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# E-Commerce Adoption in Small Businesses: Cases from New Zealand

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## ABSTRACT

*Electronic commerce (EC) adoption in small to medium-sized enterprises (SMEs) is confronted with different difficulties. This is due to reasons relating to the SME's structure and to their surrounding environment. This research is interested in identifying factors influencing EC adoption and success in SMEs. A review of the technological innovation adoption (TIA) research in SMEs provides useful insights into factors influencing adoption. Thus, this research attempted to achieve two main objectives. Initially, this research examined the prior TIA factors in order to check for their relevance to EC adoption research in SMEs and accordingly, developed an adoption framework made of fifteen factors. Secondly, this research attempted to examine the impact of the developed framework on EC adoption in three New Zealand (NZ) SMEs. The research findings and the emerging implications suggested the weakness of the EC phenomenon in NZ SMEs and pointed to a unique perspective concerning the adoption context of the cases. These issues are discussed in this research raising different theoretical, methodological and professional contributions and implications.*

*Keywords: Technological innovation theories, SMEs, electronic commerce adoption, case studies, New Zealand.*

## INTRODUCTION

Small to Medium-Sized Enterprises (SMEs) are attributed to the introduction of most of the inventions and innovations (Cameron & Massey, 1999; Iacovou, Benbasat & Dexter, 1995); constitute more than 95 percent of the enterprises and account for more than 60 percent of employment in their countries (OECD, 1997). For example, Grandon and Pearson (2004) found that US SMEs constitute more than 99 percent of the enterprises and account for more than half of the employed workforce and produce two-thirds of the new jobs. SMEs in the United Kingdom (UK) represent over 95 percent of all businesses, employ 65 percent of the workforce and produce 25 percent of gross domestic product (GDP) (Ballantine et al., 1998). In New Zealand (NZ), SMEs form a significant component of the economy output (35%) in terms of the number of firms (96%) and number of employees (41%) (MOED, 2000).

It is believed that the Internet and eCommerce (EC) provides different opportunities to the small sector such as gaining access to international markets and as to overcome inherent internal problems related mostly to their limited resources and weak organizational structure (Blili & Raymond, 1993). Poon (1999) has defined small business EC as "the use of Internet technology and applications to support business activities of a small firm." Santarelli and D'Altri (2003) found that both mail order and EC reduce a buyer's cost of finding suppliers and that the Internet

provides buyers with better information about product characteristics such as prices and availability. However, EC is more efficient than other forms of distribution when the goods/services involved in the transaction can be digitized and delivered online. Further, EC may be associated with lower distribution costs in the case of search goods, or of those goods and services which do not require much information to the customer. However, they contended that EC will never acquire a significant share of the market in the case of experience goods which cannot be inspected directly via the Internet. Santarelli and D'Altri (2003) deduced that by making good use of the knowledge base and the skills needed to deal with the information and communication technologies, SMEs may benefit from adopting EC to reduce their market entry and distributive costs, and to reach a higher number of potential customers.

However, in view of the EC literature it was found that the few available EC research in SMEs indicated that SMEs opted to dwindle behind large enterprises in adopting or using IS or EC strategically in their businesses (Levy, Powell & Yetton, 2002). In looking for reasons for such slowness in adopting technological innovations in SMEs, researchers reported the weakness of the sector at different organisational and managerial (organic and central organisational structure and decision-making), technological, individual (central role of the CEO) and environmental (new technology, technology vendors, consultants, competition, supplier/buyer, rivals, newcomers, substitute products) levels (Blili & Raymond, 1993; Poon, 1999; Thong, 1999).

Therefore, knowing the reasons behind such laggardness and slowness in adopting EC in SMEs in different countries in the world is very important and represents a complex issue at the same time, as each country has its own unique adoption/diffusion setting. Therefore, looking at the EC adoption phenomenon in SMEs from the perspective of the different countries in the world is essential and indeed, could assist in identifying key adoption patterns (e.g., culture) that are specific to each country. Thus, the importance and hence, the contribution of examining EC adoption in SMEs is twofold. Initially and in line with the literature, Grandon and Pearson (2004) found that only a small number of studies focused on the adoption and use of EC in SMEs, which raises the importance of conducting more research into this important area. Secondly, exploring the EC adoption phenomenon in NZ SMEs is quite justified here as this research is interested in identifying the factors that motivate or hinder the adoption decision of EC in NZ SMEs.

At the theoretical level and in view of the available theories which explore technological innovations in small business, the technological innovation theories appeared to be the most cited theories. These theories looked into the adoption and diffusion of IS in SMEs (Premkumar & Roberts, 1999; Thong, 1999; Thong & Yap, 1995, 1996). According to this literature review, the implications here are threefold. Firstly, extending the innovation adoption factors implemented in countries such as the U.S and Singapore to new country-settings such as NZ could introduce new insights that are unique to the adoption culture of that country (Thong, 1999). Secondly, different researchers highlighted the importance of introducing and testing the significance of new variables on innovation adoption (Fichman, 1992; Thong, 1999). Lastly, the implication with respect to EC adoption in SMEs is that past research found that facilitation factors vary according to the innovation type (Swanson, 1994). Hence, extending the prior adoption factors in SMEs which examined the adoption of different technologies or information systems/technology solutions to EC adoption is unwarranted at best as EC introduces features that are unique to its

different perspectives. Features such as security, copyright, new online business models and legal concerns are some of the features that are unique to EC only.

