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INNOVATION THEORIES IN RETROSPECT

The Case of Electronic Commerce Adoption in Small Business in New Zealand

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Abstract: A review of the technological innovation adoption literature on small to medium-sized enterprises (SMEs) provides useful insights into factors influencing innovation adoption but points to the need to introduce more determinants of innovation adoption to SMEs research. This research is interested in identifying these factors and hence, introducing more potential determinants to electronic commerce (EC) adoption research in SMEs. Therefore, this research attempts to extend the technological innovation theories to EC adoption research in SMEs by identifying potential constructs and factors from these theories and then checking their face validity using three case studies in New Zealand. This research endeavours to shortlist and discuss the most important determinants of EC adoption and to eliminate the least relevant ones.

Keywords: Innovation theories, electronic commerce adoption, SMEs, determinants of adoption, case studies.

1 INTRODUCTION AND JUSTIFICATION

The adoption of information technologies by individuals and organisations is part of the process of information systems implementation, which is a prominent area in IS research (Kwon and Zmud, 1987; Moore and Benbasat, 1991; 1996). Measuring potential adopters' perceptions of information technology innovation has been termed a “classical issue” in the innovation diffusion literature and a “potential key” for integrating different findings within diffusion research (Kwon and Zmud, 1987).

In view of the innovation adoption research in small business, the available research provides valuable insights into the adoption criteria of IS in small business (Premkumar and Roberts, 1999; Thong 1999; Thong and Yap, 1995; 1996). Therefore, extending the innovation adoption factors implemented earlier in countries such as the U.S and Singapore to new country-settings such as New Zealand would highlight significant features that are unique to the adoption culture of that country (Thong, 1999). The uniqueness of the New Zealand perspective however, stems from the fact that 84 percent of the New Zealand sector is dominated by micro enterprises employing up to five employees only (MOED, 2000), from the geographical isolation and from the time differences which separates New Zealand from the rest of the northern hemisphere, and from the small population in New Zealand (3.82 million) (NZStat, 2001). On the other hand, past research found that facilitation factors vary according to the innovation type (Swanson, 1994). Therefore, extending the prior innovation theories in small to medium sized enterprises (SMEs) to eCommerce (EC) adoption is unwarranted as EC introduces features that are unique to its perspective, which may not necessarily relate to IS as such. Features such as the external focus of EC with suppliers and buyers, security and legal concerns are some of the features that are unique to EC only.

2 RESEARCH PROBLEM AND OBJECTIVES

In supplementing factors developed in earlier IS adoption research in small business different researchers have highlighted the importance of introducing and testing the significance of new variables on innovation adoption (Fichman, 1992; Thong, 1999). Accordingly, this research is confronted with the following question: *How can factors extracted from the innovation literature influence EC adoption in SMEs?* That is, what are the most probable determinants of innovation adoption and then, how can those determinants explain EC adoption in SMEs? Therefore, the research objectives are to introduce additional determinants of innovation adoption and then to discuss their significance on EC adoption in SMEs in New Zealand. Adopting such an approach in this research could contribute significantly to the technological innovation literature, the development of appropriate factors that relate to EC adoption in SMEs and hence, safeguard against any failure in missing out the effect of an important determinant/s on EC adoption.

3 POTENTIAL DETERMINANTS OF INNOVATION ADOPTION IN SMEs

In view of the innovation theories, Rogers' (1995) model appeared to be the most widely accepted model by researchers in identifying "perceived" critical characteristics for innovations in IS research in general, and on SMEs research in particular (Iacovou et al., 1995; Kaplan, 1999; Karahanna et al., 1999; McGowan and Madey, 1998; Moore and Benbasat, 1991; 1996; Premkumar and Roberts, 1999; Thong 1999). Rogers (1995) identified five significant characteristics of the innovation that influences its adoption: relative advantage, compatibility, complexity, trialability, and observability. However, the same researchers who endorsed Rogers' (1995) model (above) contend that Rogers' model should be blended with other contexts/factors in order to provide a more holistic adoption model (For full details about criticisms for Rogers theory refer to Attewell 1992; Chau and Tam, 1997; Larsen and McGuire, 1998; Moore and Benbasat, 1991; 1996). However, Van de Ven (1991), Fichman and Kemerer (1993), and Kwon and Zmud (1987) argue that the innovation attributes not only play an important role on its adoption in organisations, but also support its post- adoption stages as well. They even extend their argument to include the adoption of complex technologies. Understandably, the strength of Rogers' model could be complemented with other contexts in order to gain a more holistic understanding about IS innovations in organisations (Fichman and Kemerer, 1993). This is necessary to minimise the risk of adoption failure (Larsen and McGuire, 1998).

