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The role of IT competences in gaining value from e-business: An SME case study

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Abstract
Many SMEs have been slow to exploit the potential of e-business. However, it can be difficult for any firm to gain value from e-business, and particularly so for SMEs that may lack important information technology (IT) competences. The study focused on one SME which had undertaken a series of e-business initiatives over a period of 10 years. The analysis revealed that the firm used e-business in two different ways: e-business for innovation, and e-business for integrating business processes. Four IT competences were found to be particularly important to the firm's developments: IT leadership, business systems thinking, architecture planning, and making technology work. The study provides a detailed understanding of how the firm used e-business to gain value and how its IT competences influenced its e-business developments. The study also shows that a lack of competence in some areas inhibited the firm's e-business developments.

Keywords
e-business, information technology, IT competence IT value

Introduction

While some SMEs have successfully engaged in e-business (Dibrell et al., 2008; Johnston et al., 2007), there is much evidence that others have been slow to adopt internet-based technologies (Bengtsson et al., 2007; Brown and Lockett, 2004). Fillis and Wagner (2005) concluded that a wide range of factors influenced e-business development in the SME environment. These included

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many factors that were 'internal' to the firm, for example, the ability to combine business and technical skills, and the entrepreneurial orientation of the owner-manager. Such studies provide strong evidence that a broad range of IT resources within a firm influence e-business developments in SMEs. However, as yet we have no clear understanding of how these internal IT resources influence how successful a firm is in engaging in e-business. Hence, the study on which this article is based aimed to extend the research on e-adoption and success in SMEs by gaining a better understanding of the role played by internal IT resources in e-business developments. In particular, the study examined how IT competences inhibited and/or enabled e-business developments in SMEs. A case study approach was adopted and much of this article reports on an analysis of e-business developments in a firm with 26 employees. The analysis includes an outline of their e-business developments, their IT competences, and how developments have been influenced by competences.

For the purposes of this study, e-business was taken in its broadest sense to mean 'any business transaction or service conducted over the Internet' (Ross et al., 2001: 2). As well as buying and selling, this definition includes the use of internet technologies such as e-mail and intranets to exchange information either within the firm itself or with external stakeholders (Daniel and Wilson, 2002).

Literature review

There is a growing literature on the role of organizational skills needed for successful e-business. There are many approaches to strategic management theory, but the resource-based view (RBV) of the firm and the notion of 'core competences' has been used by a number of researchers to examine the skills and resources required by firms to successfully build and leverage IT (Daniel and Wilson, 2003; Feeny and Willcocks, 1998; Ward and Peppard, 2002). The resource-based view of the firm considers the organization as a 'bundle' of resources and that by coordinating and integrating these resources a firm can deliver competitive advantage (Ward and Peppard, 2002: 384). Strategic management therefore becomes a process of building and leveraging core competences.

Three capabilities are critical for superior performance in e-business (Saini and Johnson, 2005: 361): 'these capabilities are information technology (IT) capability, strategic flexibility, and trust-building capability'. It is important to provide an insight into the nature of these IT capabilities. Caldeira and Ward (2002) showed that IT competences are particularly important to SMEs. IT knowledge and skills were needed to, for example, tailor software, negotiate with IT suppliers, and to cooperate with a software house in the development of software. These competences were clarified in Caldeira and Ward (2003) to identify three skill sets: technical IT skills, managerial IT skills, and business and general management skills. They argued that SMEs need all three types of competence, to help them identify and realize IT opportunities in the firm.

Others to identify important IT competences include Feeny and Willcocks (1998) who developed a list of nine core IS capabilities that underpin the pursuit of high-value-added applications of IT (Table 1). Although Feeny and Willcocks referred to them as IS capabilities, they meet the definition of 'competence' as defined by Lambert and Bytheway (1998: 3) as 'the ability to develop, manage and deploy resources in support of a capability or capabilities'. Thus, this article refers to them as competences rather than capabilities as used by Feeny and Willcocks. Feeny and Willcocks (1998) did not aim to provide a comprehensive set of IT competences. Instead, they proposed the nine to reflect the core abilities that firms need to exploit IT in the current environment, where many IT services are outsourced. Thus, it is not surprising that their nine abilities emphasize supplier relationships.

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Table 1. The Feeny and Willcocks IS Capabilities and their Definitions

IS Capability	Definition (Feeny and Willcocks, 1998)
Leadership	Integrating IS/IT effort with business purpose and activity
Relationship building	Getting the business constructively engaged in IS/IT issues
Business systems thinking	Envisioning the business processes that technology makes possible
Architecture planning	Creating a coherent blueprint for a technical platform that responds to current and future business
Making technology work	Rapidly achieving technical progress by one means or another
Informed buying	Managing the IS/IT sourcing strategy that meets the interests of the business
Contract facilitation	Ensuring the success of existing contracts for IS/IT services
Contract monitoring	Protecting the business's contractual position, current and future
Vendor development	Identifying the potential added value of IS/IT service suppliers

Two studies have developed instruments to help measure some of the Feeny and Willcocks (1998) competences. Van der Heijden (2001) took e-business as its focus, and examined the following three Feeny and Willcocks competences: IT leadership, business systems thinking, and relationship building. Shi et al. (2005) also measured some of the Feeny and Willcocks (1998) competences. They focused on IS outsourcing competences, specifically: informed buying, contract facilitation, contract monitoring, and vendor development.