Therefore, this research is confronted with the following question: *How can factors extracted from the technological innovation literature influence EC adoption in SMEs?* That is, what are the most probable factors of adoption and how can those factors explain EC adoption in SMEs? Thus, the former aims to introduce more factors and the later attempts to investigate the impact of these factors on EC adoption in SMEs in NZ. Adopting such an approach in profiling different adoption factors and examining their impact in the SME's context could contribute to the development of appropriate factors that relate to EC adoption in SMEs more specifically. Extending the technological innovation adoption research in SMEs to EC adoption research in SMEs is highly emphasised in this research. Assessing the impact of large number of factors on EC adoption could safeguard against any failure in missing out the effect of any important factor(s) on EC adoption. Therefore, revisiting the technological innovation research and eliciting more factors of adoption is deemed necessary in this research before undertaking any EC adoption research.

The following sections attempt to shortlist the most important determinants of EC adoption using the research subjects (the NZ SMEs themselves) and recent EC research in SMEs.

## ADOPTION FACTORS IN SMEs

In view of the technological innovation theories, Rogers' (1983; 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 in SMEs specifically (Iacovou et al., 1995; Kaplan, 1999; Karahanna et al., 1999; McGowan & Madey, 1998; Moore & Benbasat, 1991, 1996; Premkumar & Roberts, 1999; Thong, 1999). Rogers (1995) identified five significant characteristics of the innovation that influences its adoption:

1. Relative advantage: the degree to which an innovation is perceived as being better than its precursor;
2. Compatibility: the degree to which an innovation is perceived as being consistent with the existing values, needs and past experiences of potential adopters;
3. Complexity: the degree to which an innovation is perceived as being difficult to use;
4. Trialability: The degree to which an innovation may be experimented with before adoption.
5. Observability: the degree to which the results of an innovation are observable by others.

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 & Tam, 1997; Larsen & McGuire, 1998; Moore & 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 only by organisations, but also support its post-adoption as well. They even extend their argument to include the adoption of complex technologies. Understandably, the strength of Rogers' model could be supplemented with other

### Table 1: Research on IS adoption by SMEs.

| Author | Contextual | Effects | | | Essential influencing factors | Most influential factors |
|---|---|---|---|---|---|---|
| | The manager | Innovation characteristics | Organisational characteristics | Environmental characteristics | | |
| 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 Complexity | Extent of adoption: Organisational characteristics in general (size, employees' IS knowledge, and information intensity) and size in specific |
| Premkum-ar & 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 e.g., franchise, subsidiary) | Relative advantage (+Cost) Top management support Size Competitive pressure | Relative advantage |

contexts in order to gain a more holistic understanding about IS innovations in organisations (Fichman & Kemerer, 1993). This is necessary to minimise the risk of adoption failure (Larsen & McGuire, 1998).

The innovation literature also emphasises the importance of environmental, organisational, and technological characteristics on IS adoption (Chau & Tam, 1997; Rai & Bajwa, 1999; Tornatzk & 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 few existing models provided essential influencing factors on IS 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 depict potential determinants of EC adoption in the current research.

In the following, the different technological innovation factors are revisited in order to depict more potential determinants of adoption.

**Technological Innovation Factors**

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

**Organisational Factors**

Research on IT adoption identified many organisational factors that would influence IT adoption. Kwon and Zmud (1987) found the following factors influencing 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 & Roberts, 1999; Thong, 1999; Thong & 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 & Raymond, 1993; Thong, 1999; Thong & 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.
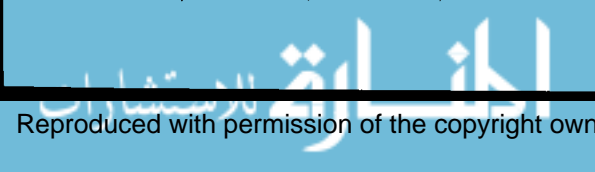
## Individual Factors

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 taker) 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.

## Environmental Factors

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.

In summary, the following factors were found important to the adoption of technological innovations:

Technological context
1. Observability
2. Trialability
3. Relative advantage.
4. Cost: adopting the new technology is more cost effective than the earlier adopted technology.
5. Complexity
6. Compatibility
7. Image: image enhancement in the social system of potential adopters

Organisational context
1. User involvement: end user involvement in the adoption decision of IT
2. External/Internal communications: external/internal communications from peers or/and media, internal networking, etc.
3. Quality of internal IT systems and capability
4. Specialisation: the perception that IT assists in furthering the SME's specialisation.
5. Top management support
6. Size: larger organizations have more resources and accordingly, are more equipped to adopt new technological innovations than smaller SMEs.
7. Quality of IS systems and capabilities represent a better readiness for EC adoption.

8. Information intensity of products: the higher the information part of the SME's products, the more likely they would adopt EC.
9. Specialization: whether EC further supports the specialization of the SME's business or not.
10. Top management support in terms of providing resources and backing.

Individual factors:
1. CEO's innovativeness: willingness to adopt new ideas/technological innovations
2. CEO's prior IS/EC knowledge represents a good foundation for EC adoption.

Environmental context
1. Vertical linkages: involvement if the SME in a son-parent type business relationship.
2. The role of the government on adoption
3. Competition from other companies in the business (Rivalry)
4. External pressure from Suppliers/buyers
5. External Support from Technology vendors

## RESEARCH DESIGN AND METHODS

This research is exploratory in nature in the sense that there is no prior research in NZ to guide the current research endeavour. Look for example at Al-Qirim (2003). Accordingly, this research attempts to use the case study approach to investigate the effect of the developed determinants on EC adoption in SMEs in NZ 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. "…..near the positivist stance, he attempted to validate inferences from events outside the laboratory while at the same time retaining the goals of knowledge shared with laboratory science. On the other side near the interpretivist school, he adopted an implicit positivist stance in describing case study research" (Campbell in Yin, 1994:1). His views are that case studies are the preferred research strategy to answer how and why type questions and using interviews would also be acceptable by the interpretivist school (Walsham, 1995). Thus, attempting to provide a balance between understanding and prediction, of subjectivity and objectivity.