The innovation literature also emphasises the importance of environmental, organisational, and technological characteristics on IS adoption (Chau and Tam, 1997; Rai and Bajwa, 1999; Tornatzky and Fleischer, 1990). Kwon and Zmud (1987) in their review of the technological innovation literature identified the importance of Rogers' (1995) characteristics and introduced five influencing contexts: innovation, organisational, environmental, individual, and task (task structure, autonomy, uncertainty) factors. In review of the IS adoption literature in small business, the available adoption models provide essential influencing factors on IS/IT adoption in SMEs (Table 1). As there are few adoption studies tackling innovation adoption in SMEs, it is necessary to revisit the different contexts in light of the innovation theories in order to propose potential determinants of EC adoption in this research.

Table 1. Research on IS/IT adoption by SMEs

Contextual Effects						
Author	The manager	Innovation characteristics	Organisational characteristics	Environmental characteristics	Essential influencing factors	Most influential factors
Thong and Yap (1995)	The CEO: CEO's innovativeness CEO's IT knowledge CEO's attitude towards adoption of IT		Size. Information intensity.	Competition (Rivals).	CEO's IT knowledge. CEO's attitude towards adoption of IT. Size. CEO's innovativeness.	Size.
Thong and Yap (1996)	The CEO: CEO's innovativeness. CEO's Attitude towards IT.		Employee's IT knowledge. Information intensity.	Competition (Rivals).	Employee's IT knowledge. CEO's Attitude towards IT. CEO's innovativeness.	Extent of adoption: Employee's IT knowledge. Information intensity.
Thong (1999)	The CEO: CEO's innovativeness. CEO's IS knowledge.	Relative advantage. Compatibility. Complexity.	Size Employee's IS knowledge. Information intensity.	Competition (Rivals).	Size. Relative advantage +Compatibility. CEO's IS knowledge. Employee's IS knowledge. CEO's innovativeness.	Extent of adoption: Organisational characteristics in general (Size, employees' IS knowledge, and information intensity) and size in specific.
Premkumar and Roberts (1999)		Relative advantage. Compatibility. Complexity. Cost.	Size. Employee's IS knowledge. Top management support.	Competitive pressure from rivals. External pressure from suppliers/buyers. External support from IT vendors. Vertical linkages (tight integration with another firm)	Relative advantage (+Cost). Top management support. Size. Competitive pressure.	Relative advantage.

3.1 Technological (Innovation) Context

As noted in Table 1, some of Rogers' (1995) factors were considered by IS adoption research in SMEs and hence, including the remaining factors of Rogers' (1995) model is deemed appropriate in this research. Tornatzky and Klein (1982) examined the relationship between innovation characteristics and innovation adoption and found cost as a significant factor on adoption as well. Although Rogers (1995) suggested that "image" could be explored within the relative advantage characteristic, it was highlighted as an autonomous determinant in recent IT research (Moore and Benbasat, 1996).

3.2 Organisational Context

Research on IT adoption identifies many organisational factors that would influence IT adoption. Kwon and Zmud (1987) found the following as the main factors that influence IT adoption: top management support, size, quality of IS, user involvement, product champion, and resources. These findings are also endorsed by recent literature tackling SMEs (Premkumar and Roberts, 1999; Thong 1999; Thong and Yap, 1996). Damanpour (1991) found that organisational innovativeness (adopting innovations) correlated positively with business specialisation and external (publishing and media) and internal (from peers, employees, friends, etc.) communications. On the other hand, in small businesses the CEO (usually the owner) is the central authority and the decision-maker and the one who provides support and resources for the adoption and diffusion of IS (Blili and Raymond, 1993; Thong, 1999; Thong and Yap, 1995). Therefore, the top management support and the product champion characteristics are investigated under the individual (CEO's) context next. However, top management support would be addressed if any of the studied cases were found managed by a group of managers.

3.3 Individual Context

Individual characteristics of the CEO, such as education, age, experience, and psychological traits have been found to strongly influence innovation adoption (Rogers, 1995). Thong (1999) and Thong and Yap (1995; 1996) considered individual characteristics represented by the chief executive officer (CEO) as an essential part in IT adoption in SMEs. They found that the CEO's innovativeness (e.g., introducing new original ideas, always looking for something new rather than improving something existing, and risk taking) and IT knowledge (computer experience and computer awareness) has a positive effect on IT adoption. Therefore it was important

to explore the impact of the CEO's innovativeness and the CEO's IT knowledge on EC adoption.

