EC. The owner/ managers are proactive in their use of IT and EC even though some of the owner/ managers consider themselves to be lacking in IT illiteracy.

Strategic Direction of EC

The strategic direction of EC can directly influence the degree of business transformation. Analysis of the data suggests that the use of EC can be classed as strategic or experimental. The strategic use of EC within the organisation is fundamentally likely to create greater organisation transformation than an experimental stance. The greatest benefits from EC will only accrue when SMEs treat EC as a strategic tool and engage in organisation transformation to leverage competitive advantage as opposed to an experimental utilisation of EC. The existence of an EC strategy (either implicit or explicit) can be an instrumental factor in determining how EC is use within the organisation of EC.

The strategic direction of EC varied across the phases. In Phases 1 and 2 utilisation of EC is experimental. EC is used as a complementary marketing and sales function, it is applied independently of existing information system processes and no formal integration exists between existing IT applications and EC endeavours. Thus potential benefits of increased efficiencies and cost reductions are absent. In Phase 3 EC is valued strategically with utilisation involving direct linkages into existing IS/ IT structures and EC strategic use aligned with implicit/ explicit business strategies aimed at acquiring efficiencies, cost reductions and improved customer service. EC is used to streamline existing business processes. In Phase 4 enterprises rely completely on web-based EC as their business infrastructure. EC is used as a strategic platform central to their business operations without which these enterprises would not exist.

Forging strategic alliances between SMEs can compliment an organisation's ability to derive organisational efficiencies. The use of EC is pivotal to the development such alliances and the support of virtual business transformations (Chau and Turner, 2001a).

(ii) Internal Resources Factors

The amount of internal resources available for EC activities significantly affects the ability to implement and support EC initiatives. The allocation of budgets, human resources and time directly influence the nature of EC developments and ongoing maintenance.

Financial Resources

Financial constraints have previously been cited in the literature as barriers to the adoption of EC (NOIE, 2000; Lawrence and Keen, 1997; Poon and Swatman, 1998). In this study the analysis reveals that the availability of financial resources plays a significant part in EC utilisation particularly amongst small and micro businesses, with owner/ operators developing their own EC websites to save money.

Human Resources, Time

The introduction of innovation requires time and personnel to integrate, train and maintain new systems within an organisation. SMEs that allocate existing staff to EC activities place extra constraints on existing staff duties. The costs of providing training and other change management functions entail additional cost that are potentially difficult to recoup. SMEs that have staff with inherent levels of technical knowledge provide additional benefits to the organisation by supplying in-house skills to help develop and maintain EC applications. For many of the small and micro businesses the owner/ manager took an active role in the development, implementation, utilisation and maintenance of the EC applications. If these services can't be provided in-house, the services may be out-sourced to external providers, incurring added expense. Some SMEs indicated that the knowledge gained from the EC development process provided unexpected advantages.

Technological Factors

The analysis of the data reveals two types of technological factors. The technological factors can be combined into technical issues relating to information technology and electronic commerce issues. It is an advantage for organisations to possess staff with technical skills and experience in both information technology and EC.

IT/ EC Skills and Experience

In this study several cases had management possessing various levels of IT/ EC skills. For some these skills were formally acquired while in other cases the skills set were self taught or acquired 'on the run'. The level of IT experience amongst the SMEs studied was varied but all had access to the skill sets required by drawing on basic IT skills acquired by necessity in the past, through family and friends or by developing their own skills.

In-house development can reduce EC costs and enhance in-house skills that may provide competitive advantage. The use of external developers often generates problems particularly where EC specifications have not been formalised or when the reported skills and services of developers and Internet Service Providers (ISPs) have been overstated. Although the medium sized firms studied had in-house IT officers or divisions their capacity to implement EC initiatives did not always result in a comprehensive utilisation of EC. This was partly due to the strategic approach to EC adopted by these medium sized enterprises, particularly in Phase 3 where the utilisation of EC was predicated on gaining on-going return on the EC investment.

IT Infrastructure

The IT infrastructure of SMEs included in this study ranged from stand-alone personal computers to wide area networks linked across Australia. For some cases a stand-alone computer set-up is all that is required to implement and utilise EC.

A single computer with Internet access was a typical IT configuration in four cases. For some SMEs, their home computer was used to develop and maintain their EC utilisation. The ability to host the website or EC applications did not emerge as a major hurdle for the some SMEs included in the case studies.

The issue of integrating EC functionality into existing back-office systems presented problems for several Phase 3 and 4 firms. If the software is not constructed to an open standard it presents problems for organisations trying to integrate EC functions into closed systems. Problems also arise for small and micro businesses using off the shelf accounting packages that try to integrate EC functions into these proprietary systems.

EC Infrastructure

EC security measures need to be considered when installing and developing EC hardware and applications. This issue is important particularly for Phase 3 and Phase 4 SMEs that may directly integrate EC functionality into back office systems especially when websites are hosted internally by the organisation. In some cases this issue was addressed by posting a mirror copy of the organisations database with the Internet Service Provider. This way the original master database is physically protected from attack. Although this provides some degrees of protection it limits the potential benefits accrued from EC. Another potential security risk arises in those organisations conducting online transactions. Internet fraud is problematic and hard to detect. One organisation operating an online store unfortunately experienced this criminal activity and incurred a financial penalty.

Security is a factor that needs to be addressed internally and conveyed externally to users of an organisation's EC applications.