This research adopts Yin's (1994) multiple case (comparative) design in studying three single units of analysis (holistic). Conducting multiple case studies require a lot of resources and time (Yin, 1994). Multiple case designs have a number of advantages. Multiple case studies permit replications, allow researchers to perceive patterns more easily and help develop a more elaborate theory. Multiple case studies (Yin, 1994) allow both within-case and cross-case analysis and

comparisons to be made, therefore in the analysis stage each of the embedded cases in each unit of analysis (organization) must be considered, analysed and compared with other embedded parts before the big case is compared with other cases to find patterns.

The use of data triangulation in the case research that is collecting data at different times from different sources in the study of a phenomenon, and viewing evidence from different sources assess the quality of the case research and overcome the potential bias. In ensuring issues of internal validity - the accuracy of information and whether it matched reality - a case study investigator needs to develop a sufficiently operational set of measures to collect the data (Yin, 1994). In addition, the use of triangulation helps construct validity. To meet the test of validity, this research conducted an extensive literature review and developed propositions based on this literature. Relying on this well-constructed theoretical framework further assures that the researcher's interpretations were accurate and objective. Following Yin's (1994) guidelines, the data collected from interviewees in the different cases were compared in order to identify patterns and to establish the chain of evidence. This research investigated other sources of evidence in the media (Internet) to further validate the research findings.

The researcher identified several SMEs to interview and only three showed interest and willingness to allocate part of their time to be interviewed. This was important given that each interviewed manager gave around 4-5 hours of their time to meet with the researcher of this paper. The first case was met once, the second case was met three times and the third case was met twice. Those managers were top executives (CEOs) and the ones that take critical decisions in their organisations including the adoption decisions. It was important to meet those managers in order to give the complete and historical background concerning the adoption of EC in their organizations. Semi structured followed by structured interviewees were conducted with the managers of three SMEs in NZ. All interviews were audio recorded and notes were taken. Later, the researcher contacted those managers through emails to complete some of the missing information.

Table 2 provides different organisational information about the three cases. The identities of the three cases were disguised and were given the fictitious names shown in Table 2. The web sites of the different cases have been analysed as well. Such published resources represented the other source of evidence in this research. Researchers have suggested the use of archival records, such as business and print-media records, as one important resource for evidence (Yin, 1994). Content analysis is an objective, quantitative, and systematic research method for making replicable and valid inferences from the data with respect to their context (Krippendorff, 1980). Content analysis is an unobtrusive measure in the sense that it eliminates response bias (Kolbe & Burnett, 1991). Further, the interviewed SMEs reviewed a draft of the research (during the composition phase) to validate interpretations and conclusions made.

In view of the depicted factors above, it is worth noting here that it is quite difficult to investigate the effect of all of the depicted determinants on EC adoption in great detail in this research. Therefore, the research procedure attempts to overcome this obstacle by adopting two approaches here. Firstly, interviewees were requested to discuss and depict their perceptions about the impact of the different factors on their adoption decision for EC.

## Table 2: Organisational Information about the Cases.

| S./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 & 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 |

From these initial meetings, the researcher was able to discard (Table 3) the insignificant factors earlier on. For example, the insignificance of Rogers' (1995) observability and trialability factors (Table 3) on adoption is found to be consistent with the findings of prior research (Tornatzky & Klein, 1982). Recent IS adoption research in small business reported the same as well (Premkumar & Roberts, 1999; Thong & Yap, 1995, 1996; Thong, 1999). Such an approach gave the researcher more confidence in not missing out a potential significant determinant. Also, this approach allowed the researcher to concentrate and expand on the most important factors on EC adoption from the SMEs' perspective in NZ.

Secondly, to further validate the importance of the final depicted determinants (Table 4) they were revisited using recent EC research (Table 4). Table 4 summarizes the determinants that were found to influence EC adoption in SMEs. For example, Mirchandani and Motwani (2001) investigated factors that differentiate adopters from non-adopters EC in small businesses. The relevant factors included enthusiasm of top management, compatibility of EC with the work of the company, relative advantage perceived from EC, and knowledge of the company's employees about computers. The degree of dependence of the company on information, managerial time required planning and implementing the EC application, the nature of the company's competition, and the financial cost of implementing and operating the EC application did not influence adoption.

## Table 3: Insignificant EC Adoption Factors

**Technological context**

Observability: although, the degree to the 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 was 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 perceived the end user involvement in the adoption decision of EC is irrelevant to their adoption decision. Initially, they all 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. Although SelfStor highlighted that this factor might have been problematic to their elderly staff but however, emphasised that the adoption decision for EC is an organisational one and hence, users should comply with the organisation directions. SelfStor confirmed that with basic training, their staff would do their best to make the system operational for the company. Thus, making this factor irrelevant to adoption from the SMEs' perspective.

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 & 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 that did not prevent the cases 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 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 of EC not relating directly 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 NZ.

Doolin et al. (2003) highlighted the following drivers for Internet channel development amongst businesses in NZ:

i. Internal factors: logistical infrastructure, in-house technical expertise, parent company involvement, opportunity to leverage brand, acquiring web retailing operation, product characteristics

ii. External factors: Overseas trends and firms, availability of third party providers, customer perception or demand

And the following inhibitors:

i. internal factors: conservative management, lack if in-house IT expertise, parent company involvement, limited financial resources, inadequate IT infrastructure, channel conflict.

ii. external factors: publicized Internet failures, market characteristics, customer characteristics