3.4 Environmental Context

Thong (1999) found competition influencing IT adoption in small businesses to be insignificant and interpreted that on the basis that Singapore SMEs existed in similar competitive environments and hence, possessed similar perceptions about competition on IS adoption. On the other hand, Premkumar and Roberts (1999) found the competitive pressure factor influencing IT adoption to be significant. They found vertical linkages were tightly correlated with son-parent type organizations and external support (from consultants, vendors) to be insignificant in IT adoption. This research is interested in exploring the government's role on EC adoption in SMEs in New Zealand because research in SMEs showed that government incentives lower the barriers to computerisation and make it more attractive to SMEs (Yap et al., 1994).

4 RESEARCH METHODOLOGY

This research is exploratory in nature in the sense that there is no prior research in New Zealand to guide this research endeavour. Accordingly, this research attempts to use the case study approach to investigate the effect of the developed determinants on EC adoption in SMEs in New Zealand and to explore the EC adoption criteria using three case studies.

Historically, researchers tended to categorise methods hierarchically and argued that case studies were appropriate for the exploratory phase of an investigation only (Yin, 1994). Vidgen and Braa (1997) introduced an IS research framework where they classified the different methodologies according to their intended research outcomes: positivist, interpretivist, and interventionist. An overlap among these purified research disciplines (paradigms) would depict hybrid methodologies: quasi experiments, hard case, and action case. According to the preceding taxonomy, Yin's (1994) case study approach matched the one depicted by the hard case methodology. In an introduction to Yin's (1994) book, Donald Campbell (in Yin 1994: pp. ix-xi) indicated that near the positivist stance, Yin (1994) "epitomizes a research method for attempting valid inferences from events outside the laboratory while at the same time retaining the goals of knowledge shared with laboratory science". He commented that near the interpretivist school, Yin (1994) adopted an implicit positivist stance in describing case study research and hence, immersed himself in the classical social science cases studies. Yin's (1994) views are that case studies are the

preferred research strategy to answer how and why type questions and using interviews would also is acceptable by the interpretivist school (Walsham, 1995). Thus, attempting to provide a balance between understanding and prediction, of subjectivity and objectivity. Accordingly, this research adopts Yin's (1994) multiple-case (comparative) design in studying three single units of analysis (holistic). Semi structured and structured interviewees were conducted with the managers of three SMEs in New Zealand between July 2000 and December 2000. Table 2 provides different organisational information about the three cases. Interviews were recorded on audiocassettes and notes were taken. The Web sites of the different cases have been analysed as well. The interviewed SMEs reviewed a draft of the research (during the composition phase) to validate interpretations and conclusions made.

Table 2. Organisational information about the cases

No.	SMEs	SelfStor	ShipBrok Limited	AerialMap
1	Base	Auckland	Auckland	Auckland
2	Branches	5 branches – Auckland based	One in Sydney	One in the South Island (Flying base)
4	Business description	Self storage services	Shipping brokerage (ShipBrok) Commodity trading	Aerial photography and mapping
5	Annual turnover (NZ$Million)	4.6	4	3
6	Organisation size based on number of employees (FTEs)	23	Auckland: 4 Sydney: 3	42
7	Age of Web site (months)	12	6	4
8	Customers	General/retailer	Specific	Specific

Table 3 shows the different adopted EC technologies across the three cases. Most of the cases were found to be adopting email for internal and external communications and Web sites. Technologies such as FTP, Telnet, email lists, Bulletin Boards were not quite clear to all of the cases in terms of their definitions and functionalities, and the researcher had to explain those to the interviewees in order to get their responses.

Table 3. Adopted Internet technologies across the cases

I	Internet technologies	SelfStore	ShipBrok	AerialMap
1	Communication technologies	Adopted (duration)	Adopted (duration)	Adopted (duration)
	Internal email	X (1.5 years)	X (1.5 years)	X (3 years)
	External email	X (1.5 years)	X (1.5 years)	X (3 years)
	Email lists (List servers)	-	-	-
	Bulletin boards (Usenet)	-	-	-
	Others	-	-	-
2	Searching/retrieving tools			
	FTP	-	-	X (2 years)
	Telnet	-	-	X (2 years)
	WWW browsing (through Microsoft explorer or Netscape)	X (1.5 years)	X (1.5 years)	X (3 years)
	Others	-	-	-
3	Communication infrastructure and applications			
	Intranet	-	-	X (1 year)
	Extranet/VPN	-	VPN (1 year)	-
	Internet based EDI	-	-	-
	Web site	X (1 year)	X (6 months)	X (4 months)
	Others	-	-	-
4	Internet enabled technologies for commerce			
	Mobile data systems Teleconferencing Video conferencing	None.	None.	None.