None of the studies by Feeny and Willcocks (1998), Van der Heijden (2001) and Shi et al. (2005) focused on SMEs, so we do not know whether the Feeny and Willcocks capabilities are relevant in the SME environment. However, some recent studies have focused on SMEs. Eikebrokk and Olsen (2007) focused on competences for e-business success in SMEs. Three of their seven competences were found to influence e-business success, specifically: the e-business concept, process integration, and systems and infrastructure. Scupola (2008) also focused on IT competences and e-business within the SME environment. Scupola confirmed the following three management level competences as important: vision, value, and control. At the individual level, three types of competence were important: technical skills, interpersonal skills, and conceptual skills. These two studies, plus that of Caldeira and Ward (2003) are important as they show that the concept of IT competences is relevant to SMEs. The studies also indicate that a broad range of IT competences applies to SMEs, including managerial and technical competences.

The SME literature suggests that small firms have struggled to gain value from e-business (Brown and Locket, 2004; Daniel and Wilson, 2002). However, there is a growing literature indicating a link between IT competences and e-business value. For example, Amit and Zott (2001) argue that value is created through a bundle of resources and capabilities, which may be within or outside the firm. They proposed a model of the sources of value creation, comprising efficiency, complementarities, lock-in and novelty. They stress that these 'value drivers' are interdependent, that is, the presence of a value driver can enhance the effectiveness of others (p. 509). In the SME context, Daniel and Wilson (2003) stress the importance of both innovation and integration in realizing value from e-business.

The process of creating value by integrating online business services with offline internal processes and IT systems is a central theme running through e-business transformation literature. This process takes the form of a stage-based transformation (Daniel, 2003; Poon and Swatman, 1997; Rao et al., 2003; Ross et al., 2001; Stone, 2003). Figure 1, (Stone, 2003), illustrates the process of

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transformation in SMEs. The early stages are characterized by simple initiatives to extend market reach. As the volume and complexity of transactions online increase, the company enters Stage 2. Stone (2003) admits that most SMEs find integrating with external partners very difficult due to the power shift in the relationship, but notes the benefits to the business are customer 'lock in' and the ability to manage functions more effectively. The final stage, 'adapt dynamically', is where the integrated business infrastructure allows the business to respond quickly to changing market conditions and customer need. Chu et al. (2007) provided empirical evidence of four broad eras of e-commerce that supports the Stone stages.

While many large firms develop internal IT departments to create and manage inter-organizational links, Poon and Swatman (1997) observed that e-business transformation in SMEs often began with inter-organizational links, with little or no integration with existing IT systems. Integration occurs only gradually, with full integration of online and offline IT systems occurring only at the final stages.

Another way that e-business activity can create value for firms is through 'innovation', which deals with the firm's ability to be creative and capture the value-creating opportunities presented by the growth of internet technology and its usage. The internet has been characterized as a disruptive technology and presents 'a plethora of latent opportunities for small firms and/or entrepreneurs to creatively engage in new value creating activities' (Jones et al., 2003: 287). Prahalad (1998) argues that in the new business environment, recognizing impending discontinuities and learning how to be innovative are the real challenges for senior managers. Tidd et al. (2005) define innovation as the mobilization of 'knowledge, technological skills and experience to create novelty in their offerings and the way in which they create and deliver those offerings' (p.5). They classify innovation strategies into the 4P's: Product innovation, Process innovation (changing the way products and services are created or delivered), Position innovation (changing the context in which products and services are introduced) and Paradigm innovation (changing the underlying mental models which frame what an organization does). A second dimension is the degree of novelty

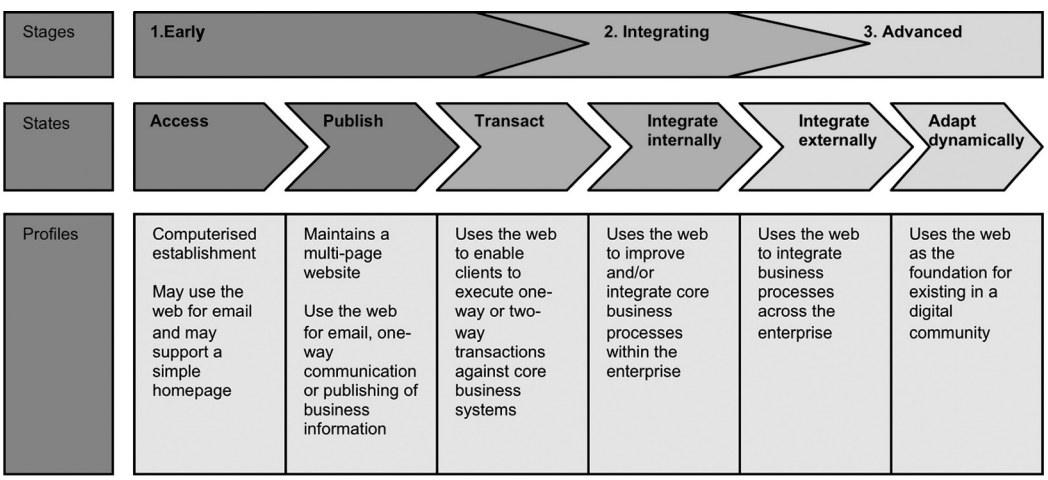

Figure 1. The IBM Model of Stages and States of E-business (Stone, 2003: 349)

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involved. Is the innovation incremental, a change at the component level/doing something better? Or is it a radical innovation, a change at the system level/doing something new? The Tidd et al. (2005) model can be used to identify where and to what degree firms are innovating.