### Table 4: Factors Influencing EC Adoption in SMEs.

| | Determinant | Found significant (see Note below) | Found most significant | Found insignificant |
|---|---|---|---|---|
| | **Technological** | | | |
| 1 | Relative advantage | 1, 2, 3, 4, 5, 7, 8, 9, 12, 14, 15, 16, 18 | | |
| 2 | Compatibility | 2, 4, 15, 16, 17, 18 | | |
| 3 | Complexity | 3 | | 5 |
| | **Organizational** | | | |
| 1 | Top management support | 4 | | |
| 2 | Organizational readiness (size) (cost/financial and technical resources) | 1, 4, 5, 7, 8, 9, 10, 12, 17 | 1, 5,9 | 4 |
| 3 | Information intensity and product characteristics | 12, 14, 15 | | 4, 18 |
| 4 | Managerial time | | | 4 |
| | **Environmental** | | | |
| 1 | Industry pressure (competition) | 1, 5, 6, 7, 8, 9, 10, 12, 16(-) | 1, 9 | 4, 13, 18 |
| 2 | Government pressure | 1, 5, 6 | 1 | |
| 3 | Consumer readiness | 10, 12, 16(-) | | |
| 4 | Support from technology vendors | 12, 19 | | |

**Note:** (1): Kuan and Chau (2001), (2) Beatty et al. (2001), (3) Riemenschneider et al. (2003), (4) Mirchandani and Motwani (2001), (5) Grandon and Pearson (2004), (6) Chang and Cheung (2001), (7) Mehrtens et al. (2001), (8) Iacovou et al. (1995), (9) Chwelos et al. (2001), (10) Zhu et al. (2003); (11) Santarelli. & D'Altri (2003), (12) Doolin et al. (2003), (13) Kula and Tatoglu (2003); (14) Poon and Swatman (1997); (15) Poon and Swatman (1998); (16) Poon and Swatman (1999a,b); (17) Macgregor and Vrazlaic (2004); (18) Teo et al. (1998); (19) Abell and Lim (1996).

Rogers (1995) highlighted the importance of the image factor on IS adoption. He suggested that it could be studied from within the relative advantage characteristic. However, Moore and Benbasat (1996) stressed the image factor as an independent factor on its own. The apparent role of the CEO in IS adoption in SMEs is very important (Premkumar & Roberts, 1999; Thong, 1999; Thong & Yap, 1995, 1996). Hence, studying his/her innovativeness and involvement in EC adoption is very important (Poon & Swatman, 1997, 1998, 1999a,b).

According to the above literature review and analysis, this research is interested in investigating the impact of the factors shown in Table 5 on EC adoption in NZ SMEs.

## Table 5: EC Adoption Framework

| Technological factors: | Organisational factors: |
|---|---|
| 1. Relative advantage: adopting the new technology is more advantageous than the earlier adopted technology.<br>2. Cost: adopting the new technology is more cost effective than the earlier adopted technology.<br>3. Complexity: adopting the new technology is less/more complex (difficult to learn about) than the earlier adopted technology.<br>4. Compatibility: adopting the new technology is less/more compatible (with the value and belief of potential adopters) than the earlier adopted technology.<br>5. Image: image enhancement in the social system of potential adopters | 1. Size: larger organizations have more resources and accordingly, are more equipped to adopt new technological innovations than smaller SMEs.<br>2. Quality of IS systems and capabilities represent a better readiness for EC adoption.<br>3. Information intensity of products: the higher the information part of the SME's products, the more likely they would adopt EC.<br>4. Specialization: whether EC further supports the specialization of the SME's business or not.<br>5. Top management support in terms of providing resources and backing. |
| Individual factors: | Environmental factors: |
| 1. CEO's innovativeness: willingness to adopt new ideas/technological innovations<br>2. CEO's prior IS/EC knowledge represents a good foundation for EC adoption. | 1. Competition from other companies in the business (Rivalry)<br>2. External pressure (from Suppliers/buyers)<br>3. External Support (from Technology vendors) |

## RESULTS AND DISCUSSION

Table 6 depicts the various adopted EC technologies across the three cases. All 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.

In line with the adoption framework above, this research presents the findings and provides a discussion of the different factors across the three cases.

## Table 6: Adopted EC 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 |

### Technological Innovation factors

**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 the 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. They went through a long process of trials with different names and terminologies to optimise the search results with the different search engines. ShipBrok commented, ".... Mastering EC vocabularies/terminologies and understanding and knowing EC products is a very difficult task".

**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 and 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 one 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.

**Perceived Advantages** 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).

**Cost-Benefit** 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 than 3 percent, which cast doubt about the effectiveness of such EC initiatives in generating sufficient profits to SMEs. On the other hand, it is suspected that the preceding depressing perceptions about the effectiveness of EC could prevent the SMEs from making big investments on advanced EC initiatives.

**Industry/Product** Specifics The researcher analysed the different business models of the different cases in this research using the information provided by interviewees and by analysing

the web sites of the three cases according to the industry type and to the transacted product/s of the three cases. The researcher attempted to cross the preceding analysis with the reported perceived benefits of the three cases in order to add another dimension of understanding to the relative advantage perspective by reporting any specifics pertaining to certain industry or product (Table 7). Further, an attempt is made to validate the actual perceived benefit by measuring the extent of EC use in the three cases (the last column in table 7).

### Table 7: EC in Relation to the Business Models of the Different Cases

| | Main Business Model | Product | Main EC in use | Main Purpose and use of EC | Prevailing communication medium in the business |
|---|---|---|---|---|---|
| SelfStor | Physical Retail: self storage facilities | Local storage facilities | web site | Supplementary and local market endorsement via Cyberspace: New opportunity to promote their physical model – Inviting customers to visit the physical storage facilities. | Telephone/fax, Face-to-face, and mail/courier. |
| ShipBrok | International charter brokerage services | Information exchange with overseas businesses | Ext. Email<br><br>VPN<br><br>web site | Efficiency: Communications with overseas businesses.<br><br>Efficiency: Access remotely and securely to the company's servers.<br><br>New opportunities: to promote their commodities products. | Ext. Email, telephone/fax, and Face-to-face, mail/courier. |
| AerialMap | Physical Local mapping services | Colour or black/white maps and images<br><br>Library of NZ photos | web site,<br><br>Intranet<br><br>Ext. Email | Supplementary and market endorsement via Cyberspace: Marketing tool to promote their physical model and library of photos either locally or internationally.<br><br>Effectiveness: Enhance internal co-ordination among the teams of the different projects<br><br>Send purchase orders and information. | Face-to-face, mail/courier, and telephone/fax, Ext. Email. |

