
The University of Bradford Institutional Repository

<http://bradscholars.brad.ac.uk>

This work is made available online in accordance with publisher policies. Please refer to the repository record for this item and our Policy Document available from the repository home page for further information.

To see the final version of this work please visit the publisher's website. Where available, access to the published online version may require a subscription.

Author(s): Lockett, N. and Brown, D.H.

Title: The Potential of Critical E-Applications for Engaging SMEs in E Business: A Provider Perspective

Publication year: 2004

Journal title: European Journal of Information Systems

ISSN: 0960-085X

Publisher: Palgrave Macmillan

Citation: Lockett, N. and Brown, D.H. The Potential of Critical E-Applications for Engaging SMEs in E Business: A Provider Perspective. European Journal of Information Systems. Vol. 13, No. 1, pp. 21-34.

Link to published version: <http://www.palgrave-journals.com/ejis/journal/v13/n1/abs/3000480a.html>

Copyright statement: © 2004 Palgrave Macmillan. Reproduced in accordance with the publisher's self-archiving policy.

This is a post-peer-review, pre-copyedit version of an article published in European Journal of Information Systems. The definitive publisher-authenticated version (Lockett, N. and Brown, D.H. The Potential of Critical E-Applications for Engaging SMEs in E Business: A Provider Perspective. European Journal of Information Systems. Vol. 13, No. 1, pp. 21-34.) is available online at: <http://www.palgrave-journals.com/ejis/journal/v13/n1/abs/3000480a.html>

The Potential of Critical E-Applications for Engaging SMEs in E-Business: A Provider Perspective

Prof David Brown and Dr Nigel Lockett

Abstract

Against a background of the low engagement of SMEs in e-business this paper investigates the emergence of, and potential for, critical e-applications defined as ‘an e-business application, promoted by a trusted third party, which engages a significant number of SMEs by addressing an important shared business concern within an aggregation.’ By a review of secondary data and empirical investigation with service providers and other intermediaries the research shows that such applications can facilitate the e-business engagement of SMEs. There are three key findings, namely: the emergence of aggregation specific e-business applications; the emergence of collaboratively based ‘one to many’ business models; and the importance of trusted third parties in the adoption of higher complexity e-business applications by SMEs. Significantly this work takes a deliberately provider perspective and complements the already considerable literature on SME IT adoption from a user and network perspective. In terms of future research the importance of a better conceptual understanding of the impact of complexity on the adoption of IT by SMEs is highlighted.

KEYWORDS: SME; aggregation; networks; e-business; IT adoption; intermediaries

Introduction

The purpose of this paper is to report recent research that seeks to deepen our understanding of the e-business engagement by small and medium sized enterprises (SMEs) from a provider perspective and to do so in a way that informs both theory and practice. As is argued below in both these areas there are shortcomings and difficulties. In the case of theory the adoption of information technology (IT) by SMEs is largely concerned with a user perspective, with only limited recognition of the provider view. And in the case of practice the issue is the unexpected low levels of engagement of SMEs in e-business. Clearly both these areas are linked – the latter serving to highlight the limitations of the former.

The presentation and interpretation of this research is structured into four main parts. In the first part the current engagement by SMEs in e-business is reviewed and some of the problems are highlighted, particularly the neglected importance of application complexity. Because of the economic significance of the SME sector this review of e-business engagement is done within the context of government expectations.

The second part positions the research theoretically. In addition to the central concern of IT adoption within SMEs the research framework explicitly considers the theories of networks and aggregation since both of these provide a possible underpinning mechanism for the facilitation of e-business engagement by SMEs. Part three details the methodology and in particular the empirical design including the limitations. Finally, part four presents the research outcomes and the interpretation of these together with some implications for ongoing research.

SMEs and E-Business Engagement

E-Business as a concept has matured and can be defined as ‘the use of electronic communication networks to transact, process and collaborate in business markets’ – it incorporates e-commerce. Defining SMEs, however, can be problematic because of the many different international conventions. This paper adopts the European Union and UK convention which defines an SME as any business, which has less than 250 employees (SBS 2003). The economic importance of such enterprises is widely recognised. Within the EU there are over 18 million SMEs generating 67 percent of the employment and 59 percent of the total GDP (CORDIS 2002); in the UK alone the equivalent figures are 3.7 million SMEs generating 55 percent employment and 51 percent of the GDP (SBS 2002). With such an important role in the creation of national wealth it isn’t surprising that governments pay attention to those factors, such as emerging e-business technologies, which could affect this sector’s performance.

Before the Internet electronically facilitated commercial activity was based on proprietary networks, such as EDI, and was mainly the province of larger companies for reasons of cost. However, the advent of the Internet offered relatively low cost access to network infrastructure, and hence new channels to market, which appeared to be particularly promising for smaller enterprises (Kalakota and Whinston 1996). This has been acknowledged by both international agencies (OECD 1998) and national governments. For example in the UK the Government set three clear targets for the engagement of SMEs in e-business by 2002 (DTI 2002):

- The first was to ensure the connectivity of 1.5 million SMEs. Connectivity measures the number of businesses within the benchmarked countries (US, Canada, Japan, Germany, Australia, France, Italy and Sweden) that either have a website, make frequent use of external e-mail or use electronic data interchange (EDI). In the UK the target has already been exceeded and totalled 1.9 million by mid 2001.
- In contrast the second target of 1 million SMEs trading online was not met with just 490,000 trading online by end of 2002. A business is defined as trading online if it is engaging in both ordering and paying online with either customers or suppliers. A recent international benchmarking study highlighted

the 'stalling or in some cases declining, willingness of businesses to trade online' (Booz Allen Hamilton 2002: 116) and noted that this was particularly evident in small businesses and in the UK.

- The third target of reaching parity with the best world practice was expressed in terms of SMEs' progress up a five stage 'adoption ladder' with each stage representing an increase in complexity. The stages are: (1) email (2) website (3) e-commerce (i.e. trading online) (4) e-business (i.e. integrated supply chain) and (5) transformed organisation (i.e. new business models based on interworking between organisations).

For this third target, because the adoption rate is believed to be so low, the Government has not tried to measure engagement in higher complexity applications beyond e-commerce (stage 3). The other leading economies against which the UK was benchmarked exhibit similar traits, namely that with the ever-increasing complexity of e-business applications SMEs are proving slow to engage beyond elementary email and Web hosting services (DTI 2002). This conclusion is further supported by earlier independent research (Poon and Swatman 1999). In the absence of any national statistics the North West of England provides confirmation of the low uptake of the more complex forms of e-business amongst SMEs. In Lancashire West by 2001 only 1.3 percent of firms were networked with suppliers as part of a formal e-supply chain (Davies 2001).

This failure of SMEs to engage in the more complex e-business applications was unexpected by both academics and policymakers alike. It was anticipated that large organisation's e-practices would migrate and influence the behaviour of SMEs. In selected instances, such as the motor and aerospace industries, there is some emerging evidence that this is occurring but it is clearly not widespread (Booz Allen Hamilton 2002). From a theory perspective the issues are significant and suggest that our understanding of small firm behaviour and in particular their adoption of information and communications technologies (ICT), either alone or within sector aggregations, is too limited. To date well cited research on ICT adoption by SMEs (e.g. Cragg and King 1993; Iacovou et al 1995; Kendal et al 2001; Poon and Swatmann 1999) is characterised by a user perspective and by a focus on the technical or organisational factors underpinning adoption, rather than the influence of application complexity on the adoption decision. In all cases such research takes as the unit of analysis the individual enterprise, and then combines the results to draw conclusions.