The literature review shows that most SMEs are 'stuck' in the early stages of integration (Poon and Swatman, 1997; Daniel, 2003; Levy and Powell, 2005). The review also highlighted that the internet has provided opportunities for SMEs to create value through e-business innovation, yet gaining value from e-business has proved difficult. Studies have begun to use the resource-based view of organizations to identify a broad range of IT competences that may be required for e-business success. Most of this IT competence research has been conducted in the large firm environment with only a small number of studies of SMEs, which provide a very different IT environment due to their typical lack of IT resources, particularly of human IT resources. Despite these major differences, there is evidence to indicate that some of the findings from large firms can be generalized to SMEs. However, the studies of SMEs are in their infancy and have yet to provide a consensus on what IT competences are important for gaining value from e-business.

Research methods

The research project aimed to understand how IT competences inhibited and/or enabled an SME's e-business development. As little of the IT competence literature has focused on SMEs, the project adopted a case study approach to identify clear links between IT competences and e-business developments in the SME environment. Yin (2003) defines a case study as, 'an empirical enquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident' (p.13). Yin suggests that a case study approach is particularly useful if contextual conditions may be 'highly pertinent to your phenomenon of study' (p.13). A small business was selected that matched Daniel and Wilson's (2003) definition of e-business transformation: that is, one that had undertaken 'an on-going sequence of e-business developments that collectively amount to a significant modification to business strategy' (p.286). The use of a case study protocol provided structure and reliability to the research process (Yin, 2003). A semi-structured interview approach was used to collect data. Responses were recorded and transcribed. In addition, key documents were collected and websites were reviewed. Discussions took place with the Managing Director, the majority shareholder in the firm, the Marketing Manager and other key players in the firm's e-business developments. A preliminary meeting with the sponsor and pre-interview emails provided a way to introduce the research and the researcher into the situation and to minimize 'social dissonance' (Myers and Newman, 2007). It was also a way to start to assure interviewees of confidentiality (Myers and Newman, 2007).

The case study was conducted over an extended period of time as the findings were documented, discussed with the organizational sponsor and then explored further in the context of subsequent analysis. The approach was valuable in allowing a number of voices or perspectives to emerge and in exploring the different understandings of the different participants (Klein and Myers, 1999; Myers and Newman, 2007). Throughout the analysis 'theory is used as a sensitizing device to view the world in a certain way' (Klein and Myers, 1999: 75).

Barnes et al. (2004: 610) provided a starting point for the interview questions which were then adapted to reflect the project's research objectives. Open-ended questions were aimed at gathering information about the following three major topics:

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- e-business developments over the years, based on Stone (2003)
- e-business and business innovation, based on Tidd et al. (2005)
- IT competences, based on Feeny and Willcocks (1998).

IT competences were explored using a number of sources, based primarily on Feeny and Willcocks (1998). Van der Heijden (2001) acknowledged the difficulties associated with measuring competences and argued that specific behaviours were associated with competences. He identified a set of behaviours for three of the Feeny and Willcocks (1998) competences. Also, Shi et al. (2005) created an instrument to measure the four Feeny and Willcocks competences that focused on IT outsourcing. This project adopted a similar approach by operationalizing seven of the nine Feeny and Willcocks (1998) competences. Two of Feeny and Willcocks' IT competences, 'contract facilitation' and 'contract management' were omitted from the list because their definitions were deemed to be more suited to large organizations engaged in lengthy and major outsourcing contracts. Also, two of the remaining competences provide good coverage of working with external vendors. Each of the seven remaining Feeny and Willcocks competences were carefully examined and a list of associated behaviours was compiled from the literature.

The behaviours were used to analyse the case evidence to establish the existence or non-existence of specific competences in the firm. This approach resulted in a total of seven competences and 32 behaviours, as indicated in Table 2. The logic behind this framework is that if the behaviour indicating a competence is strongly represented then it can be said that the competence is also strong. Conversely if the behaviours are not exhibited or are weak then the corresponding competence can be said to be weak or non-existent. For each transcript the researcher analysed each behaviour and assigned a letter to indicate that the behaviour clearly exists in the organizations (X), there is some evidence of its existence but it could be significantly improved in the firm (x) and if there was no evidence to suggest the behaviour exists (-).

NTE Ltd: A case study

NTE Ltd is based in the North-East of England, and is a supplier of business communication equipment, ranging from telephones to public address systems. Traditionally, the company has had two main channels to market, a distribution business and an installation business. The distribution business supplies hardware throughout the UK to resellers and installers. The installation business operates only in the North East region of the UK. While each market has different customers with different needs, the company's core value proposition is its technical and value-adding approach to understanding customer needs and delivering solutions. When compared to its competitors, NTE is a small business (26 staff), with limited bargaining power and can be undercut on price. Adopting a value-added support strategy has enabled the firm to maintain greater profitability for its products than would otherwise be possible.

Against a background of rapid change, re-skilling and the challenges to traditional revenue sources, NTE began its process of e-business transformation. As NTE's Managing Director commented: 'Technology is changing and we don't know where the market is going in a few years time.' The development of an e-commerce strategy was part of a wider search for 'replacement markets'. 'We are constantly looking for new markets, new products and more niche stuff … by casting your net wider, which the Internet allows you to do, then you can make the business more resilient.'