All the cases 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 (Tables 8). 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". As

ShipBrok was involved with overseas markets, it used the email extensively to efficiently communicate with their trading partners and businesses. ShipBrok business relied heavily on communication tools such as telex, telephone, and fax with their overseas shipping and brokerage companies. ShipBrok were pioneers in using a proprietary telecommunication software package called Comtext since 1992. They were also the agent for this software (a division that no longer exists). The software allowed for email, telex and fax management over value added networks (VANs) with established nodes in NZ, Australia, Europe and Asia. The system allowed for 80% savings on communication costs in comparison with the traditional public switched telephone network (PSTN) services. ShipBrok commented, "…PSTN based communications are expensive, slow, and accessing our internal systems from overseas is not possible". When the Internet arrived it was the logical progression path for ShipBrok to start using Internet email in 1999. The only drawback was the lack of receipt confirmation for the transmitted messages where earlier systems and technologies were efficient in printing receipt reconfirmation. ShipBrok felt that physical receipt confirmation printout is more legible than Internet email confirmation.

As AerialMap adopted more EC technologies (Table 6), it perceived more advantages from adopting Intranet, web site and other EC technologies as shown in Table 8.

The SelfStor business model was a physical one and relied heavily on personal selling and on physical visibility in pushing customers towards their five self-storage facilities facing the major motorways in Auckland. SelfStore has a huge investment (NZ$ 40 million) in storage facilities in five locations in Auckland and a sixth is yet to be established.

It was suggested that industry- and/or product-specifics played a major role in adopting certain EC technology more than others. For ShopBrok it was the communication perspective (email) and remote and secure login 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. As for MiniStor, they established the web site to supplement their marketing initiatives and therefore, designed a simpler web site to act as a pointer for their customers and tourists to visit their self-storage facilities.

**Organisational factors**

**Image** 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.

**Table 8: Perceived Advantage and Disadvantages of EC by AerialMap.**

| I | EC | Perceived Advantages | Perceived Disadvantages |
|---|----|--------------------|------------------------|
| 1 | Intranet | 1. Intra- Publishing: company policies, quality manuals, products/services information, and latest company news (sales/opportunities) – Planned an not yet completed.<br>2. Integrate internal applications with state of the art technology like Intranet<br>3. Optimise administrative and project management time<br>4. Overall increased efficiency and productivity | 1. Expensive<br>2. Internal applications are not yet fully integrated |
| 2 | web site | 1. Publishing: information about AerialMap's products and services. A means to replace AerialMap's semi-annual catalogue.<br>2. Local outreach: publish their photo library to attract mass buyers<br>3. Market exposure and marketing<br>4. International outreach<br>5. Improved customer service and satisfaction by providing email inquiries<br>6. Enhance AerialMap's image and credibility<br>7. Improve competitive position | 1. Expensive<br>2. No immediate return on investment (ROI)<br>3. Finished products are physical and on paper<br>4. Products and services are not standard and requires human customisation<br>5. Customers prefer traditional business means (face-to-face, telephone/fax) |
| 3 | Other Internet technologies | 1. Ext. Email: Business communication based on email (RFQs, correspondence) and information delivery<br>2. Browser/FTP: Software updates/downloads<br>3. Research for new products and solutions in the field of AerialMap<br>4. Access to international expertise<br>5. Telnet: download global positioning system (GPS) data from remote servers. | 1. Lack of EC use by governmental establishments.<br>2. No use of Email lists, or bulleting boards or other EC enabling technologies<br>3. Security<br>4. Viruses<br>5. Abuse by employees<br>6. Wasting employee's time |

**Size** The number of employees measured the organisation size (Cameron & Massey, 1999; Premkumar & Roberts, 1999; Thong & Yap, 1995, 1996; Thong, 1999). Research found that the larger the SMEs' in size, the more resources they would have, which could be allocated to adoption (Premkumar & Roberts, 1999; Thong & Yap, 1995, 1996; Thong, 1999). The researcher

in this research crossed the organisational size of the different cases with the adopted EC technologies (Tables 2 and 5) and found that organisational size correlated positively with EC adoption and with adopting more EC technologies as in the case of AerialMap (Table 5). AerialMap had 42 employees and their environment relied heavily on information processing of aerial photos and satellite imageries. Thus, AerialMap envisaged having efficient communication means and efficient IS/EC infrastructure (Intranet) in place as a necessity to coordinate the different activities and projects among the team-members of these projects. AerialMap experimented with different ISPs until they settled with a wireless communications provider that supplied efficient and reliable communication radio channels. AerialMap was actively involved in promoting their web site with different search engines in order to guarantee wider international exposure.

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" (discussed below). Therefore, size was not found to be conclusive in the case of EC adoption in this research.

**Quality of IT systems and IT capabilities** Although it was viewed by the three cases as positively influencing EC adoption, however, in the context of adoption, the cases pointed to the insignificance of this factor on their adoption decision for EC. Initially, 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 that did not prevent the cases 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) and the subsequent advancement of their EC initiatives.

Thus far, this research found the current factor ill-specified in the different cases and hence, insignificant to EC adoption. However, it would influence the extent of EC adoption but could not be endorsed in the current research as it was highlighted by the cases as a visionary path.

**Information Intensity** The SMEs pointed to the insignificance of the information intensity factor on their adoption decision for 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 (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 (Tables 7 & 8). 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 (c.f. Table 7). 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 NZ 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 online.