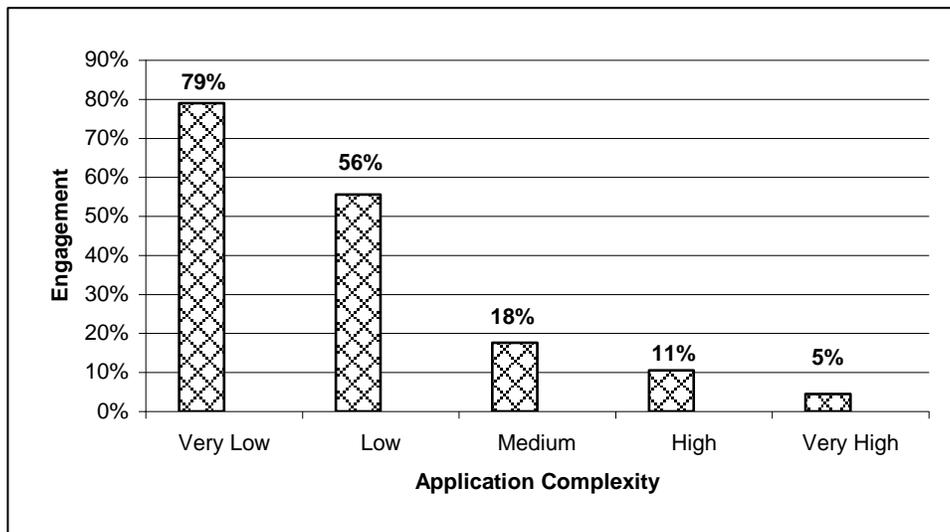
The above clearly suggests that a discussion of application complexity is important in the context of engaging SMEs. A taxonomy of application complexity which goes beyond the UK Government linear classification suggested above is shown in Table 1, together with examples of applications. Using this classification, and the most recently available survey data, the authors have analysed e-business engagement by SMEs in terms of application complexity and this is shown in Figure 1.

Table 1. Classification of E-Business Application Complexity (Lockett & Brown 2001)

Proposed Classification		Examples	Complexity
Communication	COM	E-Mail, Web Access	Very Low
Marketing	MAR	Web site	Low
Productivity	PRO	MS Office, Intranet	Low
E-Commerce	E-C	Buying & Selling On-line	Medium
Collaborative	COL	Extranet	Medium
Enterprise	ENT	Financials, SFA, Vertical Applications	High
Marketplace	M-P	E-Marketplaces	High
Collaborative Enterprise	C-E	eSCM, eCRM	Very High
Collaborative Platform	C-P	Emerging Platforms*	Very High

*Collaborative E-Business Platforms: E-Business Platform (SAP 2002) and E-Business Suite (Oracle 2003).

Figure 1. SMEs E-Business Engagement by Application Complexity (DTI 2002; EC 2002; Mazzi 2001)



In summary, the analysis in Figure 1, suggests that most SMEs appear comfortable with email and Web access (low complexity), are tentative with the use of the Internet for online buying and selling (medium complexity), but have little or no engagement in the high or very high complexity applications, such as e-marketplaces, supply chains or inter-organisational collaborative networks. This is despite the early promise of Application Service Providers (ASPs) facilitating such access to complex applications. Typically the small number of enterprises (11 percent or less) engaged in the more complex e-business applications appear to do so for two main reasons. Firstly they form part of an existing supply chain, many of which will have had previous EDI links, such as transport based SMEs supporting supermarket logistics. Secondly, there

are those companies that are required to do so by larger companies as the latter take steps to migrate to Web-based supply networks – the automobile and defence industries being current examples. Hence the trend in Figure 1 is not merely surprising in terms of the early expectations of engagement, but raises the important question of what this relative lack of engagement will mean not only for SMEs but also the larger organisations that have significant numbers of SMEs in their supplier networks.

In sharp contrast to SMEs is the experience of larger organisations in their adoption of e-business applications. Frequently the e-business agenda has been provider led with large software companies (eg. Oracle, Peoplesoft, SAP) supplying, or jointly developing systems such as Enterprise Resource Planning (eERP) and Customer Relationship Management (eCRM), which support core business processes including planning, production, distribution and sales. The provision of these so called ‘critical applications’, most recently through Web-based technologies, has been central to the rapid adoption of e-business by large enterprises. Critical applications are so called because they purport to offer a route to ‘best practice’ that firms find difficult to ignore (SAP 2002; Oracle 2003). This isn’t to suggest that provider led innovation isn’t problematic – it can be especially when the importance of the role of the user is underestimated (Swan and Clark 1992; Robertson et al 1996). In reality the combination of a high level of implementation support from the provider, together with user commitment, IS experience and clarity of their own organisational processes and priorities can mitigate the implementation risk. But such a partnership is resource rich on both parties. For the provider this can be recovered in their pricing structures; for the user their size facilitates access to the necessary resources. Neither of these options are normally available to SMEs.

Summarising this first part of the paper the significant issue is the clear impact of application complexity on e-business adoption by SMEs and that this factor is largely absent in current theories of adoption. A complementary insight is the contrast with larger organisations in which the role of critical applications developed by providers has proved significant. It is against this background that the paper explores the potential of applications designed specifically to encourage SMEs to engage in higher complexity e-business applications. In the next part of the paper the research is positioned theoretically.

Theoretical Frameworks

The broad research setting for this work is the relative lack of engagement of SMEs in e-business; the focussed research area is the extent to which critical applications, electronically available on an e-networked basis, could facilitate such engagement. In terms of both informing the research design and the subsequent interpretation of the research data three main strands of theory are relevant. The first is the adoption of ICT by SMEs. The second is the concept of aggregation and of networks as an organisational form. The latter

provides the wider context within which the third strand of theory dealing with the emerging e-business models can be discussed.

IT Adoption by SMEs

Studies on the adoption of e-commerce by SMEs are relatively recent but research antecedents are well established. Rogers' work (1962; 1983; 1995) on the diffusion of innovations, whilst initially neither IT nor SME focused, has evolved to incorporate diffusion networks and critical mass in order to appreciate the adoption of interactive innovations, such as the Internet (Rogers 1995: 313). The early work of Rogers took a provider (or supplier) perspective and identified the characteristics of innovation which would impact on its rate of diffusion including such factors as complexity, trialability, compatibility and relative advantage. Other work, however, has tried to develop a better understanding of adoption in the specific context of IT and SMEs. Three strands of work can be identified, which although overlapping can usefully be separated, namely strategic, technological and organisational. The first is that which emphasises the strategic logic in the decision to adopt (e.g. Bili and Raymond 1993). In this context SMEs can be both victims and beneficiaries depending on their degree of proactivity. The notion of strategic information systems planning in SMEs is further developed in Levy et al (2000; 2001). This strand of research has resulted in frameworks, such as Levy's 'focus domination model', to help position and integrate IT investments – one of which could be e-business applications.

A second technological strand, and arguably the most prolific, has seen adoption as an outcome of a complex process of evaluation, frequently informal, by SMEs of multiple factors both external and internal. These factors are frequently cast as enablers or barriers to adoption (Lefebvre et al 1991; Cragg and King 1993; Thong and Yap 1995; Walczch et al 2000; Mehrtens et al 2001). Iacovou et al (1995) focussed on the single technology of EDI and identified perceived benefits, organisational readiness (resources) and external pressures (competitive and non-competitive) as the critical factors in adoption. Since EDI is a complex application (but not necessarily Internet based) these findings may be particularly relevant in the adoption of similar higher complexity e-business applications.

The third organisational strand is that which takes an explicit organisational stance, and frequently that of the owner manager and the social parameters within which the firm operates. As such the approach counters the strategic or technological emphasis of the first two strands (Dierchx and Stroeken 1999; Fuller and Southern 1999; Southern and Tilley 2000). An important observation of Southern and Tilley is that 'when small firms use IT complex relations unfold. It is by no means a simple linear development whereby observers can expect an incremental build up of knowledge and expertise on ICT to be established within the firm' (p152).

In the context of the adoption of increasingly complex e-business applications this view appears highly pertinent.

Throughout the above strands of literature three characteristics prevail, namely (i) the unit of analysis is the single firm (ii) the perspective adopted is that of the user, and (iii) the dimension of application complexity as a key variable is absent. In their original context these characteristics are reasonable, but they are also limiting. For example the notion that once a firm has decided to adopt an IT application that obtaining the application is non problematic. In the case of complex applications, such as integrated e-business, this assumption may be unwise. From a provider perspective the issue of user readiness (technical and financial) together with the on-going support and maintenance issues may signal an uneconomic contract and mitigate against initial supply. Hence by adopting a provider perspective, and by exploring the potential of small firm aggregations, this research seeks to develop the above work.