As NTE is a communications company, some staff had a strong technology background with different degrees of IT skills. Table 3 provides an overview of the e-business team. This team of two was supported internally by two managers and externally by four firms (Table 4). The NTE

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Table 2. Summary of IT Competences at NTE

Leadership competence: Integrating IS/IT effort with business purpose and activity			**NTE** (2)
Behaviours	1	Ability to identify and evaluate the implications of IT-based opportunities as an integral part of the business strategy formulation and define the role of IS/IT in the organization. [8]	X
	2	Set goals and directions. [2]	X
	3	Build strong business/IT relationships and manage the interdependencies. [2]	X
	4	Owner-manager personally instrumental in organizational exploitation of IS/IT. [2]	X
	5	Owner-manager exhibits positive attitude to growth. [4]	x
	6	Owner-manager is entrepreneurial in outlook. [3,6]	X
	7	Can make rapid strategic decisions with shorter strategy, development and implementation cycles. [1]	X
	8	Can develop a business case which requires substantial changes to the business model with uncertain information, in a rapidly changing environment where there is limited prior experience to draw on. [1]	X
Relationship-building competence: Getting the business constructively engaged in IS/IT ssues			
Behaviours	1	Develops a user's understanding of IT potential. [2]	X
	2	Helps users and IT specialists to work together, creating a dialogue that ensures user's ownership and satisfaction. [2]	–
	3	Ability to engage multiple stakeholders both inside and outside the firm to build an internal and external commitment to strategic change. [1]	x
	4	Ability to redesign the sales and service process to build a two-way dialogue with the customer, replacing previous broadcast styles of communication. [1,7]	x
	5	Promotes staff learning and knowledge management. [5]	X
Business systems thinking competence: Envisioning the business process that technology makes possible			
Behaviours	1	Recognizes the importance of the interdependencies between business and IT functions inside the firm, builds and communicates a holistic view of the current organization and activities as a basis for envisioning potential new patterns. [2]	X
	2	Integrates channels to provide a multi-channel service in so far as is necessary to deliver the value proposition for given segments. [1]	X
	3	Creates a feedback loop from e-business into corporate strategy so that the two occur simultaneously and interactively. [1]	X
Architecture-planning competence: Creating a coherent blueprint for a technical platform that responds to current and future business			
Behaviours	1	Through an insight into technology, suppliers and business directions develop a vision of an appropriate technological platform. [2]	X
	2	Formulates associated policies that ensure necessary integration and flexibility in IS services as the basis of shared IT services across the firm. [2,7,9]	X
	3	Integrates a wide range of systems with real time data to facilitate innovation. [1,7]	X

(Continued)

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Table 2. (Continued)

Making technology work competence: Rapidly achieving technical progress by one means or another			
Behaviours	1	Ability to develop/acquire and implement information, systems and technology solutions that satisfy business needs. [8]	X
	2	The ability to define service arrangements and performance criteria to match the business requirements (including project management). [8]	X
	3	Establish and operate processes that ensure data, information and knowledge management activities meet organizational needs. [8]	x
	4	Ensure that new processes and ways of working are designed and implemented effectively in conjunction with new technology. [8]	X
	5	Rapidly trouble shoot problems that are disowned by others. [2]	X
	6	Identify how to address business needs that cannot be properly satisfied by standard technical approaches. [1]	X
	7	Exhibits strong understanding of IT fundamentals rather than IT specifics. [2]	X
Informed-buying competence: Managing the IS/IT sourcing strategy that meets the interests of the business			
Behaviours	1	Monitors the services and technology available. [2]	X
	2	Ensures technology, information and application assets are effectively maintained and costs of acquisition and ownership are understood and managed. [8]	x
	3	Structures the tendering process. [2]	–
	4	Oversees contract negotiations. [2]	–
Vendor-development competence: Identifying the potential added value of IS/IT service suppliers			
Behaviours	1	Looks beyond contractual arrangements to explore the long-term relationship with suppliers, builds a strong mutual understanding of each other businesses to maximize the contribution of suppliers. [2]	X
	2	Actively seeks to protect the business against switching costs. [2]	X

Note 1: Key to sources: 1. Daniel and Wilson, 2003; 2. Feeny and Willcocks, 1998; 3. Fillis et al., 2003; 4. Jeffcote et al., 2002; 5. Martin and Matlay, 2003; 6. Poon and Swatman, 1997; 7. Ross et al., 2001; 8. Ward and Peppard, 2002; 9. Weil and Vitale, 2002.
Note 2: The letters in the right-hand column of the Table indicate strength: strongly observed (X), weak or could be improved (x), behaviour was non-existent (–).

team developed a strong understanding of HTML code, but as websites became more sophisticated and required database-driven queries, it required the business to look at .asp and .php coding, which took the team outside their competences. External providers were used when skills were not available within the business. As the presentation of websites and particularly branding became more important, NTE began to use external companies with a strong graphics and coding background to help produce more professional websites for the UK market.

E-business developments at NTE

Figure 2 depicts how the firm's online activities developed over the years, starting with e-mail in 1997. Significant steps forward included their first shopping site in 2000, and a real-time stock ordering system in 2003.

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Table 3. The In-house IT Team

Job title	Employment commenced	IT qualifications	Role in projects
Managing Director (MD)	–	No formal IT qualifications. Background in electrical engineering. Participated in a University Business School's web development programme. Also attended basic web development training, Macromedia Dreamweaver and Adobe.	Introduced web development to the business. Encouraged in-house development of skills. Encouraged experimentation, developed strategy and pushed through developments.
Marketing Manager	1993	No formal IT qualifications, background in technical sales. Attended basic web development training, Macromedia Dreamweaver and Adobe.	In-house web developer, contributed to strategy and direction.
Network Administrator	1995	Background as specialist telecommunications engineer, migrated to IT/network engineer. MCSE qualified.	Background IT support, managed web servers, email, domain name registration, site set-up.
Web Developer	2001 to 2002	Recent graduate, HND in web design.	In-house web developer, brought in to speed up web development and investigate the options for an online shop for distribution business.

