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Abstract

This paper presents a study of Swedish regional small businesses which investigated the barriers to E-commerce adoption (amongst other things). The aim of the paper is twofold: to examine the correlation between barriers to E-commerce adoption in order to identify underlying factors: and to determine whether these differ between SMEs that are members of a small business cluster and SMEs that are not. The paper begins by examining the nature of SMEs and identifying features that are unique to SMEs. A discussion of barriers to E-commerce adoption based on previous research is then presented and the barriers are mapped to the unique SME features. The paper will then briefly examine the role of small business clusters in the adoption of E-commerce. This is followed by a correlation and factor analysis of the two sets of data and a discussion of the results. Finally, the limitations of the study are presented and conclusions drawn.

Keywords

smes, business, prioritising, e, commerce, small, effect, regional, clusters, barriers, adoption

Disciplines

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The Effect of Small Business Clusters in Prioritising Barriers to E-commerce Adoption in Regional SMEs

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One of the most powerful forces affecting the world's economy and commerce today is the substantial increase in globalisation through the use of Information and Communications Technologies (ICTs). Kaynak et al (2005) suggest that the rapid emergence of E-commerce has changed the nature of business so quickly and pervasively that where once it was revolutionary, now, it is simply evolutionary.

There have been many studies of E-commerce in the small business sector (van Slyke et al 2005, Kaynak et al 2005, MacGregor et al 2005). A number of reasons have been put forward but principal among them has been the realisation that both at an academic as well as a government level that the small to medium enterprise (SME) sector is one of the cornerstones of economic prosperity in many countries (NOIE, 2002, MacGregor et al 2005). Studies (Taylor & Murphy 2004, Scupola 2003, European Commission 2002, Stockdale & Standing 2004) have shown that many SMEs are turning more and more to global markets.

Despite the advocacy by governments that it is becoming a critical necessity for SMEs to involve in E-commerce, studies in Europe, the US and Australia (Martin & Matlay 2001, Dixon et al 2002, Buckley & Montes 2002) have found that SMEs are less engaged with ICTs than their larger counterparts and, indeed, invest less in these technologies per employee than larger firms. Recent studies (OECD 2002, Taylor & Murphy 2004, Dixon et al 2002) have found that while over 20% of SMEs purchase through the web and more than

30% sell through the web, the value of these purchases and sales only account for 2% of the total.

The slow pace of E-commerce diffusion in the SME sector has led to a variety of studies, both at an academic level as well as through government initiatives. These studies have concentrated on barriers to adoption, benefits derived through E-commerce adoption and problems encountered by SMEs in their move towards E-commerce adoption.

This paper presents a study of Swedish regional small businesses which investigated the barriers to E-commerce adoption (amongst other things). The aim of the paper is twofold: to examine the correlation between barriers to E-commerce adoption in order to identify underlying factors; and to determine whether these differ between SMEs that are members of a small business cluster and SMEs that are not. The paper begins by examining the nature of SMEs and identifying features that are unique to SMEs. A discussion of barriers to E-commerce adoption based on previous research is then presented and the barriers are mapped to the unique SME features. The paper will then briefly examine the role of small business clusters in the adoption of E-commerce. This is followed by a correlation and factor analysis of the two sets of data and a discussion of the results. Finally, the limitations of the study are presented and conclusions drawn.

E-Commerce

There are nearly as many definitions of E-commerce as there are contributions in the literature. The World Trade Organisation (WTO) defines E-commerce as “.. the production, distribution, marketing, sale or delivery of goods and services by electronic means” (Baker & McKenzie 2001 cited Kaynak et al 2005). Shultz & Baumgartner (2001) define E-commerce as: “the buying and selling of information, products, and services via computer networks”. As there are no commonly agreed to definitions of E-commerce for E-commerce, the definition provided by Globerman et al (2001 cited Kaynak et al 2005) will be adopted in this paper, viz., “Any economic transaction where the buyer and the seller come together through the electronic media of the Internet, form contractual agreement concerning pricing and delivery of particular goods and services and complete the transaction through the delivery of payments and good or service as contracted”.

Small Business

There are a number of definitions of SMEs. Some of these definitions are based on quantitative measures such as staffing levels, turnover or assets, while others employ a qualitative approach. Meredith (1994) suggests that any description or definition must include a quantitative component that takes into account staff levels, turnover, assets together with financial and non-financial measurements, but that the description must also include a qualitative component that reflects how the business is organised and how it operates. As this study involves Swedish SMEs the Swedish definition (employing less than 50 people) will be used as the quantitative component.

Qualitatively, any description of a small business must be premised on the notion that they are not simply scaled down large businesses (Westhead & Storey 1996, MacGregor et al 2005) and although size is a major distinguishing factor, small businesses have a number of unique

features that set them apart from larger businesses.

There have been numerous studies carried out in order to isolate the features unique to SMEs. Brigham & Smith (1967) found that SMEs tended to be more prone to risk than their larger counterparts. This view is supported in later studies (Walker,1975, Delone,1988). Cochran (1981) found that SMEs tended to be subject to higher failure rates, while Rotch (1987) suggested that SMEs had inadequate records of transactions. Welsh & White (1981), in a comparison of SMEs with their larger counterparts found that SMEs suffered from a lack of trained staff and had a short-range management perspective. They termed these traits ‘resource poverty’ and suggested that their net effect was to magnify the effect of environmental impact, particularly where information systems were involved.