Aggregation and Networks

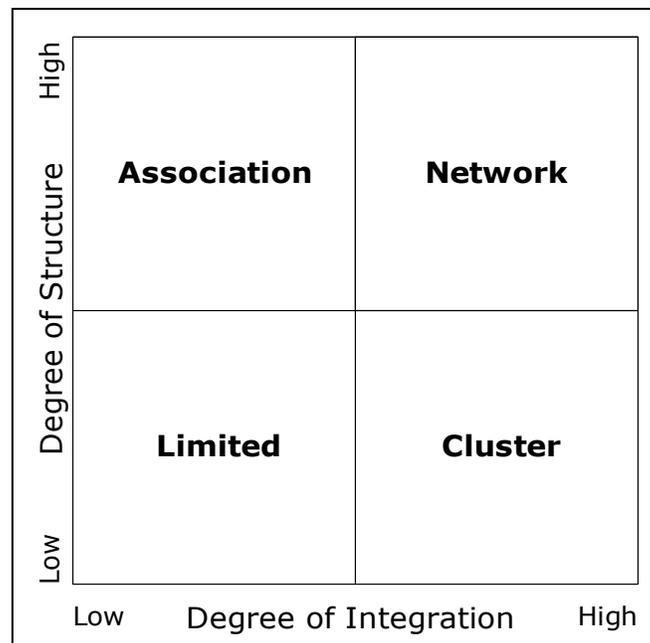
In the realm of firm behaviour the emergence of network theory has been an important development alongside our understanding of markets and hierarchies (Thorelli 1986; Powell 1990). Although 'networks' have always existed (e.g. the on-going relationships within a vertical supply chain) the recognition of networks as a distinct organisational form, amenable to analysis and theoretical development is more recent (Snow et al 1992; Miles and Snow 1986; Jarillo 1988; Axelsson and Easton 1992; Sydow 1992; Grandori and Soda 1995; Provan and Milwood 1995). This theoretical development has advanced on many different fronts: strategy, competition and collaboration (Doz 1996, Doz and Hamel 1998); network structure and embeddedness (Granovetter 1985; Shaw and Conway 2000); trust and governance (Johannisson 1986; Ring and Van de Ven 1994); classification and evaluation (Cravens et al 1996, Sydow and Windeler 1998). Although these theoretical insights into networks have developed outside of a specific e-business context (i.e. off-line) they provide many of the antecedents for the later emerging concepts of e-business networks (i.e. on-line).

Sydow and Windelers' views on inter-organisational networks (IONs), or in their specific case interfirm networks, are particularly insightful (1998: 266-277). They have identified three characteristics which define and distinguish this organisational form: (i) a special kind of network relationship which exhibits a degree of social embeddedness resembling intraorganisational relations (ii) a certain degree of reflexivity arising from the property of the network to become the object of signifying, organising and legitimating action by the firms, and (iii) a logic of exchange which combines co-operative and competitive elements, autonomy and dependence, trust and control. Of these the second characteristic is the least obvious but is potentially very

significant. Within an interfirm network ‘managers are (then) more likely to consciously consider processes in restructuring endeavours which cut across organisational boundaries’ (1998: 267).

Even within the above definition there are many possible manifestations of the network form and many ways of classifying them. Grandori and Soda (1995) differentiate networks by the extent to which the links between organisations are formalised and networks are termed bureaucratic, social or proprietary. Aldrich and Glinow (1992) classify networks into personal and social networks and provide a basis for understanding the role of network as a broker within a set of relationships. A further classification from Cravens et al (1996) links the type of network relationship (from short term, transactional to long term, collaborative) to the degree of unpredictability, and hence risk, in the environment. In the context of SMEs a classification by Lockett and Brown (2001) draws on the above, particularly Grandori and Soda, and links the degree of structure (informal to formal) to the degree of integration (independent to integrated). Within the broad concept of aggregation this taxonomy locates ‘networks’ as one form of strong or complex aggregation which can be contrasted with other weaker or simpler aggregation forms – a distinction which can be useful when considering the nature of an SME’s engagement in an aggregation and the role of any intermediaries. The four types of aggregation are shown in Figure 2.

Figure 2. Taxonomy of Aggregations for SMEs



- *Limited*: any relationships are loose and participants are independent, characterised by little or no aggregation. Intermediaries range from Chambers of Commerce and local business groups to more sophisticated organisations such as the Cambridge Network (Cambridge Network 2002).

The Potential of Critical E-Applications for Engaging SMEs in E-Business: A Provider Perspective.

- *Association*: including trade associations, guilds, professional and registering bodies, where reputation is enhanced by membership and structure is high, but businesses remain largely independent.
- *Cluster*: forming part of an identifiable business market, business cluster or economic cluster (Porter 1998) where SMEs are increasingly dependent on complex linkages within a sector, but structure is low. A recent study in the UK highlighted 154 business clusters classifying them by stage of development, cluster depth, employment dynamics and significance (DTI 2001).
- *Network*: represents a more highly developed form of co-operation which exhibits both relatively high structure and integration. (In the literature networks are often implicitly described from a large business perspective).

In relation to the above it is important to note that for SMEs the *activity* of networking is central to business creation, development and growth (Shaw and Conway 2000) and is likely to feature as a process in *all* of the above categories.

Aggregation and E-Business Models

The Internet has spawned many new business models. However of special relevance to this research has been the potential of Internet technologies to facilitate the development of new and economic inter-organisational systems (IOS), which has led in turn to new aggregation or networked based business models. The concept of aggregation and the addressing of online aggregations through new intermediaries is increasingly being recognised as an important development. A number of authors have attempted to categorise the field based on increasing functionality, innovation, integration and value. Timmers has proposed a broad classification based on functional integration and degree of innovation from e-shop to value chain integrator (Timmers 2000). Tapscott differentiates by control and value and identifies five distinct types of business web, where a business web is an ‘elaborate network of suppliers, distributors, service providers, and customers that conduct business communications and transactions on the Internet in order to produce value for end-customers and for one another’ (Tapscott et al 2000). Whilst Timmers and Tapscott have produced useful overall taxonomies other authors have developed models specific to particular applications. Examples include: Business to Business (B2B) vertical supply chains (Kalakota and Robinson 2000) and Value Adding Intermediaries facilitating collaborative and community based enterprise (Earle and Keen 2000). In the particular context of SMEs the scope for ASPs to serve ‘natural’ market places of SMEs with SME orientated applications has been noted (Mazzi 2001).

Translating the above theoretical interest in the potential of aggregations and of new intermediaries to help engage SMEs in e-business is in its early stages but there are already commercial examples. The commercial intermediaries, detailed in Table 2, are attempting to aggregate SMEs and in selected cases to engage them in

higher complexity e-business applications detailed in Table 1. All these intermediaries offer services across industries and are in essence horizontal ASPs.

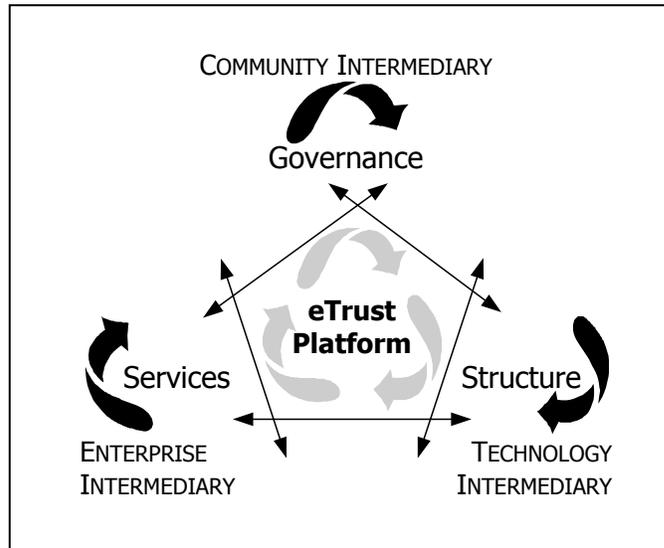
Table 2. Commercial intermediaries and SME-specific portals

Region	Example	Access to higher complexity applications
US	AllBusiness (NBCi 2002)	Yes – online accounting
	bCentral (Microsoft 2002)	Yes – web collaboration
	NetBusiness (Netscape 2002)	No
	Yahoo Small Business (Yahoo 2002)	No
Canada	BellZinc (Bell 2002)	No
UK	BT Openworld (BT 2002)	Yes – online data backup
	ClearlyBusiness (Freeserve 2002)	Yes – online data backup
Europe	BusinessEurope (BusinessEurope 2002)	Yes – e-marketplace

Currently it is also possible for SMEs to access higher complexity vertical applications like B2B e-marketplaces through two other routes. The first is through vertical industry intermediaries (VertMarkets 2002; BizProLink 2002), and the second is through industry specific e-marketplaces (Achilles 2002; Covisint 2002). The Covisint exchange is an intermediary that has emerged from within the motor industry as a means of improving supply efficiencies; BuildOnline is an example of a similar UK development in the construction industry (BuildOnline 2002). Both these industries are characterised by large numbers of SMEs in their supply chain systems. However, despite the emergence of these horizontal and vertical intermediaries engagement by SMEs remains low.