Table 4. The External IT Service Providers

Company Type	Engaged	Area of expertise	Role in e-business development
IT consultancy	2003 to date	Online integration of accounts and CRM packages (.asp code).	Integrated new stock and accounts system with Site 1, to allow customers online access to accounts, stock and ordering.
Web designers	2003–2004	Graphic designers with strong coding and database skills (.asp and .php code).	Required for integrating online shopping mechanism with new company website (Site 1). Company experimented further with database driven sites building Site 7, to return customer searches for telecoms engineers.
Marketing communications agency	2006	Graphic design company worked with specialist online marketing company (below).	Redeveloped branding on main shopping site (Site 1) for UK market.
Specialist online marketing company	2006	Web development / coding (.asp, .php).	Integrated new graphics with shopping mechanism, developed content management system for NTE with news updates, documents and also customer forum (Site 1).

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The early web developments were in-house. The first step was to develop a main company website in 1998 listing all of the company's products and services (Figure 2, Site 1). It quickly became apparent that some specialist products were attracting search engine enquiries from non-telecommunications resellers outside the UK. To capitalize on this feedback, NTE built a series of 'satellite' websites from 2001 onwards, for each of the specialist product families. While the main NTE website listed all the items that NTE sold, the 'satellite' websites were dedicated to specific product ranges. NTE invested time and resources in developing a search engine optimization strategy so that each satellite website achieved a high search engine ranking based on their chosen keywords. The satellite websites generate enquiries from all over the world and have delivered major contracts in the UK, Africa and the Middle East.

The 'static' nature of the main company website meant that it quickly became irrelevant for existing customers of the distribution company who wanted to view a large range of products online, to download information, check stock and order online. In 2003 NTE purchased an 'off the shelf' E-CRM package and customized it with the help of an external supplier to provide online stock viewing and ordering to meet the growing demand for online shopping. The purchase of this software gave NTE a low cost solution to implementing the online shopping site that the company had been investigating for some time. It was at this point that the web development strategy split and followed two distinct routes. The development of satellite, HTML websites continued to be carried out by the in-house team, but NTE increasingly used external providers to develop the shopping system, particularly to integrate systems. The internal team's skills were no longer adequate as the software required expertise in .asp and .php.

Figure 2 illustrates the two distinct development paths for e-business. The 'satellite' website strategy is evidenced by the steady stream of search engine optimized HTML product websites, as highlighted by the vertical line (dashes). All of these were developed in-house. The second e-business development path was the system 'integration' path, as highlighted in Figure 2 by dark grey boxes and a dotted arrow to show the direction taken. This development started in 2003 when the business began the process of integrating its internal stock and accounting systems with the distribution website (Site 1). This was in response to the increasing sophistication of customers and the volume and complexity of online transactions required to support them. The customized E-CRM web interface was designed with support from an external supplier. While 'shopping basket' type transactions accounted for only 5% of the company's turnover, the company's MD believed that the value of internal integration was in future-proofing the business: 'The current set-up makes it easy to make changes in the future. We didn't have to do it, because a lot of our competitors haven't and have reduced costs as a benefit. I think we will gain the benefit over time, because I think every one will make the change eventually and we have already done that.'

By August 2006 the distribution company had embarked on a different kind of integration project, with the aim of customizing its existing SQL platform and E-CRM web interface to provide an online maintenance logistics service for a single client. The company's understanding of website technology and prior investments allowed NTE to adapt resources in a dynamic way to capture this new business opportunity.

Figure 2 shows that NTE followed a 'staged' progression to achieve a significant level of integration between internal and external systems. The need to provide online support for existing UK customers of the distribution businesses drove internal IS integration. Integration was customer-led and followed the 'outside-in' approach to internal integration suggested by Poon and Swatman (1997).

The cells marked with double borders in Figure 2 refer to failed initiatives. These indicate an experimental trial and error approach to development. Some websites struggled to make a viable