Thus, making the current factor not relating to EC as such and hence would not influence EC adoption. However, looking alongside the information content of products and services could yield more useful results. More research targeting more case studies could confirm the preceding assertion. Recent research (Choi et al., 19997) pointed to this perspective and to the possibility of streamlining the product, the process and the delivery agent in order to reach the full EC capability.

**Specialisation** The different cases did not perceive EC assisting in furthering their specialisation and hence, perceived the current factor irrelevant to their adoption decision for EC. The weakness of this perspective could be contributed to the fact that the different initiatives were at the initial stages and have not yet matured enough to realise the full potential of EC. It seemed that the current factor was related 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 is a specialised business and a niche player in the marketplace with fewer competitors in the range of products and services they provide. AerialMap's business is relying heavily on information processing: reception of images, scanning of images, processing of images data, altering data, and printing/plotting the image in its final selling format (e.g., map). However, this specialisation is built on state of the art technologies such as networking and GIS system based on professional graphics Unix workstations in handling and processing images. However, other than a supplementary sales/marketing channel, AerialMap did not perceive EC to promote such specialisation. However, AerialMap perceived the web site could assist their specialisation by offering a certain range of products over the Internet such as their library of NZ photos. The manager of AerialMap showed keen interest in the web and indicated that he has plans to offer more of his products and services on the net and he is currently negotiating with a local partner to do this.

**Top Management Support** From the analysis made across the three cases it was suggested that the presence of EC in the cases correlates with the presence of an enthusiastic manager (usually an owner as well) in order to guarantee EC adoption. Although the current factor has highlighted the importance of the management role in supporting EC adoption, the individual characteristics of the managers of the three cases (next) proved to be more effective in the EC adoption scenario. Thus, making the adoption decision of EC not relating directly to top management support as such. It was quite clear that the manager of AerialMap showed the highest enthusiasm for EC followed by the manager of ShipBrok and SelfStor respectively and this scaling is explained next.

**Individual Factors**

**CEO's Innovativeness** All the managers who were involved in EC adoption were owners as well. All were in their forties of age and all held university degrees. Despite the mentioned hindrances above such as the high costs and the low perceived benefits, all the managers envisaged EC introducing different benefits to their organisations as outlined earlier and therefore adopted EC. Despite the lack of tangible benefits in the short run, 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.

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 is not rushing things concerning the different EC initiatives and he is taking things slowly.

The innovativeness of one of the managers (owner also) of ShipBrok was quite apparent in bringing in various technologies inhouse including EC. Driven by his interest in technology, this manager in ShipBrok championed the whole introduction of the various IS and EC systems at ShipBrok. The other manager of ShipBrok questioned the cost effectiveness of such huge investments on IS and EC and whether the business really needed these, which further endorses the innovative perspective of the managers across the cases in adopting EC.

SelfStore's manager, although he resorted to top management for making the final adoption decision for EC, he was an owner as well and a member of the board as well. He embraced and introduced the various initiatives including the web site into SelfStore. However, EC adoption did not go beyond the simple web site in the case of SelfStor and it was clear that he was not as keen as the managers in the other two cases in pursuing EC any further.

**CEO's IT Knowledge** There are two issues emerging alongside the current factor. Firstly, for the less knowledgeable manager with EC, this will not impede the manager 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 with technology in general this would accelerate the decision making process pertaining to adoption, whether to adopt or not. However, there are other factors and priorities that govern the adoption decision as discussed in this research.

Being a knowledgeable person with EC, AerialMap's manager opted not to reject EC but however, pursued an experimental path in having EC, "…..knowing about EC would be a positive thing and indeed would accelerate our decision making pertaining to adoption but at the current position I am taking it one piece at a time to develop my understanding about EC….. I have more important issues and priorities than EC". It was 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. On the other hand, the manager of AerialMap resorted to non traditional means in developing his Intranet and part of his web site. This may suggest that the managers did not consider EC to be vital to the business and could be developed as a supplementary means to the traditional business means and hence, opted to minimise his costs by involving himself in the development process. The manager confirmed earlier that he is expecting 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. Therefore, it is suggested that knowing about EC was not a main driver for EC adoption as such, 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 NZ (Chapple, 2002; Deloitte, 2000; PWHC, 1999), or about its returns to the business.

As highlighted earlier, the IS literature in small business reports the lack of detailed knowledge about IT and EC among the SMEs. However, there was some evidence to suggest that the manager of AerialMap showed keen interest and innovativeness in pursuing EC even if it was a risky endeavour.

### Environmental Factors

**Supplier/Buyer Pressure** All the cases indicated that their buyers drove their automation processes including the adoption of EC. The cases perceived that their buyers would influence their adoption decision for EC significantly. However, their suppliers did not influence their adoption decision for 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 various customers were not EC ready, SMEs would not be motivated to go into EC or at least would impede the progress of their EC initiatives. This might highlight issues pertaining to buyers and whether they were EC driven or interested in conducting business over the Internet.

SelfStor and AerialMap believed that their web sites would attract more customers to their business in the long run however, were not in a position to confirm that. SelfStor maintained pessimistic figures about expected hits (3%) but however, stressed the need to have a web presence as a necessity and envisioned having the web presence to diversify their targeting strategy and to supplement their traditional marketing channels. AerialMap's manager maintained great enthusiasm for EC and has many plans in mind, which could be implemented over the Internet but however, adopted a more cautious approach in progressing the different initiatives. ShipBrok adopted EC as their buyers dumped Comtext and started using Internet email. They established the web site to attract more online customers to their commodity products. However,

it proves to be a failure and it did not generate any business for them but ShopBrok kept it running due to the low hosting costs. The content of their web site is not updated as such.

**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 would 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 the current 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.

Due to the reported lack of tangible benefits in the short run by the different cases, it is suggested that at this level of EC adoption across the different cases that EC would 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. Thus, making EC to the cases more of a strategic necessity than the strategic advantage perspective and hence, making this factor not significant on adoption.