5 RESEARCH ANALYSIS

In view of the depicted determinants above, it is worth noting here that it is quite impossible to investigate the effect of all of the depicted determinants on EC adoption in great detail in this research. Upon completing the interviews and data analysis, the researcher was able to discard the insignificant factors (Table 4) earlier on. Such an approach gave the researcher more confidence in not missing out a potential determinant of adoption and more space to concentrate and expand on the most important factors on the adoption decision of eCommerce (Table 5, detailed next).

Table 4. Insignificant factors on EC adoption

Technological context

- Observability: although, the degree to which, results of using EC are observable to SMEs through the media, that did not mean anything to the adoption context of each of the three SMEs. The interviewees highlighted that by reviewing relevant magazines to their businesses, there were some advertisements for EC but there was nothing specific about EC to their business.
- Trialability: this factor was seen by the cases as irrelevant, not applicable, and simply they would not do it. They do not have the time to trial EC and suspected that the EC vendor/supplier would accept that. None of the cases were found to be adopting such an approach. ShipBrok commented, "as we were already in an environment using electronic mailing, it was not necessary to experiment or trial with the internet before switching over".

Organisational context

- User involvement: the different SMEs indicated that computerisation in their organisations was not sophisticated to be of any concern to employees and the fact that only few employees are running the computer system.
- External/Internal communications: external/internal communications from peers or/and media, internal networking, etc. were not perceived by any of the cases as influencing their adoption decision and therefore, were not represented in any of the three cases. Maybe due to the busy nature, centrality of decision-making (CEO), and to the small number of employees in SMEs (Blili and Raymond, 1993), this factor did not appear as significant.
- Quality of IT systems and capability: none of the cases retained complete or integrated IS system/s in house. The cases pointed to the existing gap between EC and IS and the fact that both were related but quite differently. Firstly, despite the simpler IS systems (and not integrated) in place, none of the cases reported that this could have prevented them from exploring and adopting EC. Secondly, the managers of the different cases indicated that in order to have full functional EC, integrating EC with the different IS systems in place (e.g., accounts, HR, inventory, etc.) is essential in order to deliver full EC functionality and benefits. However, the cases envisioned achieving such integration in the long run and hence, did not stop them from exploring and adopting EC in the first place. However, it was not clear when the SMEs would achieve such integration (or whether they would do it!)
- Specialisation: the different cases did not perceive EC assisting in furthering their specialisation. It seems that this factor relating to IS more than to EC and this in turn found to be related to industry/product specifics like in the case of AerialMap as opposed to ShipBrok as explained above. For instance, AerialMap's is a specialised business and relied heavily on information processing. This specialisation is built on state of the art technologies such as networking and GIS system and not on EC.
- Top management support: from the analysis made, it was suggested that the presence of EC in the cases correlated positively with the presence of an enthusiastic manager (usually an owner as well) in order to guarantee EC adoption. Thus, making the adoption decision for EC not related to top management support as such.

Environmental context

- Vertical linkages: none of the cases were engaged in son-parent type business relationship. Future research targeting a larger SMEs sample could test for this factor.
- The role of the government on EC adoption: there was no apparent role played by the government on the adoption decision of the three cases. The interviewees highlighted that they were not aware of any government initiative or training programme aiming at introducing EC to businesses in New Zealand.