In the above examples the role of the intermediary is pivotal to the notion of aggregating SMEs for with this aggregation comes the potential for engaging SMEs in higher complexity e-business applications on an economically viable basis. Both in the literature and in practice the common manifestation of the intermediary is as a software host providing access to multiple enterprises on a rental, purchase or transaction basis. The model underpinning this arrangement is essentially a ‘one to one’ variety. For example an intermediary has a single contract for supply and support to a single customer and this is repeated, with variations as is necessary, for many customers. As was suggested earlier in this paper such a model is resource rich and access is therefore limited. However, in the specific context of the aggregation of SMEs a more comprehensive conceptualisation of intermediary roles has been proposed, which defines the relationships between multiple SMEs and intermediaries and may provide a basis for the economic engagement of SMEs. The concept is that of the eTrust Platform, Figure 3. The notion here is that aggregated SMEs constitute a digital enterprise community enabled by one or more intermediaries. (This concept is developed from an earlier model, Brown and Lockett 2001).

Figure 3. eTrust Platform – conceptualisation of roles required to provide e-business services to online SME aggregations (Brown and Lockett 2001)



Three types of intermediary are defined: Technology Intermediary, supporting the hosting and communications; Enterprise Intermediary, providing the consultancy and application services; and Community Intermediary, concerned with the governance role for the aggregation. Clearly, one intermediary could fulfil all roles but this may not be either feasible or desirable. Theoretically the role of the intermediary as a means of facilitating the diffusion of complex ICT has been observed by a number of authors, most notably Swan and Newall (1995); Swan et al (1998) and Newall et al (2000). In these particular instances it was the professional associations that assisted in this way. In terms of the above conceptualisation these associations were fulfilling elements of both the enterprise and community intermediary roles. However, the setting for these authors' works was not SME specific and neither were they concerned with the economic viability of provision.

Research Approach

The overall research schema follows Checkland's generic model of research, the FMA framework, Figure 4, where A is the area of concern, M is the methodology and F is the interpretive framework (Checkland 1985).

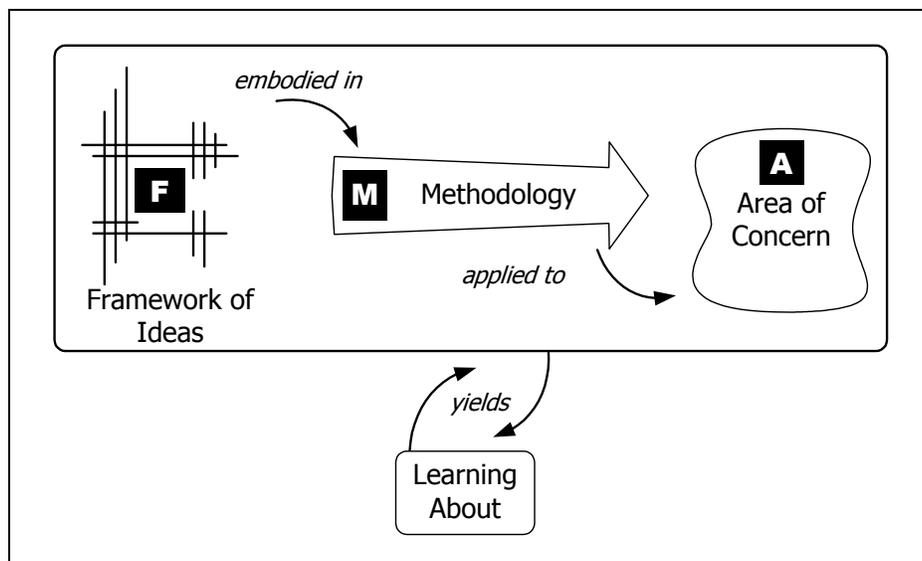
In this case:

A is the need to better understand, both theoretically and practically, the engagement of SMEs in e-business from a provider perspective. Of particular interest is (i) the potential of aggregation

- specific e-business applications, and (ii) the potential roles for intermediaries in facilitating this engagement.
- M is an empirical based approach, largely qualitative but using quantitative data where appropriate to supplement interview data and triangulate the sources.
- F is the theoretical framework that guides both the detailed empirical work and the subsequent interpretation. The main elements of this are IT adoption by SMEs, the concept of networks as a distinct organisational form and aggregation based e-business models.

The research outcome is the learning derived from A and F.

Figure 4. Research Model (Checkland 1985)



The qualitative research was planned and carried out as two stages – sampling and data collection/analysis. Each is discussed briefly below.

Sampling

To address the issues outlined in the area of concern (A) the sample frame was derived from the two earlier conceptualisations – the eTrust Platform, Figure 3, and the Taxonomy of SME Aggregations, Figure 2. The eTrust Platform model identifies two important intermediary types. The first is the ‘community intermediary’ which represents or governs the aggregation. The second is the ‘enterprise intermediary’ which delivers the services or applications. Together these two intermediaries represent the provider perspective and constitute the data sources. (The third intermediary is the technology intermediary which lies outside of this research and which for users is largely invisible). The Taxonomy of SME Aggregations identifies the four aggregation

types – association, limited, cluster, and networks. Combining these models provided a sample frame in which intermediaries, either enterprise or community, could be associated with different aggregation types. In the case of the enterprise intermediaries a further subdivision into horizontal and vertical providers was possible. A key issue in the research was the fact that the established base of e-facilitated SME aggregations was very small and hence populating the sample frame was governed by what was available, rather than some empirical ideal. A total of 36 potential organisations were identified from literature and Internet searches and were approached in order to identify senior managers and negotiate access. Some 18 organisations agreed to participate and are categorised by intermediary and aggregation types, Tables 3 & 4. In aggregations marked A, B and C in these tables both the community and enterprise intermediaries were interviewed; in all other aggregations either the community or enterprise intermediary participated. The 18 different organisations were located within 12 different aggregations. The e-business applications used within all the aggregations can be characterised as high or very high complexity in terms of the typology introduced earlier and are summarised in Table 5. Finally in addition to the 18 organisations three expert sources were selected to provide an additional independent perspective, Table 6. This gave a total of 21 data sources.

Table 3. Community Intermediaries

Business Description	Size	Aggregation Type Served
Newspaper Trade Association (Aggregation A)	SME	Association
Knowledge Worker Association (Aggregation B)	SME	Association
Organic Industry Organisation (Aggregation C)	SME	Cluster
Laboratory Supplies Trade Association	SME	Association
Motor Manufacturing Trade Association	SME	Association
Company Directors Association	SME	Association
Oil & Gas Industry Organisation	SME	Cluster
Media & Broadcasting Company	Large	Network
Food Processing Company	Large	Network
Area Business Organisation	SME	Limited

Table 4. Enterprise Intermediaries

Business Description	Size	Provider Type	Aggregation Type Served
Advertising Artwork Management ASP (Aggregation A)	SME	Vertical	Association
Community Knowledge Management ASP (Aggregation B)	SME	Vertical	Association
Organic Field Management ASP (Aggregation C)	SME	Vertical	Cluster
Data Management ASP	SME	Vertical	Network
Construction Project Management ASP	SME	Vertical	Network
E-Business Applications ASP	SME	Horizontal	n/a
E-Business Applications Provider	Large	Horizontal	n/a

E-Business Applications Provider	Large	Horizontal	n/a
----------------------------------	-------	------------	-----

Table 5. Application Complexity in terms of Table 1 Typology.