These early suggestions have been supported by more recent studies that have found most SMEs lack technical expertise (Barry & Milner 2002), most lack adequate capital to undertake technical enhancements (Gaskill et al (1993, Raymond 2001), most SMEs suffer from inadequate organisational planning (Tetteh & Burn 2001, Miller & Besser 2000) and many SMEs differ from their larger counterparts in the extent of the product/service range available to customer (Reynolds et al, 1994).

A number of recent studies (see Reynolds et al (1994), Murphy (1996), Bunker & MacGregor 2000)) have examined the differences in management style between large businesses and SMEs. These studies have shown that, among other characteristics, SMEs tend to have a small management team (often one or two individuals), they are strongly influenced by the owner and the owner’s personal idiosyncrasies, they have little control over their environment (this is supported by the studies of Westhead & Storey (1996) and Hill & Stewart (2000) and they have a strong desire to remain independent (this is supported by the findings of Dennis 2000 and Drakopolou-Dodd et al 2002).

These are summarised in Table 1. An analysis of the features revealed that they could be classified as being internal or external to the business. Internal features include management, decision-making and planning processes, and the acquisition of resources, while external features are related to the market (products/services and customers) and the external environment (risk taking and uncertainty).

SMEs in Regional Areas

SMEs located in regional areas are affected by circumstances inherent to their location. Regional areas are defined as geographical areas located outside metropolitan centres and major cities. Regional areas can be classified into inner and outer regions, remote and very remote areas. Determining the classification of a region is usually based on a formula which primarily relies on the measures of proximity to services in terms of physical distance, and population size. Rather than remote and rural areas (which are sparsely populated), the research presented in this paper focuses on inner and outer regional areas (which are more urbanised).

Regional areas are of particular interest to governments because they are characterised by high unemployment rates (Larsson et al., 2003), a shortage of skilled people, limited access to resources and a lack of infrastructure (Keniry et al., 2003). Yet, at the same time, businesses located in regional areas often play a major role in developing these areas. This potential has not gone unnoticed by government organisations. The European Union views SMEs as a catalyst for regional development (Europa, 2003). In 2001, the Swedish Parliament passed legislation that resulted in the creation of Regional Development Councils (Johansson, 2003). The Councils have a mandate to promote a positive business climate and sustainable growth in their respective regions. SMEs have been earmarked as playing an important role in promoting growth because they are seen as a key source of

jobs and employment prospects (Keniry et al., 2003; Larsson et al., 2003).

To encourage growth and development in regional areas, government organisations have been heavily promoting the adoption of information and communication technology by SMEs, including e-commerce technology. This has primarily been undertaken by funding projects that assist SMEs in their adoption of e-commerce technologies. These projects have ranged from simple Internet adoption to the establishment of virtual business networks (Damanpour, 2001; Jeffcoate et al., 2002).

Barriers to E-commerce Adoption in SMEs

Stockdale & Standing (2004) suggest that many SMEs are not achieving even minimal levels of E-commerce adoption. They add that despite the many government-led initiatives, barriers to E-commerce continue to exist rendering adoption levels lower than initially predicted.

Like the unique features of SMEs, the barriers to E-commerce adoption can be classified as external or internal to the business. Hadjimanolis (1999), in a study of E-commerce adoption by SMEs in Cyprus, considers that barriers to adoption can be categorised as either external or internal to the organisation. External barriers include difficulties in obtaining finance, difficulties in obtaining technological information and difficulties choosing the appropriate hardware and software. These difficulties he terms supply barriers. He further nominates two other sub-categories of external barriers that he terms demand barriers and environmental barriers. Demand barriers found by Hadjimanolis include E-commerce not fitting with products and services offered or not fitting with the way their customers wished to conduct their business. Environmental barriers found by Hadjimanolis included complicated governmental regulations and security concerns.