Table 5. A theoretical framework made of potential determinants of EC adoption

Innovation characteristics:	**The Environment:**
Relative advantage Cost Complexity Compatibility Image	Competition from other companies in the business (Rivalry) External pressure (from Suppliers/buyers) External Support (Technology vendors)
Individual characteristics:	**Organisational characteristics:**
CEO's innovativeness CEO's IS/IT/EC knowledge	Size Information intensity

5.1 Technological Innovation Context

5.1.1 Complexity

All cases indicated that the different software tools and packages within EC (i.e., Microsoft outlook email software, VPN, browsers, Intranet, Web site) overwhelm SMEs with a huge knowledge stream that they cannot cope with. The cases indicated that they were not used to dealing with such a range of technologies before. Above all, such technologies kept changing all the time and coping with these changes was quite challenging and would raise complexities and incompatibilities issues pertaining to EC within their organisations. For instance, AerialMap had to change ISPs several times because they were not able to configure the ISDN connection properly and effectively. AerialMap described the preceding experiments as complex and as very expensive as they had to pay dearly for an open ISDN connection (24X7), which should not be the case and they should have been able to use the dial-up option. AerialMap emphasised that registering their domain name with different search engines was a very complex task as their trading name and business details were very difficult to search for in the different search engines. ShipBrok commented, "…. Mastering EC vocabularies and terminologies and understanding and knowing EC products is a very difficult task".

5.1.2 Compatibility

SelfStor indicated that most of their resident employees at the five branches in Auckland were between the ages of 50-55. Those employees were not used to working with computers in the first place, thus resistance was expected, and this highlights incompatibility in the case of SelfStore. However, the manager of SelfStor emphasised that the adoption decision is an organisational issue and employees had to comply with management

decisions concerning the adoption of new technology. AerialMap employees are mostly computer programmers and operators and hence, viewed EC as compatible with them. ShipBrok had few employees who felt any incompatibilities with EC. However, they raised the lack of receipt confirmation over the Internet for legal purposes as a concern when adopting email. Other than the preceding concern, details concerning legal, lack of standards and security concerns from hackers and viruses were not quite clear to the cases, as they were not extensively involved enough with EC to feel the effect of these factors on their online businesses (e.g., selling, buying, collecting money online, etc.). Thus, showing little knowledge about some of EC's major implications. During the interviews, the cases highlighted that such issues did not interfere with their adoption decision for EC. However, the cases revealed that this would represent a hurdle in the long run when their Web sites start selling and generating revenues. The cases referred to viruses and spam as concerns but would not hinder EC adoption. Over all the interviewees looked at this factor as a deterrent in the long run.

5.1.3 Relative Advantage

"EC is expected to generate more enquiries about our products and services from potential customers. There are no immediate positive results but EC allows for greater exposure of our company to the wider world" (ShipBrok). All cases emphasised the cost-benefit analysis as being important in making the adoption decision for EC. They perceived investing on a Web site as a long-term investment and immediate return on investment (ROI) was not anticipated in the near future. AerialMap perceived that they would run their Web site with losses for two years. ShipBrok even questioned the investments made on EC infrastructure and upgrades as being too expensive to justify financially. However, ShipBrok highlighted one advantage by commenting, "…EC is more effective than traditional methods of advertising". SelfStore expected the number of potential sales through their Web site to be less that 3 percent, which cast doubt about the effectiveness of such EC initiatives in generating sufficient profits to SMEs. On the other hand, the interviewees suspected that the preceding depressing perceptions about the effectiveness of EC could prevent them from making investments on their current EC initiatives. They all emphasised the importance of email as an efficient external communication tool with their business partners. The cases emphasised that the Web sites could provide new opportunities by advertising and publishing relevant information about the company's products and services on the Web.

ShipBrok stressed that, "our business is quite different, we cannot sell our products over the Web as our business is based on personal contacts and

established relationships…....yes, the Web might be suitable to sell our commodity range of products but only time can tell if we can expand on this business or not through the Web". It was suggested that the industry/product specific perspective is quite apparent in adopting certain EC technology more than the others? For ShipBrok it was the communication perspective (email) and remote and secure login (VPN) to the company's internal network. For instance, when ShipBrok's interviewee was asked about the reason for not adopting Extranet and/or EDI he commented, "….because the nature of the business does not require or encourage too close a bonding…". For AerialMap, the Web site could introduce different business opportunities and revenues and therefore, AerialMap was very keen to develop a professional Web site. As they retained larger number of employees, adopting the Intranet was quite logical to AerialMap in order to streamline lots of the internal manual and paper-based transactions.

EC was perceived to enhance organisational image in the different cases and therefore, EC would influence adoption positively. The interviewees highlighted the importance of the image factor on their adoption decision for EC. Having an email address on business cards and letters and most importantly a Web site (URL) would project high organisational image and would position the cases at a higher position than their competitors. It indicates a lead in technology, which could highlight professionalism as well. "…..It is the buzzword that attracts the attention of media, customers and competitors….", as highlighted by AerialMap.