Aggregation	E-Business Application	Classification	Complexity
Newspapers	Adverting artwork management	Enterprise	High
Knowledge worker	Community management	Enterprise	High
Organic	Field management	Enterprise	High
Laboratory supplies	E-Marketplace	Marketplace	High
Motor manufacturing	E-Marketplace	Marketplace	High
Company directors	Community management	Enterprise	High
Oil & gas	Supply chain management	Collaborative Enterprise	Very high
Media & broadcasting	Enterprise resource planning	Collaborative Enterprise	Very high
Food processing	Supply chain management	Collaborative Enterprise	Very high
Area businesses	Community management	Enterprise	High
Data management	Supply chain management	Collaborative Enterprise	Very high
Construction	Project management	Enterprise	High

Table 6. Independent Sources

Business Description	Size	Sector
Business Representation Expert	Individual	Government
Trade Association Body	SME	Associations
Information Services Expert	SME	Construction

Data collection and analysis method

Identification of suitable data sources was undertaken in 2001 with the field investigations carried out in 2001 and 2002. Interview data collection took the form of semi-structured interviews with mostly senior managers in the 21 organisations shown in Tables 3, 4 & 5. The semi-structured interviews covered: the context for e-business engagement and SMEs, including special factors and personal experience; the evidence and nature of aggregation, including governance, intermediary roles and actual or future actors; provider business models, including strategy, structure, processes, revenues, legal issues and technology. (A template for the interviews is provided in Appendix I). Most interviews were conducted on the participant's premises and lasted between 60 and 90 minutes. These semi-structured interviews formed the main data source and required careful negotiation in order to gain access. Notes were taken during the interview and subsequently written up as field notes. If appropriate organisations were interviewed more than once or contacted by telephone. All were briefed on the purpose of the research. Field notes were taken and combined with other supporting data to form case notes. The interviews showed considerable internal consistency, suggesting that the sample numbers were representative. Where possible additional data, in the

form of marketing material, technical briefs and web sites, was collected in order to supplement interview data and provided a triangulation of data sources.

Data analysis was undertaken in parallel to the data collection. The units of analysis for the service providers were the intermediary types both separately and combined. Specifically the authors attempted to identify matching patterns across and within the sample frame, which were then grouped in order to produce key themes that provided the basis for the research findings.

Research Findings

Three key findings have resulted from this qualitative research in terms of the potential for e-business engagement by SMEs. In the main these views are collated, balanced and presented in this section with the significance of these different findings are discussed in the conclusion of this paper.

Theme 1: Emergence of aggregation specific e-business applications

All ten community intermediaries and the five vertical enterprise intermediaries confirmed the importance of SME focused applications that attempted to address particular needs of SMEs within aggregations. In the three aggregations where both intermediary types were interviewed, namely organic, newspaper and knowledge workers, the interaction between the community intermediary and vertical service provider was stated to be a very important factor in achieving the engagement of users. This continuous interaction between the two intermediary types helped to identify business needs and the resultant modifications to the specific applications in order to benefit the users. The manager of one e-application provider stated that “working with the them (the trade association) has been critical to us developing an application that meets the users needs. It has given use a competitive advantage and a better product”. Early examples of aggregation specific e-business applications developed in this collaborative way and confirmed through the interviews include:

- Advertising artwork management application – for artwork agencies in regional newspapers
- Community management application – for knowledge based workers
- Field management application – for the organic farming industry
- Project management application – for the construction industry

In the main these aggregation specific e-business applications are relatively new and in the early stages of development but already they appear to be successful when measured by the level of uptake. For example the artwork management application provider reported that the recruitment of users had been exponential and that more than 60 percent of potential users, all small advertising agencies, had registered.

All five of the vertical service providers supplying aggregation specific e-applications had identified what they believed to be an unmet business need of SMEs in a specific business market. Three of the five providers interviewed took the lead and developed the aggregation specific e-applications without a guaranteed market for the product. However they had identified community intermediaries early in the application's development and sought to establish collaborative arrangements that mitigated the risk. The two remaining vertical service providers developed the applications in response to the business needs identified by the community intermediary, but even here there was no guarantee of adoption by the aggregation of SMEs.

In all these cases the aggregation specific e-applications could be characterised as offering new functionality that was valued by aggregation members and which had benefited from development through interaction with community intermediaries. The innovative nature of these e-applications was the critical factor that determined the level of interest shown in the application by the aggregation members. For example the advertising artwork management application enabled advertising agencies (users) to submit artwork and copy online to many independent regional newspapers. This saved time for the agency but also made it significantly easier for agencies to use regional papers to advertise client's products and services. There was no direct charge levied on the agency by the vertical service provider. All costs were met by the trade association out of conventional membership fees. In the field management application organic farmers (users) could use the online application to record crop history and yields enabling them to more easily comply with the certification requirements of the industry. This was a very attractive but complex e-business application. Users paid for the services directly to the service provider but this was in part off-set by a reduced certification fee via the regulatory body acting as a community intermediary.

In contrast the three horizontal enterprise intermediaries offered applications to SMEs that aimed to meet standard business functions, such as accounts and material control. Although these could be customised to meet local needs the providers were explicitly not attempting to produce innovative applications requiring deep industry knowledge.

Theme 2: Emergence of collaboration based a 'one to many' business models

All five vertical service providers offered applications in a hosted environment on a 'one to many' basis and deliberately developed a 'one to many' marketing model. All five also emphasised that the intermediaries best placed to promote the application were those who had existing relationships within the aggregation. Only one vertical service provider charged users directly with all others charging the community

intermediaries. The latter approach both reinforced the ‘one to many’ marketing model and enabled community intermediaries to develop their own charging mechanism to ‘members’. This explicit interaction between the application provider and SMEs, within a network or cluster, and facilitated by a community intermediary is evidenced in this research and is very recent.

There is limited secondary evidence of application providers attempting to address SMEs through intermediaries. E-Business applications designed for SME markets are increasingly offered through affiliate agreements such as the small business initiative (Oracle 2002) and through value added resellers (VARs) such as Netstore (Netstore 2002). However in both these instances there is no attempt to develop innovative SME aggregation specific applications. This model of engaging SMEs through VAR networks has served the enterprise software industry well in the context of standard applications however there is little evidence, to date, of its effectiveness in implementing e-business applications. This view was strongly reinforced by the independent sources interviewed in this work.

In contrast the three horizontal intermediaries were marketing to SMEs on a ‘one to one’ basis even if subsequently they were hosted and supported on a shared ‘one to many’ basis. In all cases the payment model was directly between the service provider and SME user. The business manager for one large e-business application provider admitted that “whilst we have some customers with only three users, in reality it isn’t economic for us to target customers with less than 20 users with hosted solutions”. Inherently this ‘one to one’ model for marketing is more expensive and the evidence from the research was that the horizontal providers were focussing on larger SMEs and divisions of large enterprises on economic grounds.

Theme 3: Importance of trusted third parties

In terms of the eTrust Platform conceptualisation (Figure 3) the community, enterprise and technical intermediaries are all ‘trusted third parties’. In this research all 21 data sources confirmed the importance of trust within the formation and development of SME aggregations engaged in e-business. Some of the community intermediaries noted that the emergence of new and unknown online intermediaries addressing aggregations added to the confusion many SMEs felt regarding e-business. There was recognition by many community and enterprise intermediaries that existing trusted offline relationships, be they a lead company in a business network or a trade association, could be important in recruiting SMEs to online services. Trade associations, in particular, identified a new role for themselves as a sponsor or facilitator, rather than a direct provider of e-business services. In their view this situation derived from the SMEs’ view of them as ‘trusted’ parties that could be relied on to act in their interests. One general secretary of a trade association stated that “our members are finding it increasingly difficult to know which e-marketplace to use and are wanting us to endorse products. We are organising a special event at our next general meeting to discuss this with

members". This new role was genuinely emergent. Not one of the trade associations had foreseen the possibility that this new role could have very significant strategic implications. Not surprisingly all vertical service providers specifically identified the role of the community intermediary as being important in the recruitment of users to their applications based on their trusted relationship within the aggregation. The nature of this relationship varied from simple provision as in the case of the advertising artwork service provider to active joint initiatives as in the case of the field management application provider.