ID	Features Unique to SMEs	Reported by
	<i>Features Related to Management, Decision Making and Planning Processes</i>	
INT 1	SMEs have small and centralised management with a short range perspective	Welsh & White (1981) Bunker & MacGregor (2000)
INT 2	SMEs have poor management skills	Blili & Raymond (1993)
INT 3	SMEs exhibit a strong desire for independence and avoid business ventures which impinge on their independence	Reynolds et al (1994) Dennis (2000)
INT 4	SME Owners often withhold information from colleagues	Dennis (2000)
INT 5	The decision making process in SMEs is intuitive, rather than based on detailed planning and exhaustive study	Reynolds et al (1994) Bunker & MacGregor (2000)
INT 6	The SME Owner(s) has/have a strong influence in the decision making process	Reynolds et al (1994) Bunker & MacGregor (2000)
INT 7	Intrusion of family values and concerns in decision making processes	Reynolds et al (1994) Dennis (2000) Bunker & MacGregor (2000)
INT 8	SMEs have informal and inadequate planning and record keeping processes	Markland (1974) Rotch (1981) Reynolds et al (1994) Miller & Besser (2000) Tetteh & Burn (2001)
	<i>Features Related to Resource Acquisition</i>	
INT 9	SMEs face difficulties obtaining finance and other resources, and as a result have fewer resources	Welsh & White (1981) Cragg & King (1993) Blili & Raymond (1993) Gaskill & Gibbs (1994) Reynolds et al (1994)
INT 10	SMEs are more reluctant to spend on information technology and therefore have limited use of technology	MacGregor & Bunker (1996) Abell & Limm (1996) Poon & Swatman (1997) Walczuch et al (2000) Dennis (2000)
INT 11	SMEs have a lack of technical knowledge and specialist staff and provide little IT training for staff	Welsh & White (1981) Blili & Raymond (1993) Cragg & King (1993) Reynolds et al (1994) Bunker & MacGregor (2000) Martin & Matlay (2001)
	<i>Features Related to Products/Services and Markets</i>	
EXT 1	SMEs have a narrow product/service range	Reynolds et al (1994) Bunker & MacGregor (2000)
EXT 2	SMEs have a limited share of the market (often confined towards a niche market) and therefore heavily rely on few customers	Reynolds et al (1994) Lawrence (1997) Hadjimonolis (1999) Quayle (2002)
EXT 3	SMEs are product oriented, while large businesses are more customer oriented	Reynolds et al (1994) MacGregor et al (1998) Bunker & MacGregor (2000)
EXT 4	SMEs are not interested in large shares of the market	Reynolds et al (1994) MacGregor et al (1998)
EXT 5	SMEs are unable to compete with their larger counterparts	Lawrence (1997)
	<i>Features Related to Risk Taking and Dealing with Uncertainty</i>	
EXT 6	SMEs have lower control over their external environment than larger businesses, and therefore face more uncertainty	Westhead & Storey (1996) Hill & Stewart (2000)
EXT 7	SMEs face more risks than large businesses because the failure rates of SMEs are higher	Brigham & Smith (1967) Cochran (1981) DeLone (1988)
EXT 8	SMEs are more reluctant to take risks	Walczuch et al (2000) Dennis (2000)

Internal Features

External Features

Table 1: Features unique to small to medium enterprises (SMEs)

Hadjimanolis subdivided his internal barriers into two categories. These he termed resource barriers (which included lack of management enthusiasm and lack of technical expertise) and systems barriers (which included E-commerce not fitting with current business practices).

In a similar study, Lawrence (1997) defined three categories. These she termed company, personal and industry barriers.

Company barriers, found by Lawrence, included low level of technology use within the business, limited financial and technical resources available, organisational resistance to change and lack of perceived return on investment.

Barriers categorised as personal included lack of information on E-commerce, management preferring conventional approaches to business practice and inability to see the advantages of using E-commerce.

Industry barriers included some respondents believing that the industry, as a whole was not ready for E-commerce technology.

A number of other research initiatives, while not providing categories of perceived barriers have produced similar findings to those of Lawrence and Hadjiminolis. Puroo & Campbell (1998), who conducted a series of interviews with SME owners, found that major barriers included a failure to see any advantage in using E-commerce. They also found that lack of technical know how, prohibitive set up costs and security concerns were strong disincentives to many SME owner/managers. Abell & Lim (1996) found many SME owner/managers felt that E-commerce did not suit either their day-to-day business procedures or the product mix offered by their business.

In a cross-cultural study of SMEs in Hong Kong and Finland, Farhoomand et al (2000) found that both cultures reported a lack of technical know how and a failure

to see how E-commerce fitted the current mode of business practices.

Recent studies have shown that many of the barriers reported in the late 1990's by Lawrence and Hadjimanolis are still current in today's SMEs. Tambini (1999) and Eid et al (2002) found that SME managers are still not convinced that E-commerce fits the products or services that their businesses offer. Studies by Bakos & Brynjolfsson (2000), Sawhney & Zabin (2002), Merhtens et al (2001) have found that there is still a reluctance for SME managers to adjust their businesses to the requirements and demands placed on it by E-commerce participation. Bakos & Brynjolfsson (2000) and Kulmala et al (2002) found that many SMEs felt that E-commerce did not suit the current mix of customers while Chau & Hui (2001) have reported that many respondents did not see any advantage to using E-commerce in their businesses. Other barriers reported in the literature include a reported lack of technical know how (Mirchandani & Motwani 2001), security concerns (Oxley & Yeung 2001, Reimenschneider & McKinney 2001) and cost concerns (Ratnasingham 2000, Reimenschneider & McKinney 2001). A summary of different e-commerce adoption barriers in small businesses based on an extensive literature review is presented in Table 2.

Small Business Clusters and E-commerce Adoption

On the surface, it could be argued that all SMEs relate to others and thus are part of some form of small business cluster. Dennis (2000) suggests that any SME dealing with another must impinge on the decision making process even if these decisions involve the strengthening or relaxing of the relationships themselves. In this study, however, we take the more usual view that membership of small business cluster is conscious, interdependent and cooperative towards a predetermined set of goals (Nalebuff & Brandenberg 1996, Achrol & Kotler 1999).