5.2 Organisational Context

5.2.1 Size

The researcher in this research crossed the organisational size of the different cases with the adopted EC technologies (Tables 2 and 3) and found that organisational size correlated positively with EC adoption and with adopting more EC technologies in the case of AerialMap. AerialMap had 42 employees and their environment relied heavily on information processing of aerial photos and satellite imageries. SelfStor like AerialMap had a large number of employees and therefore, it was expected that SelfStor would adopt EC more than ShipBrok, which maintained a few employees only. However, ShipBrok's EC initiative was more serious and extensive than SelfStor. SelfStor emphasised that the main objective of having the Web site is to lure customers to their physical stores and therefore maintained simple Web design in terms of the number of pages and the information provided. On the other hand, the business needs (their customers) of the charter broker (ShipBrok) encouraged the introduction and the integration of email into

their business, which points again to the above industry/product specifics and to the dominant significance of certain factors on EC adoption "customers" and "individual context" (discussed below). Therefore, size was not found to be conclusive in the case of EC adoption in this research.

5.2.2 Information Intensity

The analysis suggested the triviality of the information intensity factor on the adoption decision of EC. SelfStore's information processing environment was not intensive and they perceived this factor as irrelevant to EC adoption. AerialMap's information processing environment was intensive and relied heavily on IT in processing imagery data (Geographical Information Systems (GIS)) but that did not relate to EC adoption. Even in the case of adopting the Intranet, AerielMap stressed that the Intranet (once fully developed!) would be used in different types of applications other than processing and sharing imagery data. ShipBrok's processing environment was less intensive but relied heavily on communications with their international partners using email and VPN which, points to the product-specific perspective. The last two cases pointed to the information part pertaining to their products and services. For instance, AerialMap enthusiastically emphasised the possibility of selling their library of New Zealand photos through their Web site very easily due to the possibility of digitising (scanning) these photos where customers could easily pay for these photos and download them at the same time. Thus, making this factor not relating to EC as such and hence would not influence EC adoption. However, looking alongside the information content of products and services (the product, the process and the delivery agent (Choi et al., 1997)) could yield more useful results.

5.3 Individual Context

5.3.1 CEO's Innovativeness

Despite the lack of tangible benefits in the short term, the managers of the different cases showed keen interest in adopting EC and in embracing the different automation and EC initiatives in their organisations from the initiation phase till adoption, which further endorses the innovative perspective across the cases in adopting EC. It was suggested from the interviews, the manager of AerialMap showed the highest enthusiasm for EC followed by the manager of ShipBrok and SelfStor, respectively. Driven by his keen enthusiasm for EC, the manager of AerialMap received training courses on developing Web sites and involved himself in developing the

organisation's Intranet along with another technical person in the organisation and he even shared in designing and developing the pages of their Web site with their contracted Web designer. He was still considering establishing a VPN link with the remote branch and enhancing and integrating the Intranet and the Web site with their existing legacy systems. However, the manager stressed that he was not rushing things concerning the different EC initiatives and he is taking things slowly.

5.3.2 CEO's IT Knowledge

It is suggested that adopting EC in the case of AerialMap is driven by the manager's interest and enthusiasm about the technology otherwise, he would not have allocated all that time to train himself and to trial with EC. The manager confirmed earlier that he expected to incur losses from the Web site for the next two years before it breaks even and even then, he was not sure about the future. This may justify his relaxed mode in experimenting with EC rather than allocating professional resources and expertise behind EC. The other cases pointed to their lack of knowledge about EC and hence, would rely on technology vendors to grasp some of the perspectives and to provide the necessary information to make the adoption/rejection decision. Therefore, making their adoption decisions for EC was not related to their knowledge of EC as such. There are two issues emerging alongside this factor. Firstly, for the less knowledgeable managers in EC, this will not impede them from adopting EC, as they would resort to experts in the field to complement this lack of knowledge about EC. Secondly, for the knowledgeable manager this would accelerate the decision making process pertaining to adoption, whether to adopt or not. Being a knowledgeable person with technology, AerialMap's manager opted not to reject EC but however, pursued an experimental path in having EC. Therefore, it is suggested that knowing about EC was not a main driver for effective adoption of EC, simply because the managers would not have that great a knowledge about EC and business models in the first place, as confirmed by recent research in New Zealand (Chapple, 2002; Deloitte, 2000; PWHC 1999), or about its returns to the business.