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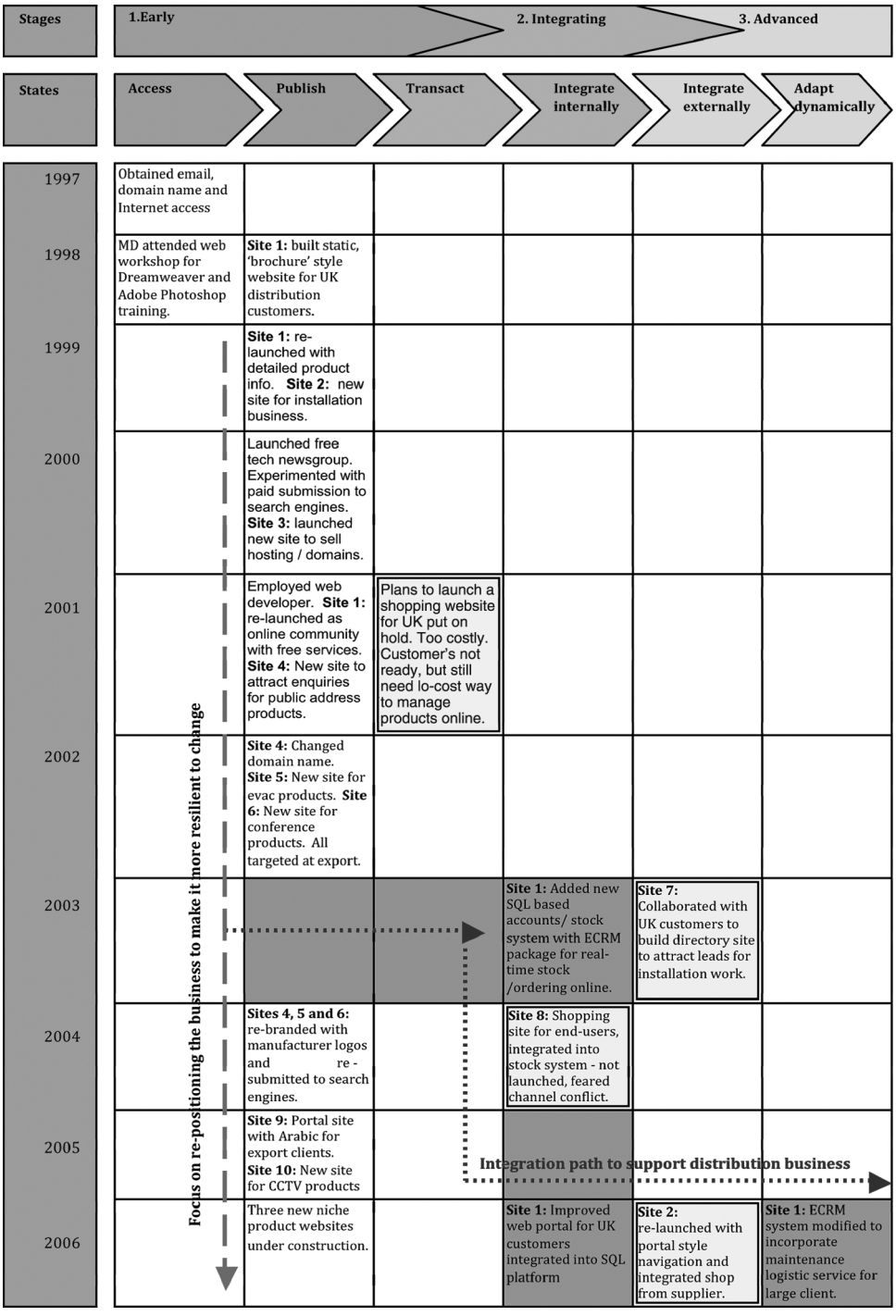

Figure 2. NTE Ltd: E-business Integration Activities (adapted from Stone, 2003: 349)

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business case. Some attempts to integrate externally with customers and suppliers did not deliver the expected benefits. In two cases, customer response was poor and the websites were difficult to customize as external parties had developed them. This meant that NTE could not use its successful search engine optimization strategy to attract customers; sites were also difficult to update and subsequently abandoned.

IT competences and NTE'S e-business developments

The data in Table 2 show that the following four competences were particularly strong at NTE: leadership, business systems thinking, architecture planning, and making technology work. For leadership, NTE's owner-manager exhibited strong, entrepreneurial and strategic leadership abilities. Business systems thinking was also crucial as business leadership worked closely with the technology to explore possibilities for new sources of value. In addition, a strong score in 'architecture planning' indicated an ability to understand future business needs and how IT could assist. Making technology work was also strong at NTE and assisted many very successful developments, including websites that have resulted in major business expansion. Other areas of competence were less important to the success of e-business at NTE.

Leadership. The Managing Director's entrepreneurial approach had a strong influence on e-business at NTE. 'We have always been very entrepreneurial; we are open to new ideas. Many of the ideas come from the MD – lots and lots of ideas and lots of enthusiasm.' He has enabled risk taking and learning by doing. There is no climate of fear of failure. 'The MD is the owner-manager. He is a really positive person. He is willing to take people down experimental paths. He's not afraid of technology – and very entrepreneurial.' An aspect of this entrepreneurial approach is an ability to accept failure, learn and move on. 'There is very strong leadership. We learn from experiments and then move on. There is no sense of failure.' This leadership style has been reflected in the culture of the organization: 'You have to be a self starter and self manage.' NTE has a very loose hierarchy and if a person has an idea, they often have the chance to follow it up.

In the development of e-business initiatives, the owner-manager showed strong creative and marketing abilities. Recognizing that one particular page on the first, main company website was generating more customer enquiries than the others, the MD pushed through the development of a dedicated website for that product. Understanding customers' keyword use was particularly important. For example, tender documents would often require a construction company to deliver a product about which they had little or no knowledge. NTE ensured that their website would be ranked number one with search engines if the construction company searched for the equipment online. These 'satellite' websites became the core of the company's online strategy and provided an entry route into new and specialist export markets for the business.

Relationship building. The MD and the Marketing Manager played a major role in managing relationships between the internal stakeholders involved in the e-commerce strategy. It was relatively easy at NTE as it only took a few core staff to make a major strategic change. It was not important to build wide commitment from staff.

A focus on the relationship with the customer and a real understanding of the customer was an important contributor to the success of the e-business initiatives at NTE. 'We have a strong understanding of what our customers want. We don't assume we know. If we didn't keep close to them we might miss an opportunity. We keep moving with the revenue opportunities. That way mistakes are not big if you keep responding to the customer.' However, it is important to note that much of

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this understanding of customers came from observing customers' behaviour on-line rather than directly seeking their views or input.

