



The role of dynamic capabilities in e-business transformation

Elizabeth M. Daniel¹ and
Hugh N. Wilson¹

¹*Cranfield School of Management, Cranfield,
Bedford, U.K.*

Correspondence:

Elizabeth Daniel, Cranfield School of
Management, Cranfield, Bedford MK43
0AL, U.K. Tel: +44 1234 751122;
Fax: +44 1234 752641;
E-mail: E.M.Daniel@cranfield.ac.uk

Abstract

The domain of e-business is characterised by rapid change and in such markets managers can no longer rely on the resources that they have assembled to provide their extant competitive position. Instead they must be able to combine resources in new ways, gain additional resources and dispose of superfluous resources, and to do this repeatedly and rapidly if they are to compete successfully. The term 'dynamic capabilities' is emerging in the strategic management literature for these skills. This study seeks to identify the dynamic capabilities that are necessary for e-business transformation and to identify practices in developing these capabilities that are both effective and common across companies, and might therefore be considered as 'best practice'. Eight distinct dynamic capabilities are identified, each appearing to address either innovative or integrative aspects of e-business transformation. Consistent with previous studies of dynamic markets it was found that 'best practice' involved simple, experiential and iterative approaches to these necessary capabilities.

European Journal of Information Systems (2003) 12, 282–296. doi:10.1057/palgrave.ejis.3000478

Keywords: dynamic capabilities; e-business; dynamic markets; innovation; integration; turbulence; analytic induction; case studies

Introduction

Despite the downturn in sentiment towards the dot.com companies in April 2000, e-business transformation continues to be a strategic imperative for many businesses. Firms recognise that e-business can assist with numerous objectives, such as enriching the dialogue with customers (Kenny & Marshall, 2000), streamlining internal business processes (Dutta & Segev, 1999) and developing deeper relationships with key suppliers (Kaplan & Sawhney, 2000; Wise & Morrison, 2000). However, this domain also poses many challenges such as the entrance of new competitors (Porter, 2001), the blurring of market boundaries (Rayport & Sviokla, 1995) and the emergence of new business models (Amit & Zott, 2001).

Such dynamic environments pose considerable challenges for managers. A number of researchers have suggested that in such environments competitive advantage is transient, rather than sustainable (D'Aveni, 1994; Ilinitich *et al.*, 1996). Managers must therefore concentrate on renewing rather than protecting their sources of competitive advantage (Rindova & Kotha, 2001). No longer can they rely on the assets, staff, products, brands and other resources that they have assembled to provide their present competitive position. The dynamic nature of the e-business domain requires them to be able to combine these resources in new ways and to gain additional resources, and to do this repeatedly, if they are to compete successfully.

Received: 15 May 2002
Revised: 25 August 2003
Accepted: 9 September 2003

Strategic management scholars have recently begun to refer to the processes by which firms reconfigure their resources in order to gain competitive advantage as dynamic capabilities (Teece *et al.*, 1997). Such capabilities are viewed as critical to the success of firms in dynamic markets, to the extent that the threat to such firms may not come primarily from their competitors, but rather from within their own firm, from the challenge of developing and sustaining effective dynamic capabilities (Eisenhardt & Martin, 2000).

In this paper, we seek to help managers undertaking e-business transformation by exploring the role of dynamic capabilities in this domain. We use the term e-business transformation to describe an organisation's deployment of e-business to modify its strategy significantly. In accordance with our focus on the resource based view, we define strategy in turn as a 'sustained pattern of resource allocation' (Mintzberg, 1978). As will be discussed, this transformation may be achieved in a number of linked stages or projects. We identify specific dynamic capabilities that are necessary for e-business transformation and identify practices in developing these capabilities that are both effective and common across different industries, and might therefore be considered as 'best practice'.

The theoretical foundations for the concept of dynamic capabilities are currently being laid out in the strategic management literature. To date there has been little application of this concept to the information systems field in general and to the specific case of e-business, for which we were able to find only one study (Rindova & Kotha, 2001). This paper therefore draws heavily on literature from the strategic management field and provides a first step in applying this concept to the dynamic environment of e-business transformation.

This paper commences with a review of the literature addressing dynamic capabilities. The objectives and methodology adopted for the study are then described and the findings of the study are then presented and discussed. We conclude with a more general discussion of our findings including suggestions for further research. In this paper, we do not present a review of the now considerable literature addressing e-business. Instead the reader is referred to the recent literature review of this field by Ngai & Wat (2002), to papers addressing the underlying characteristics of on-line markets (Rayport & Sviokla, 1995; Dutta & Segev, 1999; Evans & Wurster, 1999; Shapiro & Varian, 1999), to the comprehensive papers on internet strategy (Venkatraman, 2000; Porter, 2001; Amit & Zott, 2001) and to the recent exploration of the contingency factors affecting e-business adoption (Teo & Pian, 2003).

Dynamic capabilities

Dynamic capabilities have their antecedents in the resource-based view (RBV) of the firm (Wernerfelt, 1984). This strategic paradigm views firms as collections of specific physical, human and organisational assets, or

resources. If these assets are valuable, rare, inimitable (difficult to imitate) and non-substitutable – the so-called VRIN attributes – they can be used to implement value-creating strategies that will provide sustainable competitive advantage (Prahalad & Hamel, 1990; Barney, 1991; Grant, 1996). An extensive discussion of RBV in the context of other major theoretical bases of strategic management research, such as those of industrial organisation economics (Porter, 1979) and transaction cost economics (Williamson, 1975, 1985) is provided by Hoskisson *et al.* (1999). RBV has proved to be a useful paradigm with which to explore the IS domain (see, e.g., Jarvenpaa & Leidner, 1998; Pereira, 1999; Zhang & Lado, 2001). Duhan *et al.* (2001) and Caldeira & Ward (2003) find RBV particularly useful in examining IS use in the context of small- and medium-sized enterprises (SMEs), while Hedman & Kalling (2003) include firm resources as a key component of their elucidation of the business model concept.