5.4 Environmental Context

5.4.1 Supplier/Buyer Pressure

All the cases indicated that their buyers drove their automation processes including the adoption of EC and hence, perceived it significant. However, their suppliers did not influence their adoption decision of EC, as none of the

cases were found to be dealing with major suppliers. The cases indicated that it is quite logical to take whatever steps necessary to adopt technologies that could attract more business from their existing customers and maintain their loyalty by making their shopping experience more convenient or introduce new business opportunities and online customers. On the other hand, if the different customers were not EC ready or interested in conducting business over the Internet, SMEs would not be motivated to go into EC or at least would impede the progress of their EC initiatives. SelfStor and AerialMap believed that their Web sites could attract more customers to their business in the long run however, were not in a position to confirm that. ShipBrok adopted EC as their buyers dumped Comtext and started using Internet email. However, their Web site proves to be a failure and it did not generate any business for them but ShipBrok kept it running due to the low hosting costs. The content of their Web site is not updated as such.

5.4.2 Competition

The cases were major players in the marketplace and hence, maintained that leadership in the marketplace required a closer look at their competitors but however, the cases emphasised that competition is not significant on their adoption decision for EC as such. SelfStore indicated that once they adopted a local software solution to manage their storage systems the rest of their competitors imitated them and adopted the same software from the same supplier. SelfStor perceived that adopting EC could endorse their leadership in the marketplace but however, not as a direct response to their competitors. EC was perceived by AerialMap as a necessary step in order to keep their leadership in the industry. ShipBrok on the other hand, did not perceive this factor significant on their EC adoption decision and related that to the international nature of their business and the fact that adopting email was a strategic necessity in order to stay in business.

5.4.3 Technology Vendors

The cases maintained negative perceptions about the performance of technology vendors. They confirmed that they dealt with different vendors for the ongoing support of their equipment but the deliverables were very disappointing. ShipBrok indicated that they were forced to live with that shortcoming for a long time. Their internal applications stayed dormant for many years and reached a level where they could not invest any more in supporting such systems. The VPN server kept failing all the time without any obvious reasons or justifications from the vendor's side. AerialMap delayed the live launch of their Web site for a couple of months due to technical problems with the ISDN providers and changed ISPs three times

until they settled eventually with a local wireless radio communications provider. It is suggested that the preceding argument and comments could be further aggravated by the lack of detailed knowledge about EC at both the technology vendors and the cases.

6 DISCUSSION AND FUTURE WORK

In addressing the professional implications in this research, EC is recent innovation and hence, represents a complex phenomenon to SMEs. There is not detailed knowledge about its different perspectives and models (Abell and Black, 1997; Abell and Lim, 1996; Deloitte, 2000; PWHC, 1999). The interviewees' raised different "compatibility" issues facing the wide success of their EC initiatives in the long term, e.g., the age of their employees, legal and security concerns. The SMEs did not anticipate many advantages out of their EC initiatives in the short term. However, they perceived EC to be an efficient communication tool (e-mail) with their customers, a secure access (VPN) to their remote internal databases, a Web presence to promote the company's physical location and products, and as image enhancement tool. It was suggested that larger organisations are more capable of adopting EC and different EC technologies than smaller ones. The SMEs' viewed their products as suitable to EC generally. The role of the CEO's innovativeness in adopting EC has been demonstrated in the different cases and in the case of AerialMap specifically. Suppliers and buyers could influence adoption significantly, but the cases did not have any major suppliers or many online buyers to further or to speedup their EC initiatives. They would not adopt EC as a direct pressure from their competitors and the cases perceived technology vendors as incapable of providing adequate services.

The interviewees did not report these impediments as hindering their adoption decision of EC. Their EC initiatives were not complex or incompatible or costly. This could be attributed to the simple EC initiatives in the cases. The suggested significance of the CEO's innovativeness makes the adoption decision in the hand of the CEO of the SME. The other suggested significant influencers such the relative advantage, size, product suitability to the Internet, and supplier/buyer pressure did not appear as conclusive to the adoption decision. This again could be attributed to the simple and experimental EC initiatives and hence, leading to the conclusion that EC in the cases was not viewed as critical or as a strategic tool. Due to the reported lack of tangible benefits in the short term by the different cases, it is suggested that at this limited level of EC adoption across the different cases, EC could not achieve any competitive edge to any of the cases. On the other hand, the reported enthusiasm about adopting EC and being in the EC playing field by the different cases points to the strategic necessity of EC to