Organisational:	**Technological:**
Management	*IT technical factors*
• Role of Management	• IT Skills/ Experience/ Support
Enthusiasm/ motivation for change	• IT Infrastructure
Management interest in technology	Hardware
EC Skills	IT Applications
Knowledge	Open/ Closed systems
Understanding	
• Leadership Qualities	
Driver for innovation/ change	
Pro-active	
Entrepreneurial	
• Strategic Direction of EC	
EC Objective	
Cost Reduction	
Revenue Generation	
Customer Relations	
Enhanced Communications	
Strategic Focus	
Experimental use of EC	
Strategic use of EC	
Use of Strategic Alliances	
Organisational:	**Technological:**
Internal Resources	*EC technical factors*
• Financial	• EC Skills/ Experience
Capital to invest in technology	EC development/ support
Capital to support on-going IT investment	Integration skills to combine back office systems
• Human Resources	• EC Infrastructure
Staff (technical knowledge, experience)	EC Hardware
Skills to manage EC	Security Issues
Training	EC Application
• Time	Customer Focus security

Table 1: Internal factors influencing SME EC business transformation

External factors influencing SME e-Business transformation

A range of external factors impacting on SMEs ability to acquire EC benefits also emerged from the data. Although these external factors are less significant in terms of influencing an SME's ability to engage in organisational transformation, they emerge as very important in terms of influencing an SME's ability to derive benefit from EC. The external factors can be distinguished by four categories: the nature of the supply chain; the influence of industry structures; the influence of external service providers and, the role of government. These are outlined in Table 2.

Nature of Supply Chain	External Service Providers
Level of automation in Supply chain	(IT/ EC consultants/ developers)
Communication methods used in supply chain	Level of Experience
Size and number of participants (critical mass)	Ability to understand organisational needs
	Level of service
Other participants internal factors	Available skill set
Industry Influence	**Government Support**
Level of industry support for change	Policy and EC framework
Information and Education	Type of Sector Strategy
Business Champions/ Drivers	Financial Assistance/ Encouragement

Table 2: External factors affecting SME ability to acquire EC benefits

Supply chain/ business partners

From analysis of the data, the level of supply chain automation remained generally low across cases. Most cases indicated that the primary form of communication with suppliers remained phone, fax and to a lesser extent email. The problem of critical mass was identified by many of the SMEs. Until a critical mass of suppliers actively using EC occurs across the supply chain, potential for EC benefit is reduced. Distributors and wholesalers included in the study expressed a desire to utilise more EC in doing business with resellers and other participants but recognised these resellers were not at the time capable. However SMEs with direct contact with consumers conducted more EC transactions. It was reported that the ability for individual SMEs to influence the supply chain environment is small. An explanation for this is that large firms dominate the industry and aspects of the supply chain.

Industry Influence

The case studies identified that none of the SMEs received or felt it purposeful to seek help from their industry in developing their EC initiatives and none of the cases mentioned industry support for change as having been significant. There was also a broad acknowledgment of the general lack of information, education and training provided via industry links on EC and its benefits. In relation to business champions the only comments made related to the relative lack of power of SMEs over the industry, its policy and approaches.

External Service Providers (IT/ EC consultants/ developers)

ISPs emerged as important support structures for hosting websites and in providing input in their development. The problems experienced by SMEs reflect on the poor level of service from ISPs that emerged as one of the largest external problems for SMEs utilising EC. This was particularly evident amongst SMEs with limited IT skills and experience. A lack of knowledge and experience by ISP/ EC developers was evident in three cases representing SMEs in different phases of EC utilisation. From the case studies, businesses that developed EC applications in-house had the least number of problems.

Government Support

Analysis of the case studies indicated that the level of government assistance had been only a minor factor in the development of EC adoption and utilisation amongst the cases studied. A number of government approaches were mentioned including: education and awareness programs for breaking down the barriers of misinformation and EC adoption fears; direct financial assistance in terms of capital funds to subsidise EC efforts helped a number of the small and micro enterprises. More generally the cases did reveal that other Government policies including tax and other initiatives was identified as potentially significant factors. These external factors effect the environment, which these SMEs operate. However the external factors do not directly affect the ability to conduct organisational transformation, although an exception to this exists where governments offer financial assistance or grants for SMEs to engage in EC initiatives, education and training.

CONCLUSIONS

This paper has explored those factors influencing SMEs ability to conduct e-Business transformation and benefit from EC within particular *Phases* as depicted in the *Four Phase Model of EC Business Transformation*. The identification of a range of factors that affect SMEs ability to utilise EC is an important step in understanding the how SMEs may migrate between *Phases* or establish themselves at any given *Phase.* The factors emergent in this study affect the capacity for SMEs to conduct organisational transformations and derive potential benefit from EC.

This paper has outlined a range of factors internal and external to the organisation that influence SMEs ability to acquire benefits from EC. The range of internal factors that emerged from the data, mirror some of the elements of Venkatraman's (1994) work on organisation transformation. Detailed analysis of these internal factors indicated that the mix of internal resources, attributes of management and technical ability of SMEs are important to the utilisation of EC by organisations included in this study. Factors that are external to the organisation, over which SMEs tend to have little control were also shown to directly affect the capacity to acquire EC benefits. These factors included the nature of the supply chain, external service providers, influence of the industry and level of government support. The combination of internal and external factors directly and indirectly influences the ability of SMEs to implement, utilise and maintain an EC operation.

FUTURE WORK

Further investigation is required to explore the combined influence of internal and external factors. This research suggests that individual factors or combinations of factors may apply forces that control relative positions of organisations within each phase of EC utilisation. Each of the factors identified in this paper can have an enabling or inhibiting effect on the ability of an SME to derive EC benefit or conduct EC business transformation. Further research identifying the range of enabling and inhibiting forces that these factors exert on SMEs will be conducted in the future. The mix of enabling and inhibiting forces generated by the interaction of these factors may determine the extent to which EC benefits and EC business transformation can be realised in each phase of EC utilisation.

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