Barriers to E-Commerce Adoption	Related Literature
High cost of implementation; Internet technologies too expensive to implement	Riquelme (2002) Van Akkeren & Cavaye (1999) Purao & Campbell (1998) Lawrence (1997) Iacovou et al (1995)
E-commerce is too complex to implement	Fielding (1996) Quayle (2002)
Small businesses require short-term ROI and e-commerce is long-term	Lawrence (1997) McGowan & Madey (1998)
Resistance to change because of the fear of new technology amongst employees	Van Akkeren & Cavaye (1999) Lawrence (1997)
Preference for and satisfaction with traditional manual methods (phone, fax, etc)	Lawrence (1997) Venkatesan & Fink (2002)
Lack of technical skills and IT knowledge amongst employees; Lack of computer literate/specialised staff	Riquelme (2002) Van Akkeren & Cavaye (1999) Lawrence (1997) Iacovou et al (1995) Quayle (2002) Damsgaard & Lyytinen (1998)
Lack of time to implement e-commerce	Van Akkeren & Cavaye (1999) Lawrence (1997) Walczuch et al (2000)
E-commerce not deemed to be suited to the way the organisation does business, or the way our clients do business	Poon & Swatman (1997) Hadjimonolis (1999) Iacovou et al (1995)
E-commerce not deemed to be suited to the products/services	Poon & Swatman (1997) Hadjimonolis (1999)
E-commerce perceived as a technology lacking direction	Lawrence (1997)
Lack of awareness about business advantages/opportunities e-commerce can provide	Iacovou et al (1995) Quayle (2002)
Lack of available information about e-commerce	Lawrence (1997)
Concern about security of e-commerce	Riquelme (2002) Van Akkeren & Cavaye (1999) Purao & Campbell (1998) Hadjimonolis (1999) Quayle (2002)
Lack of critical mass among customers, suppliers and business partners	Hadjimonolis (1999)
Heavy reliance on external consultants (often considered by small businesses to be inadequate) to provide necessary expertise	Van Akkeren & Cavaye (1999) Lawrence (1997)
Lack of e-commerce standards	Tuunainen (1998) Robertson & Gatignon (1986)

Table 2: Summary of e-commerce adoption barriers in small businesses

Viewed then as ‘self designing’ partnerships Eccles & Crane (1998 cited in Dennis 2000) suggest that strategic alliances are a dynamic arrangement evolving and adjusting to accommodate changes in the business environment. Achrol & Kotler (1999) take this a step further by stating that strategic alliances

‘ are more adaptable and flexible because of loose coupling and openness to information. Environmental disturbances transfer imperfectly through loose coupled networks and tend to dissipate in intensity as they spread through the system’ (p 147)

Thus member organisations have interconnected linkages that allow more efficient movement towards predetermined objectives than would be the case if they operated as a single separate entity. By developing and organising functional components strategic alliances/clusters provide a better mechanism to learn and adapt to changes in their environment.

In addition to providing much needed information alliances often provide legitimacy to their members. For businesses that provide a service and whose products are intangible, company image and reputation becomes crucial since customers can rarely test or inspect the service before purchase. Cropper (1996) suggests that alliance or cluster membership very often supplies this image to potential customers.

The advent of E-commerce has given rise to a 'new wave' of research examining the role of small business clusters, particularly in SME's. Much of this research has been prompted by the realisation that old hierarchical forms of company organisation produced relationships which are too tightly coupled (Marchewka & Towell 2000), and do not fit an often turbulent marketplace (Overby & Min 2000, Tikkanen 1998).

Schindehutte & Morris (2001) state that organisations, particularly SMEs, survive or fail as a function of their adaptability to the marketplace. Those organisations that can interpret patterns in the environment and adapt their structure and strategy to suit those changing patterns will survive. While adaptability may be a function of prior experience or business sector focus, in the SME sector adaptability often relies on cluster partners.

There are many definitions of alliances in the literature. Dennis (2000) suggests that they

“..are dynamic arrangement(sic) that are constantly evolving and adjusting in order to accommodate changes in the business environment. Member companies have interconnected

linkages that allow them to move more efficiently towards set objectives than those operating as a separate entity” (p287)

She adds that while all companies form relationships with suppliers, customers etc., it is the extent of the closeness, interdependence and consciousness of these relationships that determines whether they are truly part of an alliance. This definition implies that only those interorganisational links that have formal governance can be termed strategic alliances. By comparison, Yeung (1994) defines an alliance as

“an integrated and coordinated set of ongoing economic and non-economic relations embedded within, among and outside business firms.” (p 476)

Thus for Yeung an alliance is not only a structure but embodies processes between organisations. These processes may be formal economic processes or may be informal cooperative relationships, sharing expertise and know-how. Indeed, Dahlstrand (1999) suggests that informal links may be conscious or unconscious mechanisms.

While recent studies (Keeble et al 1999, O'Donnell et al 2001, Overby & Min 2001) stress the importance of informal interorganisational links, the definition of these links in small business varies widely. As this chapter has as its focus SME alliances with some implied form of governance (be they organisationally linked small businesses or firms who have made use of small business associations), the definition provided by Achrol & Kotler (1999) will be adopted, viz.

“an independent coalition of task- or skill-specialised economic entities (independent firms or autonomous organisational units) that operates without hierarchical control but is embedded by dense lateral connections, mutuality, and reciprocity, in a shared value system that defines “membership” roles and responsibilities” (p 148).

As with the origin and definition of alliances, there are a number of differing taxonomies in the literature. These taxonomies are normally based on structure, process or power. It is appropriate to consider each of these styles of classification.

Structure

Veradarajan & Cunningham (1995) suggest that clusters or alliances can be subdivided into four groups:

Functional (linking functional aspects of organisations that result in joint manufacturing, marketing or product development). These tend to share knowledge, information and resources.

Intra-interorganisational (developing relationships either nationally or internationally). These share information.