In addition to the contribution made by the community intermediaries to the development of specific applications and to facilitating access to the SMEs they could have two further roles that derive directly from their trusted third party status. Firstly as negotiators for the service fees charged either directly to users, or more commonly, to the community intermediary (i.e. themselves). They then either recover the fees using a variety of mechanisms from the aggregation members or they are off-set by other benefits. Secondly they act as negotiators for the service level agreement (SLA) with the service providers. For example the lead client of a construction consortium for new supermarkets, in the role of community intermediary, negotiated with the service provider to pay the fees on behalf of contractors for the new e-business applications. Similarly the newspaper trade association paid the service fees for advertising agencies submitting artwork via the new e-business application. In each of these cases the perceived or actual benefits of more effective project management and the ease of use resulting in increased advertising respectively were sufficient to provide the services with no direct charge to users. In all instances both the community and enterprise intermediaries indicated that the SMEs appeared to rely heavily on the community intermediaries as the trusted third party to approve and hold the SLA with the service provider. Considering the importance of SLAs in the context of hosted applications this decision indicates a high level of trust on the part of the users, but also for many of them an indication of their dependence. This opinion was expressed by many of the interviewees based on the reality that large numbers of SMEs did not have the competence or confidence to negotiate SLA agreements for complex e-business applications.

Clearly the role of trusted third parties, particularly the community intermediary, goes beyond simply negotiating fees and SLAs with service providers. They hold unique positions within business sectors often gained over many years and across many aspects of trading relationships. This study highlights their important role in the engagement of SMEs in complex e-business applications.

Conclusion

This empirically based research set out to learn more about the engagement of SMEs in e-business from a provider perspective and to relate this to previous research in the area of ICT adoption. Of particular interest to us were the role of critical applications and the role of intermediaries in the engagement process. In the

world of practice the context for this work was the low, and unexpected, engagement by SMEs in e-business, beyond simple e-mail or web catalogues. In terms of previous research the concern was that in the main ICT adoption has been viewed, either explicitly or implicitly, from the user perspective. As we indicated earlier the unstated assumption here being that service provision was non-problematic.

Given the above aims our research findings appear helpful. Firstly the study establishes the importance of aggregation specific e-business applications or ‘critical e-aggregation applications’ (defined as ‘an e-business application, promoted by a trusted third party, which engages a significant number of SMEs by addressing an important shared business concern within an aggregation’) as a way of encouraging SMEs to engage in higher complexity e-business applications. Secondly, it confirms the potential for addressing SMEs as aggregations as a highly efficacious method for the marketing and provision of shared services. Finally it highlights to enterprise service providers the crucial role of the trusted third party in sponsoring or promoting specific e-business applications to aggregations of SMEs. Indeed the research shows that this role works best when both the enterprise and community intermediaries are aware of each other’s respective contribution and a working relationship is established.

These findings are of significance for both policy and practice. The paper started with an appreciation of the low engagement by SMEs in higher complexity e-business applications. At present there is no recognition by UK policymakers (as far as the authors could establish) of the mechanism of engaging SMEs as aggregations, as opposed to individual organisations, for the express purpose of adopting e-business practices. Current policy is couched in terms of targets for e-business adoption by SMEs with little about the means for achieving this (DTI 2002). There are policy implications arising from the research, in particular the recognition of the role of the community intermediary in facilitating and legitimising e-business engagement. An example would be the scope for encouraging and incentivising traditional trade associations to explore their potential as community intermediaries.

In terms of practice the findings are unequivocal with respect to how the service providers are organised. In the context of large enterprises the ‘one to one’ marketing business model is viable for both vertical and horizontal applications. Enterprise resource planning (ERP) serves as a good example since this complex application will generate further demands of financial and human capital as the requirements of customisation, integration and ongoing support are recognised. These demands can normally be met by large enterprises. Whilst it may be economic to provide higher complexity e-business applications to SMEs on a ‘one to many’ basis the cost of marketing and supporting on a ‘one to one’ basis is prohibitive. It would be possible to conjecture that as awareness by SMEs of the advantages of higher complexity e-business applications increases so too will adoption rates, but as we shown earlier in Figure 1 this is not born out by

the statistics. The clear evidence from all of the enterprise service providers interviewed is that the aggregation model is likely to be the most viable means of engaging SMEs. By confirming this provider perspective the research adds to our understanding of the likely mechanisms for engaging SMEs in complex e-business applications that are both desirable and economically feasible.

In terms of theory, even before any empirical data was interpreted, the research has confirmed the usefulness of the eTrust platform conceptualisation, Figure 3, as a means of framing the discussion with the different types of organisations involved. Previously a number of authors (e.g. Tapscott et al 2000; Earle & Keen 2000) provided models of the new relationships that can follow from the introduction of e-business technologies. Many of these models identify the new intermediaries, such as ASPs, that would be needed. However, there are no specific conceptualisations of the role of intermediaries in the context of shared applications by aggregations. The usefulness of such a conceptualisation was proven many times in the research process. None of the 21 organisations interviewed had thought about their role other than in terms of their everyday identities as an ASP, lead contractor or trade association etc. The ability to discuss their situation in terms of their role as an enterprise or community intermediary was welcomed. It contributed to the sense-making of specific situations and to the wider problem of generalising experience.

From the interpretation of the empirical data, summarised earlier in the three themes, there are significant theoretical observations. At the crux of the research is a concern to better understand e-business adoption by SMEs. The seminal work of Rogers on innovation diffusion, especially the later variant (1995), although not SME focussed, is highly relevant. This took a provider perspective and sought to explain adoption in terms of diffusion networks, critical mass and specific factors including complexity. This research suggests that Rogers' innovation model is helpful for understanding SMEs but complements it by offering a mechanism whereby a critical mass can be achieved, namely facilitation through trusted third parties.

In relation to other work on ICT adoption specific to SMEs (e.g. Bili and Raymond 1993; Levy et al 2001; Cragg and King 1993; Fuller and Southern 1999) the emphasis is on such factors as strategic logic, implementation enablers and organisation specific factors - all viewed from a user perspective. This work has been influential but application complexity is not singled out. However our research emphasises that, in the experience of the providers, perceived application complexity is crucial to SMEs and that they would not proceed to adopt without substantial support. Including complexity as a key variable highlights the need for a more profound understanding of what complexity actually means in the context of ICT adoption by SMEs.

The Potential of Critical E-Applications for Engaging SMEs in E-Business: A Provider Perspective.

The research findings in respect of aggregation as a means of helping SMEs develop their e-business capability can be reflected on theoretically in several ways. In terms of the rationale for network formation there have been significant contributions (e.g. from Miles and Snow 1986; Thorelli 1986; Oliver 1990; Powell 1990; Glaister and Buckley 1996). Drawing on earlier literature Craven et al (1996) is useful in considering the rationale for network formation in terms of organisation adaptation to the environment, management imperatives for the rationalisation of resources, and competing in rapidly changing environments. This research echoes the importance of these factors for both SMEs and the application providers. From the provider perspective the aggregation of SMEs offers a realistic means of understanding, addressing and providing appropriate applications on an economic basis. In this sense the aggregation becomes in Sydow and Windelers' terms "an object of action framing" (1998: 267). In this specific context the enterprise intermediary is able to subsume the behaviour of individual SMEs within the wider network practices. Similarly the community intermediary is able to act on behalf of the aggregation in matters of negotiation relating to service costs and service levels, but at the same time can act internally within the aggregation in respect of the governance of individual firm behaviour.