Business systems thinking. NTE have focused on IT as an enabler. They have created a dynamic relationship between strategy and e-business initiatives that has resulted in a stream of investments. 'We have always been creative. It's not technology for technology's sake. For us it's what you can get out of it. The idea that technology can help us is core – we always see it as an enabler. We always have the idea that technology can deliver a benefit – that's what we tell our customers about the technology products that we sell.' NTE's approach to technology has also been flexible, aiming to learn from success and failure. 'We have abandoned projects when we have realized the value is not there and we've looked for another way of doing it rather than persist.'

Architecture planning. NTE has not taken a formal approach to architecture planning, but a competence has emerged. 'We had a vision of what we didn't want based on what we had learned. We experiment and things evolve. The open accounts system is a good example - we wanted to be able to access the database. We won't be tied into one vendor. We must have one joined up system.'

As a small business they focused on costs and were prepared to compromise. For example in relation to the use of packages: 'We generally don't keep packages up to date. We skip generations. Upgrades are difficult.'

Making technology work. NTE have strong in-house IT skills. 'We have an extremely technical guy. I can just say to him – "can you make this work?" We are totally reliant on him – but he won't leave us. The trouble will come when he retires – but that's years away.' As in other areas NTE have taken a very pragmatic approach while remaining aware of the risks. Also, their web-skills have resulted in great success with 'basic' websites.

Another important element is the attitude to technology. 'We have the skills. It's a lack of fear. We are gung-ho - we might not have a clue, but hopefully by the end we'll have learned.'

Informed buying. External providers of services and software have been important to NTE's e-business developments. They have tended to learn from their initiatives, including the failed projects. 'We are more informed now than we were, but only by what we learned as we went along. We constantly scout around for things we can use. We can only spend small amounts of money. We don't do formal purchasing, we don't have IT professionals to sit around and review products – it's not like that in a small business. We have to judge carefully when is the right time to commit. We have had our fingers burnt in the past.' NTE had considered employing contractors rather than outsourcing. For example, they recognized that they had to pay for expertise in .asp, .php and database integration. 'We have explored employing staff but are not sure if we have enough work and also we need two skill sets – the graphic design and database side.'

Vendor development. Vendor development has been a barrier for NTE as they have found a mismatch between the commercial model of software service providers and their needs as an organization. 'Generally IT suppliers have been enabling and restricting. We haven't found the flexibility we need and this is a big issue for us. The vendors are focused on complete web site developments and are unwilling to provide the maintenance service that provides the flexibility NTE need to learn, adapt and continue to evolve.'

NTE have found vendor relationships frustrating: 'We have found establishing a long-term relationship hard – they need a constant stream of money. We really need a flexible external

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provider but we can't find one. Suppliers are important – we haven't got the skills in key areas, but it's a lot of hard work to put in to find the relationship is not going to work very well.'

Furthermore, NTE's investment in CRM increased risks. 'I'm interested in on-demand CRM. It might be time for it. But the investment in CRM is getting to be too big to get wrong – we can't test it out without too big an investment. We're afraid of the switching costs with the wrong CRM. How do you learn in this situation?'

NTE found it hard to build successful, long-term relationships with vendors. Thus the data in Table 2 is misleading as the two items used failed to fully capture the breadth of this competence, particularly regarding making things work long-term, to gain added value. We consider the apparent contradiction between the rating of the competence as 'strong' and the problems identified flows from the definition for this vendor development competence. We suggest it should be revised to 'identifying and *successfully exploiting* the potential added value of IS/IT suppliers'. This would also imply that we would need to include additional behaviours to be able to assess the revised scope of the competence.

Discussion

The case demonstrates that SMEs can use e-business strategically, particularly as an enabler of innovation (Bengtsson et al., 2007; Dibrell et al., 2008). NTE sought access to new markets and a wider customer base and achieved this through a series of low cost internet initiatives. This strategy compared favourably with the high costs involved in meeting export clients face-to-face. Internet technology enabled the business to deliver tailored marketing messages to a wider customer base/marketplace than was possible through traditional marketing tools. The innovation came from the close link between the creative marketing function and IT, not the IT per se. The technology they used was basic, but the firm used it creatively. Over time the firm developed a marketing strategy that worked. It required a constantly evolving IT strategy. The case shows how important creativity and innovation are in delivering value from IT as their e-business value came primarily from business model innovation (Amit and Zott, 2001; Daniel and Wilson, 2003).

The study also showed that process efficiencies were possible for SMEs (Johnston et al., 2007). However, efficiency gains proved more difficult compared with the gains from innovation. This finding adds to our understanding of how SMEs develop their IT competences. The innovation strategy was achieved by building IT competences through training and employing new staff, as well as on the job through numerous projects, including failed projects. This strategy enabled NTE to make significant progress with IT in the early years, but a lack of some competences prevented them from developing even more sophisticated systems, which is a problem highlighted for SMEs by Brown and Lockett (2004). In particular, the external relationship competences of informed buying and vendor development impeded their e-business developments. This is an important finding as it indicates that low levels of some internal competences can significantly inhibit IT developments. This suggests that sooner or later, a lack of competences will inhibit a firm's IT developments as firms need to develop a full range of competences in order to take full advantage of IT. This has many practical implications for firms. For example, it may indicate the need for firms to conduct an IT competence audit prior to engaging in major IT initiatives, and to address significant weaknesses, again, prior to the IT project.