Intra-interindustry (building relationships through resource pooling). These share resources.

Motivational (sharing of marketing and technological know-how). These tend only to share knowledge.

This is similar to the subdivisions suggested by O'Donnell et al (2002) who termed their subdivisions vertical, horizontal, industrial and social.

Process

Whereas Veradarajan & Cunningham subdivided clusters or alliances in terms of structure, Johannisson et al (2002) suggest that they can be subdivided into four groups based on process. The four groups are:

resource-based (each firm controls their own unique resources which are combined to strategic advantage),

industrial organisation (firms as autonomous entities establishing their own unique market position),

virtual organisation (independent yet interdependent organisations striving for joint variety using advanced technology),
industrial district (small firms characterised by production type, organised for internal cooperation and external competition).

Achrol & Kotler (1999) suggested that clusters or alliances can be subdivided in terms of process. They provide four types: internal (designed to reduce hierarchy and open firms to the environment),

vertical (cluster that maximise the productivity of serially dependent functions by creating partnerships among independent skill-specialised firms),

intermarket (clusters that seek to leverage horizontal synergies across industries),

opportunity (clusters that are organised around customer needs and market opportunities and are designed to seek the best solutions to them).

Power

Dennis (2000) considers power to be the most important factor upon which to classify alliances. She provides two classifications

dominated (a group of smaller companies dominated by a single larger company),

equal partner (where there is no governing partner and each relationship is based on reciprocal, preferential, mutually supportive actions).

An obvious bi-product of cluster taxonomies is the analysis of organisations which form the various types. Golden & Dollinger (1993) in an exploration of business relationships concluded that

“differences in strategic postures are associated with differences in the quality and type of intraorganisational relationships” (p52).

This is particularly apparent in smaller organisations. Jarratt (1998) suggests that particular strategic postures lead organisations to adopt particular alliance forms. She suggested that there were four distinct categories of strategic posture, termed:

defender (were more likely to select conjugate relationships),

prospector (who were more likely to select confederate relationships),

analyser (more likely to select agglomerate relationships),

reactor (whose business relationships were unpredictable).

Properly utilised, formal alliances can provide a number of advantages over stand-alone organisations. These include the sharing of financial risk (Jorde & Teece 1989), technical knowledge (Marchewka & Towell 2000), market penetration (Achrol & Kotler 1999) and internal efficiency (Datta 1988).

Early studies of SME alliances (Gibb 1993, Ozcan 1995) concentrated on formal alliances, indeed Golden & Dollinger (1993), in a study of small manufacturing firms concluded that few small firms were able to function without some form of inter-organisational relationship having been established. They added that these inter-organisational relationships were associated with successful strategic adaptation by small businesses. Dean et al (1997) suggested that formal alliances were used by SMEs to

“pool resources and talents together to reap results which would not be possible (due to cost constraints and economies of scale) if the enterprise operated in isolation.” (p 78)

In the 1990s many SME alliances took a more semi-formal' approach. Local or government agencies such as small business associations and chambers of commerce provided a formal umbrella in the form of advisory services that assisted in legal, financial, training or technical

advice. Individual members operated formally with the umbrella organisation but could interact informally with fellow members.

While researchers, government agencies and practitioners have continued to examine and refine both formal and semi-formal alliances, recent literature (Rosenfeld 1996, Premaratne 2001) suggests that informal or social linkages may provide a higher and more stable flow of information and resources in the small business environment.

Thorelli (1986) states that central to the concept of formal approaches is the distribution of power which he defines as the ability to influence the decision of others. The five factors he cites as the potential sources of power for members are economic base, technology, expertise, trust and legitimacy. Miles et al (1999) suggest that for SMEs the decision to join an alliance comes from a perception of goals by the individual organisation. If the organisation sees itself as strong in its own right, an alliance may be seen as an option to increase that strength. The distribution of power moves in favour of the strong organisation allowing it to capitalise and influence weaker members without losing its own identity.

If, on the other hand, the organisation sees itself as weak, an alliance may be a necessity in order to survive and compete in the larger marketplace. For these organisations the distribution of power works away from them leaving them in a weak position in exchange relationships.

This of course varies from alliance to alliance. In a small alliance (few participating organisations) there is more likely to be an asymmetric relationship between partners. As the size of the alliance increases there are a greater number of potential partners, providing a greater chance to benefit for all members.

The Role of Alliances or Clusters in E-commerce Adoption

As already mentioned, the advent of E-commerce has given rise to a number of research initiatives examining the role of small business strategic alliances or clusters in the adoption of E-commerce.

A study by Wheelen & Hunger (2002) found that membership of some form of small business strategic alliance allowed businesses to concentrate on their distinctive competencies while gathering efficiencies from the other firms in the cluster, who, likewise, were concentrating their efforts in their own areas of expertise. They, they found particularly applicable to the adoption and use of E-commerce.

Studies by Cirillo (2000) and Terziovski (2003) found that membership of a strategic alliance allowed features such as supply chain management, logistics etc. to be managed more easily than stand-alone businesses.

A number of studies in the UK and Europe (Daniel et al 2002, Daniel & Wilson 2002, Ciappei & Simoni 2005) have shown that greater success with E-commerce use appears to occur through membership of a cluster or strategic alliance. These results have been mirrored in the USA (Singh & Gilchrist 2002), while a recent study comparing strategically aligned and stand-alone SMEs (MacGregor et al 2005) showed that while there were no significant difference in benefits enjoyed by both groups, membership of a strategic alliance appeared to 'dampen' problems incurred, compared to stand-alone businesses.