For the individual SME the question of whether or not to adopt e-business applications specific to their sector is too simplistic. In reality such applications would generally not be available from providers for the reasons previously given. It is the actual, or likely, existence of an 'organised' aggregation (i.e. a network, association or cluster in terms of the conceptualisation given in this paper) that underwrites the providers' interest. Once formed the question for individual SMEs is whether to participate in the network. Consideration may need to be given to a range of factors such as common interests, resource efficiencies and stability governance. Their decision is hugely helped by the mitigation of risk that involvement in a collaborative arrangement offers (Contractor and Lorange 1988). Overall, although the theory frameworks and models for inter-organisational networks were developed before Internet technologies, this research confirms the broad relevance of these concepts for interpreting the behaviour of electronically mediated collaborative relationships.

Finally, there are some observations on the theory of e-business models and in particular intermediaries. The value of conceptualising the different roles in the form of the eTrust Platform has already been highlighted. In the small but growing literature on e-business models (eg. Timmers 2000; Earle and Keen 2000; Tapscott et al 2000; Chaffey 2002) there is considerable emphasis on the opportunities for disintermediation and reintermediation. However, this research highlights the importance of *existing relationships* in business markets. This is graphically illustrated by the community intermediaries. It is their relationship with SMEs that provides the basis for a meaningful interaction between the potential providers of specific e-applications and the aggregations of SMEs. At the core of this relationship is trust but in the context of the eTrust

platform this is complex. In terms of the relationship between the community intermediary and the SME the research findings in Theme 3 suggests that the trusted relationship is based on confidence in another's goodwill. However, the relationship between the community and enterprise intermediary is based on a business risk view, as a result of the community intermediary's involvement in the negotiation of service levels and costs (these two useful perspectives are identified and discussed further in Ring and Van de Ven 1994). Swan and Newell's work (1995), although not specific to SMEs, highlights the importance of the professional associations in the diffusion of complex technologies in terms of a knowledge-focused perspective – they are 'boundary spanners' in Trushman and Scanlan's (1981) terminology. Newall et al. (1998), however, identified the problem when the intermediary (in their case a professional association) becomes an uncritical passive purveyor of 'black box' technologies to the users on behalf of the technology provider. In our work the community intermediary was more likely to be active through its negotiating role and hence more aware of potential limitations of the technology. In general this research suggests that the findings of Swan and Newall could be generalised to other community intermediaries, such as trade associations.

In terms of further research the need for more work on the conceptualisation of the adoption process by SMEs of advanced information technologies, such as e-business, is clear. In particular the areas of application complexity and how users perceive this, the significance of users within aggregations and the roles of trusted third parties warrant consideration. Such work would advance our theoretical understanding of adoption from both the provider and user perspectives. Moving beyond adoption to evaluation there is no significant work on the impact on SMEs of e-business applications. Do they affect the productivity and profitability of adopters, or do they provide an environment that supports innovation?

Acknowledgements

The authors would like to thank Hewlett-Packard Laboratories, SAP (UK) and Lancaster University Management School for their financial support of the eCluster Research Project. In addition the authors would like to express their thanks to the Associate Editor and the anonymous reviewers for their helpful comments on the previous versions of this paper, particularly relating to the theoretical contribution.

References

- ACHILLES (2002) www.achillesmarket.com, accessed 15 October 2002..
- ALDRICH H and GLINOW MA (1992) Personal Networks and Infrastructure Development. *In The Technopolis Phenomenon: Smart Cities, Fast Systems, Global Networks*. (GIBBON DV, KOZMETSKY G and SMILOR RW, Eds) 125-145, Rowman and Littlefield, NY.
- AXELSSON B and EASTON G (1992) *Industrial Networks: A New Reality*. Routledge, London.

The Potential of Critical E-Applications for Engaging SMEs in E-Business: A Provider Perspective.

BELL (2002) www.bellzinc.ca, accessed 15 October 2002.

BIZPROLINK (2002) www.bizprolink.com/communities.shtml, accessed 15 August 2002.

BLILI S and RAYMOND L (1993) Information Technology : Threats and Opportunities For Small and Medium-sized Enterprises. *International Journal of Information Management* 13(6), 439-448.

BOOZ ALLEN HAMILTON (2002) *International e-Economy Benchmarking: The World's Most Effective Policies for the e-Economy*. November, IAP, UK.

BROWN DH and LOCKETT N (2001) Engaging SMEs in E-Business: The Role of Intermediaries within eClusters. *EM: Electronic Markets* 11(1), 52-58.

BT (2002) www.btopenworld.com/businesshome/, accessed 15 October 2002.

BUILDONLINE (2002) www.buildonline.com, accessed 10 November 2002.

BUSINESSEUROPE (2002) www.businesseurope.com, accessed 15 October 2002.

CAMBRIDGE NETWORK (2002) www.cambridgenetwork.co.uk, accessed 15 August 2002.

CHAFFEY D (2002) *E-Business and E-Commerce Management*. Prentice Hall, Harlow, UK

CHECKLAND PB (1985) From Optimising to Learning: A development of Systems Thinking for the 1990s. *Journal of the Operational Research Society* 36(9), 757-767.

CONTRACTOR FJ and LORANGE P (1988) *Cooperative Strategies in International Business*, Lexington Books, Lexington, MA.

CORDIS (2002) www.cordis.lu/euroabstracts/en/home.html, accessed 01 October 2002.

COVISINT (2002) www.covisint.com, accessed 09 October 2002.

CRAGG P and KING M (1993) Small Firm Computing: Motivators and Inhibitors. *MIS Quarterly*, March 47-60.

CRAVENS DW, PIERCY NF and SHIPP SH (1996) New Organisational Forms for Competing in Highly Dynamic Environments: the Network Paradigm. *British Journal of Management* 7, 203-218.

DAVIES R (2001) *vEDZ Bid: InfoLab21 An ICT Centre of Excellence at Lancaster University*. Lancaster University, UK.

DIERCKX M and STROEKEN J (1999) Information Technology and Innovation in Small and Medium Enterprises. *Technological Forecasting and Social Change* 60(2), 149-166.

DOZ Y (1996) The Evolution of Cooperation in Strategic Alliances: Initial Conditions or Learning Process? *Strategic Management Journal* 17, 55-83

DOZ Y and HAMEL G (1998) *Alliance Advantage: The Art of Creating Value through Partnering*. Harvard Business School Press, MA.

DTI (2001) *Business Clusters in the UK – A First Assessment*. Department of Trade and Industry, UK.

DTI (2002) *Business in the Information Age – International Benchmarking Study 2002*. Department of Trade and Industry, 6366 UK.

The Potential of Critical E-Applications for Engaging SMEs in E-Business: A Provider Perspective.

EARLE N and KEEN P (2000) *From .com to .profit: Inventing Business Models that Deliver Value and Profit*. Jossey-Bass, San Francisco, CA.

EC (2002) *Benchmarking National and Regional E Business Policies – Stage 1 – Synthesis report 7 February 2002*. European Commission.

FREESERVE (2002) www.clearlybusiness.com, accessed 15 October 2002.

FULLER T and SOUTHERN A (1999) Small Firms and Information and Communication Technologies: Policy Issues and some Words of Caution. *Environment and Planning: Government and Policy* 17, 287-302.

GLAISTER KW and BUCKLEY PJ (1996) Strategic Motives for International Alliance Formation. *Journal of Management Studies*, 33, 301-332.

GRANDORI A and SODA G (1995) Interfirm Networks: Antecedents, Mechanisms and Forms. *Organisation Studies* 16(2), 183-214.

GRANOVETTER M (1985) Economic and Social Structure; The problem of Embeddedness. *American Journal of Sociology* 91(3), 481-510.

IACOVOU C, BENBASSET I and DEXTER A (1995) EDI and Small Organisations: Adoption and Impact of Technology. *MIS Quarterly* 19(4), 47-60.

JARILLO J C (1988) On Strategic Networks. *Strategic Management Journal* 9, 31-41.

JOHANNISSON B (1986) Network Strategies, Management Technology for Entrepreneurship and Change. *International Small Business Journal* (5)1.

KALAKOTA R and ROBINSON M (2000) *e-Business 2.0: Roadmap for Success*. Addison Wesley, Upper Saddle River, NJ.

KALAKOTA R and WHINSTON A (1996) *Frontiers of Electronic Commerce*. Addison Wesley, Reading MA.