This longitudinal study also makes a number of other contributions that improve our understanding of the resource-based view of the firm in relation to IT in the SME environment. Importantly, it provides evidence about IT competences within SMEs and thus builds on prior work (Daniel and Wilson, 2003; Feeny and Willcocks,1998; Shi et al., 2005; Van der Heijden,

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2001), and for SMEs (Admiraal and Lockhorst, 2009; Eikebrokk and Olsen, 2007; Fillis and Wagner, 2005; Scupola, 2008). The study focused on internal IT resources and provided clear evidence of how specific IT competences inhibited and/or enabled e-business developments at one firm. Four of the Feeny and Willcocks (1998) competences were particularly important to the case firm: that is, leadership, business systems thinking, architecture planning, and making technology work. This shows that SMEs need internal IT competences to make a success of e-business.

Leadership was the IT competence that had the greatest impact on the e-business developments at NTE, as recognized by others (Bassellier et al., 2003; Bengtsson et al., 2007; Feeny and Willcocks, 1998; Fillis and Wagner, 2005; Simmons et al., 2008).

Business systems thinking was also an important enabling competence at the case firm (Fillis and Wagner, 2005). Like leadership, it was an initiating competence, without which progress would have been difficult. Leadership and business systems thinking provided the drive and vision for the e-business initiatives. A strong business system thinking competence enabled NTE to understand how value could be delivered via a close linkage of marketing and IT competences.

The case study also adds to our understanding of the relationship between SMEs and their IT suppliers. This relationship proved to be crucial to e-business developments at the case firm (Fuller, 1996). The case firm found it difficult and expensive to buy in some technical competences and suppliers did not provide the flexibility the firm required to support their incremental, evolutionary approach to innovation. This lack of supplier flexibility proved to be a barrier as it hampered the case firm's IT developments. In addition, IT suppliers have different mindsets. For example, web designers are coders and focus on the technology, and graphic designers focus on images and presentation. The firm's IT suppliers wanted fixed, finite, project-based relationships rather than one that was fluid, flexible, and involved making small incremental changes.

Implications for research, policy and practice

This study raised many possibilities for further research, including a possible mismatch in the market, and strategies to help SMEs develop their competences or overcome areas of weakness.

The study shows that the use of *behaviours* can be a useful way to identify and assess competences and that the Feeny and Willcocks (1998) IT competences have some applicability to SMEs, despite the set being based on experiences in larger firms. It should be recognized that this study examined only seven of the nine Feeny and Willcocks competences. In addition, Feeny and Willcocks did not attempt to create a comprehensive set of competences, but ones they identified as 'core to the business's future capacity to exploit IT successfully' (p.10). Thus, it is likely that studies of SMEs will require the identification of additional competences that are particularly relevant to SMEs (Eikebrokk and Olsen, 2007; Scupola, 2008). The study found limitations with the Feeny and Willcocks (1998) competences. For example, only two competences referred to technical competences (architecture planning and making technology work), but neither included the ability to develop systems, which proved to be an important competence at NTE and made them different to other firms. More importantly, although the Feeny and Willcocks (1998) set stresses relationships, their competence of 'relationship building' proved too narrow, as it focused on internal relationships rather than external relationships. Also, their competence of 'vendor development' proved to be more than just recognizing the need for a value-added relationship. Thus future studies should add behaviours associated with making that relationship work. A revised definition for 'vendor development' is: identifying and successfully exploiting the potential added value of IT service suppliers.

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The study also has policy implications for the support provided for SMEs in their exploitation of IT, especially as the case firm experienced major problems with the competence of vendor development. Ways must be found to encourage the development of IT competences, including long-term vendor relationships which provide a basis for learning and innovation. Secondly, there needs to be an emphasis on providing insight into possibilities and the practicalities of taking on new technologies – potentially in the form of case studies and related events that provide an opportunity for learning and go beyond sales-oriented vendor case studies.

A major implication for practice is that the case confirms that organizational learning is an important mechanism for the development of competences and the achievement or maintenance of competitive advantage (Chaston et al., 2001). Thus, SMEs are likely to engage in a cycle of learning linking organizations and their software suppliers. Importantly, this includes learning how to further develop the software, not just make use of software (Fuller, 1996). This learning process is possibly similar to the idea of emergent strategy (Mintzberg, 1987). Learning is often accidental, coming from trial and error (Ekanem and Smallbone, 2007) and from informal workplace learning including collaborative 'elearning' (Admiraal W and Lockhorst D, 2009). The ideas of single and double loop learning (Argyris and Schon, 1978), for example, as e-business adoption results in 'reconsidering fundamental organisational characteristics' (double-loop learning) can also be applied (Spicer and Sadler-Smith, 2006).

The case indicates a major implication for policy and practice as the problems with 'vendor development' found in the case study organization were a major barrier to learning – both for the organization and the vendors. From a vendor perspective we suggest that there is a need to selectively invest in strategic relationships to enable learning and development even if this does not lead to short-term profit maximization. From a policy perspective, enabling learning for vendor or customer organization could be an important criterion in allocating funding provision.

Conclusions

This study focused on one SME, which had both successfully and unsuccessfully engaged in e-business developments over a period of ten years. The firm gained value from e-business through both innovation and process integration. The following four IT competences enabled the e-business developments at the firm: leadership, business systems thinking, architecture planning, and making technology work. IT leadership had a particularly strong influence.

It is important to note that this study involved only one firm. It is thus not possible to generalize to all firms in their industry or even to other types of SME. Also, it seems very likely that another firm would present very different data, particularly for each IT competence. For example, the case study firm had an entrepreneurial CEO who actively led the firm's e-business developments.

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