While research examining barriers to E-commerce adoption has identified many that prevent SMEs implementing E-commerce, there have been few attempts to correlate these into logical groupings, nor to determine whether these groupings are impacted by membership/non-membership of a small business cluster.

Methodology

Ten barriers to E-commerce adoption were gathered from the literature. A series of 6 in-depth interviews was undertaken to determine whether the barriers were applicable and complete. All barriers were found to be applicable and no additional barriers were forthcoming. Based on the findings of the 6 in-depth interviews, a survey instrument was developed for SME managers. The survey was used to collect data about, amongst other things, the barriers to E-commerce adoption in SMEs. Those barriers which were reported as having a greater than 50% response as important were included in the survey (refer to Figure 1). The respondents who had not adopted E-commerce were asked to rate the importance of each barrier to their decision not to adopt E-commerce. A standard 5 point Likert scale was used to rate the importance with 1 meaning very unimportant and 5 meaning very important. Respondents were also asked whether they were part of a small business cluster or not.

As the survey was intended to examine the barriers to E-commerce adoption in regional SMEs, the location of the respondents needed to be considered. A set of location guidelines was developed. These were:

- The location must be a large regional centre rather than a capital city
- A viable government initiated chamber of commerce for SMEs must exist and be well patronised by the SME community
- The location should have the full range of educational facilities.
- The business community represented a cross-section of business ages, sizes, sectors and market foci.
- The SME community included those that had adopted as well as not adopted E-commerce.

The location chosen was Karlstad Sweden which met all the guidelines and contained personnel that could assist in the distribution and re-gathering of survey materials. A total of 1170 surveys were distributed by post.

Results

Responses were obtained from 313 SME organisations in Sweden giving a response rate of 26.8%. From these, 275 responses were considered to be valid and usable. The total number non-adopters (i.e. SMEs not using E-commerce) was 123, representing 44.7% of the valid responses. An inspection of the frequencies indicated that the full range of the scale was utilised by respondents (i.e. every barrier had at least on instance of each rating from 1 to 5).

The first aim of the statistical analysis was to establish correlations between the E-commerce adoption barriers. These are shown in Table 3.

The correlation matrix shows an interesting pattern of results. The first four barriers seem to all correlate with each other, but show weak or no correlations with the last set of barriers. Similarly, it appears that correlations exist between the last five barriers in the

Correlation Matrix. Therefore, two distinct groupings of results can be identified in the Correlation Matrix. In the first grouping, there is a strong positive correlation between the barriers “E-commerce is not suited to our products/ services” and “E-commerce is not suited to our way of doing business” (Pearson’s $r = .747$, $p < .000$). These two barriers also show moderately strong positive correlations with the barriers “E-commerce is not suited to the ways our clients (customers and/or suppliers) do business” and “E-commerce does not offer any advantages to our organisation”. In the second grouping, the barriers relating to the investment, time, number of options, complexity and security aspects of E-commerce adoption generally show moderately strong positive correlations with each other. However, the barriers within these two groupings appear to be unrelated to the barriers in the alternate group, with the exception of very weak correlations for the barrier relating to security and time.

23. This question relates to the reasons why your organisation is not be using E-commerce. Below is a list of statements indicating possible reasons. Based on your opinion, please rank each statement on a scale of 1 to 5 to indicate how important it was to your decision NOT to use E-commerce, as follows:

- 1 = the reason was very unimportant to your decision not to use E-commerce**
- 2 = the reason was unimportant to your decision not to use E-commerce**
- 3 = the reason was neither unimportant nor important to your decision not to use E-commerce**
- 4 = the reason was important to your decision not to use E-commerce**
- 5 = the reason was very important to your decision not to use E-commerce**

Our organisation does not use E-commerce because:	Rating				
E-commerce is not suited to our products/ services.	1	2	3	4	5
E-commerce is not suited to our way of doing business.	1	2	3	4	5
E-commerce is not suited to the ways our clients (customers and/or suppliers) do business.	1	2	3	4	5
E-commerce does not offer any advantages to our organisation.	1	2	3	4	5
We do not have the technical knowledge in the organisation to implement E-commerce.	1	2	3	4	5
E-commerce is too complicated to implement.	1	2	3	4	5
E-commerce is not secure.	1	2	3	4	5
The financial investment required to implement E-commerce is too high for us.	1	2	3	4	5
We do not have time to implement E-commerce.	1	2	3	4	5
It is difficult to choose the most suitable E-commerce standard with so many different options available.	1	2	3	4	5

Figure 1: Question about barriers to E-commerce adoption used in survey

Correlation Matrix

	barr - not match prod/serv	barr - not fit our way of working	barr - not fit cust way of working	barr - no advantages	barr - no knowledge	barr - complicated technique	barr - doubt security	barr - investment too high	barr - no time
barr - not fit our way of working	.746								
barr - not fit cust way of working	.462	.530							
barr - no advantages	.482	.547	.280						
barr - no knowledge	-.030	.054	-.097	0.249*					
barr - complicated technique	-.009	.059	.065	.106	.544				
barr - doubt security	0.184*	0.303**	.098	0.249*	0.277*	.516			
barr - investment too high	-.051	-.138	.092	-.104	.445	.481	0.217*		
barr - no time	-0.245*	-0.261**	-.056	-0.195*	.432	.587	.174	.448	
barr - many choices	-.056	-.005	-.033	.062	.514	.579	.334	.494	.532