**Technology Vendors** The cases maintained negative perceptions about the performance of technology vendors. The different cases confirmed that they dealt with different vendors for the ongoing support of their equipment but the deliverables were very disappointing. There are many providers in the marketplace ready to supply and install equipment but usually fail to stand behind their products and promises. On the other hand, resorting to state of the art providers such as EC consultants and high-end integrators was not possible as the cases perceived technology vendors to charge dearly for their services. 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 tripping ? 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. The manager of AerialMap indicated that, "…the trip for EC is a long one and consumes so much time and the way ahead is uncertain". According to AerialMap, "…there are so many details and perfecting the web site is not an easy process". 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.

## SUMMARY, LIMITATIONS AND FUTURE WORK

Table 9 summarises the research findings above and those are further discussed below to provide the following research summaries.

Table 9: The perceived impact of the different factors on EC adoption in the cases.

| S./ No | Context | Perceptions* | Respondent's Remarks |
|---|---|---|---|
| 1 | **Technological (innovation)** | | |
| a | Relative advantage | + | Image enhancement, efficient communication tool (email), industry/product specific accelerates adoption, supplementary advertising tool. No tangible benefits from web site. |
| b | Cost | Not costly | Initial EC initiatives. Due to shallow EC initiatives, this factor did not impede EC adoption. |
| c | Complexity | - | Not fully aware of EC complexities. Due to shallow EC initiatives, this factor did not impede EC adoption. |
| d | Compatibility | - | Not fully aware of EC compatibilities. Due to shallow EC initiatives, this factor did not impede EC adoption. |
| e | Image | + | One of the motivators to adoption. |
| 2 | **Organisational Context** | | |
| a | Size | Not conclusive | Cross Tabulation between organization size and adopted EC. |
| b | Information Intensity | I | Industry/product specifics: More oriented towards the information part of the different products and services of SMEs. |
| c | Specialisation | I | More specific to IS than EC |
| d | Top management support | + | More relevant to the individual characteristics below (CEO). |
| 3 | **Individual Context** | | |
| a | CEO's innovativeness | + | Enthusiasm and involvement. |
| b | CEO's IT/EC knowledge | + | An advantage but not a significant determinant. |
| 4 | **Environmental context** | | |
| a | Suppliers/buyers pressure | + | There were no major suppliers to the cases. |
| b | Competitors | + | Strategic necessity. |
| e | Technology vendors | - | Negative perceptions. |

* (+): Positively, (-): Negatively, (I): Irrelevant

**EC Adoption and Implications in SMEs**

Technological factors such as the observability and trialability played no significant role in EC adoption in NZ SMEs. Only the complexity, the compatibility, and the cost factors played an important role in EC adoption but on the long term dimension. Image was suggested to play a supplementary role on EC adoption in this research. EC represents a recent technological innovation and NZ SMEs viewed it as a complex phenomenon. There was not detailed knowledge about its different perspectives and models amongst the NZ SMEs and the literature in NZ suggested the same (Abell & Black, 1997; Abell & Lim, 1996; Chapple, 2002; Deloitte, 2000; Doolin et al., 2003; PWHC, 1999). The interviewees' raised different "compatibility" issues facing the large-scale 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 (email) 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. This is an important finding in that EC adoption and use in NZ SMEs is limited to the communication aspect of the EC technology. Such limited approach raises an implication and points to the limited adoption and use of EC in NZ SMEs. This limited use of EC amongst the NZ SMEs was a consistent finding in the prior EC literature (above). For example, Kula and Tatoglu (2003) found that the SMEs use the Internet for external communication purposes and for searching relevant information about the market and products. This implication from the NZ context is discussed in detail in the following section.

At the organisational level, factors such as user involvement, external/internal communications, quality of IT systems and capabilities, and specialisation were irrelevant to the adoption decision of EC in the cases. The size factor was not conclusive but pointed to the importance of the organisation's size in providing adopting EC and in adopting different EC technologies. Larger SMEs were 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 SMEs. However, this finding is contrasted by a finding from Santarelli and D'Altri (2003) suggesting that smaller SMEs were more likely to adopt web sites than large SMEs. This is interesting contrast and any future research could look into this finding in more details. The information intensity and support from top management were found to point to information content of products and to the CEO's role on adoption, respectively. These two findings represent an emergent finding in this research and a contribution to the prior innovation adoption literature: First – the former points to industry specifics, suggesting that certain industries could adopt EC more rapidly than others as they discover the suitability of their products (information-content) to the Internet. For example, Kula and Tatoglu (2003) attempted to identify five categories of firm- and industry-specific factors that influence the extent of Internet adoption by SMEs:

    i.        amount of resources allocated for export development.
    ii.       international experience of the SME.
    iii.      relative strength of the SME in the sector.
    iv.      technology intensiveness of the sector.
    v.       competitive intensity of the sector.

Of these five categories they found the first four (with the first 2 being the most important) important and the last one insignificant. These specifics could be investigated in the NZ context by any future research. Further future empirical research could addresses the information content of products, organisation's size and the development of more accurate measures which could yield more interesting insights pertaining to the impact of these factors on EC adoption in SMEs.

Second – the later raise the importance of the CEO's role in EC adoption. This is discussed next.

At the individual level, CEO's innovativeness played an important role in EC adoption in NZ SMEs. The role of the CEO's innovativeness in adopting EC has been demonstrated in the different cases and in the case of AerialMap more specifically. 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 EC adoption than 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. This is a significant finding in this research.

At the environmental level, the cases emphasised the importance of 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. The cases perceived technology vendors as incapable of providing adequate EC services. Factors such as the government's role in promoting EC adoption in SMEs and vertical linkages did not play any significant role?