KENDALL J, TUNG L, CHUA K, NG C and TAN S (2001) Receptivity of Singapore's SMEs to Electronic Commerce Adoption. *Journal of Strategic Information Systems* 10(3).

LEFEBVRE L, HARVEY J and LEFEBRE E (1991) Technological Experience and Technology Adoption Decisions in Small Manufacturing Firms. *R & D Management* 21(3), 241-249.

LEVY M and POWELL P (2000) Information Systems Strategy for SMEs: an Organisational Perspective. *Journal of Strategic Information Systems* 9(1), 63-84.

LEVY M, POWELL P and YETTON P (2001) SMEs: Aligning IS and the Strategic Context. *Journal of Information Technology* 16(1), 133-144.

LOCKETT N and BROWN DH (2001) A Framework for the Engagement of SMEs in E-Business. *Proceedings of the Americas Conference on Information Systems* 656-662.

MAZZI P (2001) Small Business eBusiness: Bringing SMEs Online. *The IDC European eCommerce Forum 2001* International Data Corporation.

The Potential of Critical E-Applications for Engaging SMEs in E-Business: A Provider Perspective.

MEHRTENS J, CRAGG P and MILLS A (2001) A Model of Internet Adoption by SMEs. *Journal of Information & Management* 39(3), 165-176.

MICROSOFT (2002) www.bcentral.com/default.asp, accessed 15 October 2002.

MILES RE and SNOW CC (1986) Organisations: New Concepts for New Forms. *California Management Review* 28(2) 62-73.

NCBI (2002) www.allbusiness.com/index.jsp, accessed 15 October 2002.

NETSCAPE (2002) netbusiness.netscape.com, accessed 15 October 2002.

NETSTORE (2002) www.netstore.net, accessed 15 October 2002.

NEWELL S, SWAN J and GALLIERS RD (2000) A Knowledge-focused Perspective on the Diffusion and Adoption of Complex Information Technologies: the BPR example. *Information Systems Journal* 10, 239-259.

OECD (1998) *The Economic and Social Impacts of Electronic Commerce*. OECD.

OLIVER C (1990) Determinants of Interorganisational Relationships: Integration and Future Directions, *Academy of Management Review* 15, 241-265.

ORACLE (2002) www.oraclesmallbusiness.com, accessed 15 January 2002.

ORACLE (2003) www.oracle.com/applications/index.html, accessed 01 February 2003.

POON S and SWATMANN P (1999) An Exploratory Study of Small Business Internet Commerce Issues. *Journal of Information and Management* 35 (1), 9-18.

PORTER M (1998) Clusters and the New Economics of Competition. *Harvard Business Review* 96(6), 77-91.

POWELL WW (1990) Neither market Nor Hierachy: Network Forms of Organisation. *In Research in Organisational Behaviour* (STAW BM and CUMMINGS LL Eds) JAI-Press, Greenwich, CT.

PROVAN KG and MILWOOD HB (1995) A Preliminary Theory of Interorganisational Network Effectiveness. *Administrative Science Quarterly* 40 1-33.

RING PS and VAN DE VEN AH (1994) Developmental Processes of Cooperative Interorganizational Relationships. *Academy of Management Review* 19(1), 90-118.

ROBERTSON M, SWAN J and NEWELL S (1996) The Role of Networks in the Diffusion of Technological Innovation. *Journal of Management Studies* 33, 333-359.

RODGERS E (1962; 1983; 1995) *Diffusion of Innovations 4th Ed*. Free Press, NY.

SAP (2002) www.sap.com/solutions/, accessed 15 October 2002.

SBS (2002) www.sbs.gov.uk/press/news90.php, accessed 05 October 2002.

SBS (2003) www.sbs.gov.uk/statistics/smedef.php, accessed 20 February 2002.

SHAW E and CONWAY S (2000) Networking and the Small Firm. *In Enterprise and Small Business: Principles, Practice and Policy* (CARTER S and JONES-EVANS D, Eds) Pearson Education, UK.

The Potential of Critical E-Applications for Engaging SMEs in E-Business: A Provider Perspective.

SNOW CC, MILES RE and COLEMAN Jr HJ (1992) Managing 21st Century Network Organisations. *Organisational Dynamics* 21(4), 5-20.

SOUTHERN A and TILLEY F (2000) Small Firms and Information and Communication Technologies: (ICTs): Toward a Typology of ICT Usage. *New Technology Work and Employment* 15(2).

SWAN J and CLARK PA (1992) Organisational decision-making in the appropriation of technological innovation: Cognitive and political dimensions. *European Work and Organisational Psychologist* 2, 103-127.

SWAN J and NEWELL S (1995) The Role of Professional Associations in Technology Diffusion, *Organisation Studies* 16, 847-874.

SWAN J, NEWELL S and ROBERTSON M (1998) Interorganisational Networks and Diffusion of Information Technology: Developing a Framework. In *Information Systems Innovation and Diffusion: Issues and Directions* (LARSON T and MCGUIRE E, Eds), IGP.

SYDOW J (1992) On the Management of Strategic Networks. In *Regional Development and Contemporary Industrial Response* (ERNSTE H and MEIER V Eds), Pinter, London, UK.

SYDOW J and WINDELER A (1998) Organising and Evaluating Interfirm networks: A Structurationist perspective on Network Processes and Effectiveness. *Organisation Science* 9(3), 263-284.

TAPSCOTT D, TICOLL D and LOWE A (2000) *Digital Capital: Harnessing the Power of the Business Web*. Nicholas Brealey, London, UK.

THONG J and YAP C (1995) CEO Characteristics, Organisational Characteristics and IT adoption in Small Businesses. *Omega International Journal of Management Science* 23(4), 429-442.

THORELLI H B (1986) Networks: Between Markets and Hierarchies. *Strategic Management Journal* 7, 37-51.

TIMMERS P (2000) *Electronic Commerce: Strategies and Models for Business to Business Trading*. John Wiley & Sons, Chichester, UK.

TRUSHMAN M and SCANLAN T (1981) Boundary Spanning Individuals: their Role in Information Transfer and their Antecedents. *Academy of Management Journal* 24, 289-305.

VERTMARKETS (2002) www.vertmarkets.com, accessed 20 November 2002.

WALCZUCH R, VAN BRAVEN G and LUNDGREN H (2000) Internet Adoption Barriers for Small Firms in the Netherlands. *European Management Journal* 18(5), 565-571.

YAHOO (2002) <http://smallbusiness.yahoo.com/>, accessed 15 October 2002.

Ref: EJIS/revision2/june03

Appendix I

Template for semi-structured interviews: Provider Perspective

- 1) What is your understanding of the current position for SMEs with reference to e-business engagement?
 - a) Is the application complexity scale relevant to your situation?
 - b) How does the current secondary data relate to your situation?
 - c) Are there any special factors to consider?
 - d) What is your personal experience of adopters/non-adopters? (Strategic logic; other rationales).
- 2) What evidence is there of aggregations of SMEs and what is their nature and role both currently and as a result of e-business developments?
 - a) What evidence is there of aggregations of SMEs, including governance bodies in your sector?
 - b) Is the taxonomy of aggregations relevant to your sector?
 - c) What is their nature and role?
 - i) Currently
 - ii) As a result of e-business developments
 - d) Is the taxonomy relevant to identifying reasons for or results of e-business engagement?
- 3) What are the potential roles and mechanisms for intermediaries in facilitating SME e-business engagement?
 - a) Relevance of Trust Platform model to your situation?
 - b) Identification and detail of own role (Enterprise; Community)?
 - c) What are own and other actors roles and mechanisms for facilitating SME e-business engagement?
 - d) Any additional actors or role?
- 4) What are the possible business models from a provider perspective?
 - a) Mission: high-level understanding of overall vision, strategic goals and value proposition (product)
 - b) Structure: actors & roles that constitute the business community, governance and focus on industry, customer & product. (marketing strategy & potential benefits for actors)
 - c) Processes: more detailed view (product service and information flows)
 - d) Revenues: sources of revenue (gross & net) and investment
 - e) Legal Issues: Influences all aspects of business model
 - f) Technology: Both enabler & constraint – influences all aspects of business model