* Correlation is significant at the 0.05 level

** Correlation is significant at the 0.01 level

Table 3: Correlation Matrix of E-commerce adoption barriers, Sweden

These findings suggested the use of Factor Analysis to investigate any separate underlying factors and to reduce the redundancy of certain barriers indicated in the Correlation Matrix. The results of Kaiser-Meyer-Olkin MSA (.735) and Bartlett’s Test of Sphericity ($\chi^2 = 343, p = .000$) indicated that the data set satisfied the assumptions for factorability. Principle Components Analysis was

chosen as the method of extraction in order to account for maximum variance in the data using a minimum number of factors. A two-factor solution was extracted with Eigenvalues of 3.252 and 2.745, and was supported by an inspection of the Screen Plot. These two factors accounted for 59.973% of the total variance as shown in Table 4.

Rotation Sums of Squared Loadings			
Component	Eigenvalue	% of Variance	Cumulative %
1 (Too Difficult)	3.252	32.520	32.520
2 (Unsuitable)	2.745	27.453	59.973

Table 4: Total Variance Explained

The two resulting components were rotated using the Varimax procedure and a simple structure was achieved as shown in the Rotated Component Matrix in Table 5. Five barriers loaded highly on the first component. These barriers are related to the complexity of implementation techniques, range of E-commerce options, high investments and the lack of technical knowledge and time. This component has been termed the “Too Difficult” factor. The barriers highly loaded on the second component are termed the “Unsuitable” factor and are related to the suitability of E-commerce to the respondent’s business, including the extent E-commerce matched the SME’s products/services, the organisation’s way of doing business, their

client’s way of doing business and the lack of advantages offered by E-commerce implementation. These two factors are independent and uncorrelated, as an orthogonal rotation procedure was used. It is interesting to note that the barrier relating to security loaded on both factors, although the loading on the “Too Difficult” factor was slightly higher.

The data was then subdivided into two groups, members of a small business cluster (N=63) and non-members of a small business cluster (N=60). A similar approach was taken with the two sets of data (see Tables 6 & 7 – correlation matrices).

	Component 1 (Too Difficult)	Component 2 (Unsuitable)
E-commerce is not suited to our products/ services.	-.086	.844
E-commerce is not suited to our way of doing business.	-.034	.909
E-commerce is not suited to the ways our clients (customers and/or suppliers) do business.	-.004	.643
E-commerce does not offer any advantages to our organisation.	.076	.731
We do not have the technical knowledge in the organisation to implement E-commerce.	.743	.074
E-commerce is too complicated to implement.	.852	.102
E-commerce is not secure.	.525	.385
The financial investment required to implement E-commerce is too high for us.	.703	-.092
We do not have time to implement E-commerce.	.742	-.294
It is difficult to choose the most suitable E-commerce standard with so many different options available.	.800	-.054

Table 5: Rotated Component Matrix

	Barr – not match prod/serv	Barr – not fit our way of working	Barr – not fit cust’s way of working	Barr – no advantage	Barr – no knowledge	Barr – complicated technique	Barr – doubt security	Barr – investment too high	Barr – no time
Barr – not fit our way of working	.603								
Barr – not fit cust’s way of working	.607	.566							
Barr – no advantage	.455	.547	.248*						
Barr – no knowledge	.207	.307*	.320*	.402**					
Barr – complicated technique	.297*	.384**	.531	.314*	.635				
Barr – doubt security	.388**	.547	.546	.329*	.513	.718			
Barr – investment too high	-.055	-.128	.080	-.121	.466	.477	.279*		
Barr – no time	.298*	.327**	.458	.217	.576	.796	.594	.459	
Barr – many choices	.380**	.414**	.548	.329**	.653	.763	.631	.485	.757

Table 6: Member of a small business cluster

	Barr – not match prod/serv	Barr – not fit our way of working	Barr – not fit cust’s way of working	Barr – no advantage	Barr – no knowledge	Barr – complicated technique	Barr – doubt security	Barr – investment too high	Barr – no time
Barr – not fit our way of working	.745								
Barr – not fit cust’s way of working	.716	.801							
Barr – no advantage	.759	.790	.762						
Barr – no knowledge	.309*	.266*	.295*	.405**					
Barr – complicated technique	.476	.427**	.485	.479	.607				
Barr – doubt security	.593	.541	.579	.630	.495	.851			
Barr – investment too high	-.053	-.132	.085	-.114	.455	.488	.277*		
Barr – no time	.329**	.260*	.415**	.386**	.450	.683	.626	.458	
Barr – many choices	.266*	.342**	.443	.292*	.436	.647	.582	.495	.547

Table 7: Not a member of a small business cluster

Again, both sets of data suggested the use of Factor Analysis to investigate any separate underlying factors and to reduce the redundancy of certain barriers indicated in the Correlation Matrix. The results of Kaiser-Meyer-Olkin MSA (.856 for non-members, .852 for members) and Bartlett’s Test of Sphericity ($\chi^2 = 404$, $p =$

.000 for non-members and $\chi^2 = 331$, $p = .000$ for members) indicated that the data set satisfied the assumptions for factorability. For both sets of data, again, a two-factor solution was extracted. Table 8 shows the total variance.