the cases and not to its strategic advantage. The cases enthusiastically stressed the need to explore EC and to have an on online presence in order not to be left alone when eCommerce diffuse in the future. Therefore, they were interested in maintaining investing on their simple EC initiatives, as long as such initiatives did not exhaust their resources. This points to the CEO's innovativeness in identifying this reality and in taking the risk to proceed with the EC investment. It was suggested that complexity, compatibility, and cost could play significant role on EC adoption in the long run when the Web sites are successful and generating revenues. Size and the product specifics could play a motivating role on adoption. It was suggested that the supplier/buyer factor could play the main driver for adoption. Although it could be argued here that certain industries (suitable products to the Internet) could adopt EC more than others and that the lack of online buyer/supplier and support from technology could further aggravate the adoption decision, however, more work is needed to further the CEO's innovativeness to take the next step towards the advanced EC initiatives.

These issues are of significant importance to SMEs, policymakers, and professional (consultants, education institutions) in New Zealand and elsewhere. The rich insight provided by the different cases, is of valuable resource to those interested parties and to SMEs specifically who are interested in adopting EC. This could be of interest to large organisations as well. The impediments pertaining to the EC technology (e.g., Rogers' (1995) factors, e.g., complexity, compatibility) are not limited to SMEs only and larger organisation could face similar circumstance alongside these factors. However, the difference between large and small businesses is fundamental as highlighted alongside the other contexts in this research. Initially, larger enterprises have better resources (finances, employees, experts) than smaller ones, which could lessen the impact of many of these impediments. For instance, larger enterprises are more capable to invest extensively, allocate time and experts, trial with EC technologies, and to sustain these experimental and risky investments much longer than smaller enterprises.

In addressing the theoretical implications in this research, technological factors such as the observability and trialability play no significant role on EC adoption in SMEs and hence, only the complexity, the compatibility, and the cost factors play a significant role on EC adoption in the long term. The insignificance of Rogers' (1995) observability and trialability on adoption is found to be consistent with the findings of prior research (Tornatzky and Klein, 1982). Recent IS adoption research in small business reported the same as well (Premkumar and Roberts, 1999; Thong and Yap, 1995; 1996; Thong, 1999). Image was suggested to play a supplementary role on EC adoption in this research. At the organisational level, factors such as user involvement, external/internal communications, quality of IT systems and

capabilities, and specialisation were found to influence adoption insignificantly. The information intensity and support from top management were found to point to information content of products (point to industry-specific as well) and to the CEO's role on adoption, respectively. The size factor was not conclusive but pointed to the importance of the organisation's size in adopting EC and in adopting different EC technologies. Future empirical research that addresses the information content of products and the organisation's size and development of more accurate measures could yield more insights. Controlling for the industry-specifics could yield more accurate results to the different SMEs' sectors. At the individual level, CEO's innovativeness played an important role on EC adoption in SMEs. CEO's knowledge with EC was viewed as influencing adoption positively but SelfStor and ShipBrok pointed to their lack of detailed knowledge about EC. Thus, suggesting that the CEO's innovativeness was more significant to adoption than the CEO's EC knowledge. Having an enthusiastic CEO with a vested interest in EC and a willingness to involve himself/herself in EC from initiation until finalisation will increase the chances of EC adoption and success in SMEs. At the environmental level, factors such as the government's role in promoting EC adoption in SMEs and vertical linkages did not play any significant role? The cases emphasised the importance of the pressure from supplier/buyer on their adoption decision of EC. However, the cases did not report having any major suppliers or many online customers to justify the adoption decision or in having huge investments on EC. Their competitors did not drive EC adoption and technology vendors would influence adoption negatively.

This research attempted to revisit the technological innovation literature and to introduce relevant significant factors to EC adoption research in SMEs. Researchers in different countries are encouraged to revisit these factors and to assess their importance from the context of their countries. This research suggested the importance of certain factors and the irrelevance of other factors to the adoption decision of EC in SMEs in New Zealand. Such an approach could create the foundation for future research aiming at investigating EC adoption in SMEs utilising the suggested determinants and hence, build on this research's results. The case study approach showed its strength in exploring the impact of innovation factors on EC adoption in SMEs and in generating rich insights around the different proposed determinants of adoption. This is of great importance to parties interested in SMEs and to researchers and policymakers specifically interested in identifying potential determinants of EC adoption in SMEs. However, concluding the significant factors or the most significant ones on EC adoption was not possible from limited cases in this research. It is worth investigating these suggestions further by undertaking large empirical work

targeting large SME's sample (e.g., survey, more case studies) either in New Zealand or elsewhere.

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