We need to emphasize here that the government could play a vital role in assisting the SMEs in adopting EC. This could be in the form of spreading the awareness about the importance of EC to the survivability of the SMEs in the long term., training courses/workshops, seed funds, providing technical/hosting assistance (portals) and providing the regulatory framework to endorse the online trade including security. The performance of technology vendors needs to be addressed and the government could play a vital role here in this regard in setting performance measures and benchmarks.

## Current and Future Potential of EC

The interviewees did not report the above impediments as hindering their adoption decision of EC as such. They highlighted that their EC initiatives were not as complex to use or as incompatible with their business or as costly to hamper the adoption decision. Such views could be attributed to the simple EC initiatives in the cases and hence, further suggesting the weakness of the EC phenomenon in NZ SMEs. The suggested significance of the CEO's innovativeness makes the adoption decision in the hand of the CEO of the SME. His/her lack of detailed knowledge about EC meant that this CEO will not be able to push the current EC initiatives to more sophisticated levels. The other suggested influencers such as the relative advantage, specialization, size, product suitability to the Internet, and supplier/buyer pressure did not appear as conclusive to the

adoption decision in this research as well. This again could be attributed to the simple and to the experimental nature of the EC initiatives amongst the NZ SMEs and hence, further suggesting that EC in the cases was not viewed as critical or as strategic. Of course, this conclusion needs to be further validated using a bigger sample of the SMEs in NZ or conducting longitudinal research to pursue the progress of EC in the cases specifically.

Due to the reported lack of tangible benefits in the short term by the different cases, it was 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 in this research. On the other hand, the reported enthusiasm for EC and in being in the EC playing field earlier on, as highlighted by the different cases, further pointed to the strategic necessity of EC and not to its strategic advantage. The cases enthusiastically stressed the need to explore EC and to have an online presence in order not to be left alone when EC becomes successful 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 fact points to the CEO's innovativeness in identifying this reality and in taking the risk to proceed with the EC investment.

It is at such advanced EC initiatives that the cases suggested that factors like complexity, compatibility, cost, supplier/buyer and competition could play an important role on EC adoption in the long term. This is, when the web sites become successful and start generating revenues. Santarelli and D'Altri (2003) found that their sampled SMEs highlighted the need for more visibility among potential customers as the main factor influencing the decision to create a web site.

Thus, this research suggests that in adopting simple EC initiatives, nothing seemed to impede the innovative CEOs from adopting EC. Issues like the strategic-necessity of EC and its importance as an efficient communication tool was quite obvious to the cases. So, a question arises about the reasons for such SMEs not moving to the advanced EC initiatives. The cases always pointed to this futuristic perspective about EC. This finding was consistent with the literature as well. Santarelli and D'Altri (2003) showed that the perceived importance of EC among SMEs deals mainly with their communication requirements. Thus, adoption of Internet related technologies follows a "wait-and-see" attitude, and is to a large extent dependent upon implementation of a defensive strategy. In our case, this defensive strategy is matched by the strategic necessity perspective amongst the cases. Due to the importance of the CEO role in EC adoption in NZ SMEs, it is vital to expand on the CEO's characteristics by any future research in order to identify in details the features of the CEOs that could encourage/impede EC adoption. This is important in order to prepare and qualify such CEOs to take the next step towards the more sophisticated EC initiatives.

## CONCLUSION

At the theoretical level, this research showed the usefulness of the technological innovation literature in exploring and explaining the EC adoption phenomenon in NZ SMEs. The research attempted to revisit the technological innovation literature and to introduce relevant factors to EC adoption research in SMEs using different techniques. The intention here was to assure the

development of an optimised set of determinants that could explain the EC phenomenon in SMEs. To the researcher's best knowledge, this is the only research that attempted to follow such an approach in qualifying factors to EC adoption research in SMEs. Researchers in different countries are encouraged to revisit these factors and to critique/examine their importance in their countries.

At the descriptive level, the case study approach showed its strength in exploring/explaining 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 and the process of EC adoption in SMEs. However, concluding the significant factors or the most significant ones on EC adoption was not possible from 3 cases only. It is worth investigating these suggestions further by undertaking large empirical work targeting large SME's sample (e.g., survey, more case studies, longitudinal research) either in NZ or elsewhere.

At the professional level, this research suggested the importance of certain factors and the irrelevance of other factors to the adoption decision of EC in SMEs in NZ. Such an approach could create the foundation for future research aiming at investigating EC adoption in SMEs utilising the suggested determinants (Framework) and hence, build on this research's results. As for NZ SMEs, the importance of the CEO's innovativeness on entering the EC arena, the lack of EC knowledge amongst those CEOs (to push the current EC initiatives further), product/industry specifics, weak support from technology vendors and the remaining important/unimportant factors which could play a role in the anticipated futuristic initiatives pointed to the uniqueness of the EC adoption phenomenon in SMEs in NZ vis-à-vis the literature which was found to be weak.

In addition, the weakness of the EC phenomenon in NZ could be justified on the basis of the market structure and the economy in NZ. Such uniqueness stems from several facts: that 84 percent of the NZ sector is dominated by micro-enterprises employing up to five employees only (MOED, 2000); from the country's geographical isolation and from the time differences which separate NZ from the rest of the developed countries in the northern hemisphere specifically. The population in NZ is relatively small (3.82 million), dominated mostly by low average-income families, and more than one third of the population residing in the Auckland region (1,158,891) only (NZStat, 2001). It is expected that such constraints in comparison with large successful countries (US, EU) could have an important effect on the growth of EC in businesses in general and in SMEs specifically in NZ. However, such concerns should not deter NZ SMEs from investigating the potential impact of EC on their businesses and the opportunities which could be extracted from EC.

Addressing the above accelerators and hedging against the different impediments by concerned parties in general and the government more specifically could assist the small sector in NZ in bridging the EC divide and move forward to the more sophisticated (i.e., interactive) EC initiatives. This is remained to be seen.

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