	Component	Eigenvalue	% Variance	Cumulative %
Non-members	Too difficult	1.538	17.086	17.086
	Unsuitable	5.218	57.974	75.060
Members	Too difficult	4.895	54.389	54.389
	Unsuitable	1.407	15.629	70.018

Table 8: Total Variance Explained

Discussion

An examination of Tables 3 & 4 indicates that correlations between barriers to E-commerce adoption exist and enable the grouping of barriers according to two factors. These factors have been termed “Too Difficult” and “Unsuitable”. The “Too Difficult” factor is related to the barriers which make E-commerce complicated to implement, including barriers such as the

complexity of E-commerce implementation techniques, the difficulty in deciding which standard to implement because of the large range of E-commerce options, the difficulty obtaining funds to implement E-commerce, the lack of technical knowledge and difficulty in finding time to implement E-commerce. The “Unsuitable” factor, on the other hand, is related to the perceived unsuitability of E-commerce to SMEs.

These barriers include the unsuitability of E-commerce to the SME's products/services, way of doing business, and client's way of doing business, as well as the lack of perceived advantages of E-commerce implementation. Finally, the security barrier was found to be related to both factors, although the factor loading of this barrier was higher in relation to the "Too Difficult" factor (.525).

The results of this study are significant in several ways. The analysis has shown that ten of the most common barriers to e-commerce adoption can be grouped in relation to two main factors. This gives researchers a powerful explanatory tool because it reduces the "noise" in the data. Instead of accounting for ten different barriers, the inhibitors to e-commerce adoption can be explained as a result of one of two factors: e-commerce is either too difficult or unsuitable to the business. The Rotated Component Matrix also enables the prediction of the scores of each individual barrier based on the score of the two factors, and vice versa, for an SME. This has implications for research into e-commerce barriers. Whereas before researchers have identified various barriers (such as the ones listed in Table 2), this is the first time a study has shown that certain barriers are correlated and can be logically grouped according to two factors. This makes it simpler not only to explain, but also predict barriers to e-commerce adoption in SMEs.

An examination of Table 8 shows that while the two factors "Too Difficult" and "Unsuitable" still underpin the barriers to E-commerce adoption, the priority placed on the two factors is substantially different. 54.389% of members of a small business cluster indicated that their main reason for not adopting E-commerce is that the technology is too difficult. By comparison, only 17.086% of the non-members felt that this was their primary reason for non-adoption. Likewise, while 15.629% of the member respondents felt that E-commerce was unsuitable for their particular business, 57.974% of the non-member respondents gave this as their primary concern.

A number of authors (Marchewka & Towell 2000, Achrol & Kotler 1999, Dean et al 1997) suggest that small business clusters assist members by sharing technical knowledge, talent and skills. An examination of the data in Table 7 would tend to refute this, at least for the respondents of this study. A number of explanations are possible. One possibility is that as this study was conducted in a regional area, technical assistance may be less available or adequate than might be expected in a metropolitan setting. Another possibility is that while membership of a small business cluster has reduced both the technical and organisational concerns, the substantial reduction in the organisational factors may have rendered the technical to a greater prominence.

A number of studies (Schindehutte & Morris 2001, Overby & Min 2001, Wheelen & Hunger 2001, Cirillo 2000, Terziovski 2003) have shown that one of the major benefits of a small business cluster is to 're-shape' the organisation to prepare it for adoption of E-commerce technologies. This re-shaping included the development of functions such as supply chain management, logistics etc. It is interesting to note that while 57.97% of the non-member respondents' concerns were organisational, only 15.63% of the member respondents' concerns were related to organisational fit. This would tend to support the views of these earlier findings.

Limitations of the study

It should be noted that this study has several limitations. The data for the study was collected from regional SMEs in Sweden. Therefore, although conclusions can be drawn, the results may not be generalisable to SMEs in other countries. Also, the data for the study was collected from various industry sectors and it is not possible to make sector specific conclusions. Finally, this is a quantitative study, and further qualitative research is required to gain a better understanding of the key issues.

Conclusion

The aim of this study was twofold: to examine the correlation between barriers to E-commerce adoption in order to identify underlying factors; and to determine whether these differ between SMEs that are members of a small business cluster and SMEs that are not. To this end, the unique features of SMEs were presented and mapped to E-commerce adoption barriers indicating a potential relationship between the two. Further investigation is required to identify the exact nature of this relationship. Correlation and factor analyses were then performed on the data set of barriers from a study of Swedish SMEs to determine whether any correlations between the barriers existed. The Correlation Matrix indicated two distinct sets of groupings and a two-factor solution was extracted using factor analysis. It was found that ten E-commerce barriers could be grouped according to two factors. These were termed "Too Difficult" and "Unsuitable". The data also showed that while the two factors "Difficult" and "Unsuitable" were appropriate to both members and non-members, there was a distinct shift in emphasis between the two groups.

The study presented in this paper is only one part of a larger long-term project investigating the drivers and barriers to E-commerce adoption in SMEs. Further research is currently being undertaken in order to overcome some of the limitations outlined above. Specifically, the survey instrument is being replicated in two regional areas in Australia, the US and Indonesia, which will provide comparable results.

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