Some scholars have questioned whether RBV adequately explains why certain firms have competitive advantage in situations of rapid and unpredictable market change, termed high-velocity or dynamic markets (Teece *et al.*, 1997; Zollo & Winter, 1999; Rindova & Kotha, 2001). In such markets, the mere existence of appropriate bundles of specific resources is not sufficient to sustain competitive advantage. Instead a firm must constantly reconfigure, gain and dispose of resources to meet the demands of a shifting market. This has led to the concept of dynamic capabilities, defined by Eisenhardt & Martin (2000, p. 1107) as:

The firm's processes that use resources – specifically the processes to integrate, reconfigure, gain and release resources – to match and even create market change. Dynamic capabilities are therefore the organisational and strategic routines by which firms achieve new resource configurations as markets emerge, collide, split, evolve and die.

They quote as examples product development, alliancing, strategic decision-making and knowledge creation.

Considerable interest has recently been shown in this concept, with studies particularly focusing on their role in new product development (Petroni, 1998; Deeds *et al.*, 2000; Majumdar, 2000; King & Tucci, 2002) and international expansion (Luo, 2000; Madhok & Osegowitsch, 2000; Griffith & Harvey, 2001). The importance of these capabilities is demonstrated by the study by Rosenbloom (2000) in which he finds that the NCR Corporation only survived the advent of the electronic era in the 1950s due to their ability to 'actualise dynamic capabilities'.

Lawson & Samson (2001) apply a dynamic capabilities approach to the investigation of innovation. While many authors highlight the differences between an organisation's well-established or 'mainstream' activities and their innovative or 'newstream' activities (Kanter, 1989), Lawson & Samson (2001, p. 382) stress that 'managing the different needs of the mainstream and newstream independently is unlikely to be successful in a dynamic and turbulent

operating environment'. They suggest that in such markets organisations must develop an innovation capability that allows these two streams to be closely coupled. They propose a model that operationalises this capability as seven elements: vision and strategy; harnessing the competence base; organisational intelligence; creativity and idea management; organisational structure and systems; culture and climate; and the management of technology.

Teece *et al.* (1997) suggest that dynamic capabilities are unique to individual firms, reflecting their individual idiosyncrasies and their specific path-dependencies. While acknowledging that the details of dynamic capabilities are idiosyncratic, Eisenhardt & Martin (2000) consider that specific dynamic capabilities show considerable similarities across firms. In particular, they find that there are similarities associated with the effective way of undertaking such activities, commonly termed 'best practice'. This disagreement raises the need for further empirical evidence on this point.

Although required in all markets, dynamic capabilities change in nature in high-velocity markets from their embodiment in more stable markets (Eisenhardt & Martin, 2000). In stable markets they are detailed, analytic and stable processes and resemble the traditional conception of routines. In contrast, in high-velocity markets dynamic capabilities become simple, experiential and fragile processes with unpredictable outcomes. The simplicity of these capabilities means that there is little structure or routine for managers to rely on. Prigogine & Stengers (1984) describe such processes as dissipative, in that they require constant energy to stay in on-track, and they are constantly in the unstable state of slipping into either too much or too little structure. As the rate of change in the market increases, these processes become particularly difficult to sustain, leading to the stark warning that in high-velocity markets, '*the threat to competitive advantage comes not only from outside the firm, but insidiously from inside the firm though the collapse of dynamic capabilities*' (Eisenhardt & Martin, 2000, p 1113).

The study by Rindova & Kotha (2001) represents an as yet rare application of dynamic capabilities in the context of e-business. In this study, the authors focus on the cases of the internet portals/search engines Yahoo! and Excite. Their study, which explores the changing form of these firms as a source of competitive advantage, links the concepts of dynamic capabilities to that of strategic flexibility (Garud & Kotha, 1994; Sanchez, 1995). In particular, they find that dynamic capabilities generate strategic flexibility, a prerequisite for firms competing in dynamic markets.

Research objectives and study methodology

The objectives of the current study are two-fold. Firstly, to identify dynamic capabilities, across different industries, which are necessary for e-business transformation. Secondly, to identify what practices in developing these capabilities are both effective and common across

companies, and might therefore be considered as 'best practice'.

The study seeks to extend existing theory to a new domain, effectively generating new theory, suggesting the use of inductive, qualitative methods (Hussey & Hussey, 1997; Locke, 2001). Such inductive methods are frequently operationalised as case studies (Eisenhardt, 1989a; Yin, 1989). Additionally, the RBV is usually linked to a case study approach due to the ability of such studies to incorporate a rich picture of the firms studied, including their unique context and idiosyncrasies (Hoskisson *et al.*, 1999). Since we are looking to identify principles that can be generalised above individual firms, or even single industries, a multiple firm, cross-industry case study approach was adopted.

The analytic induction approach to data collection and analysis was used. Originally proposed by Znaniecki (1934), analytic induction has refined into perhaps the best-developed logic for theory development and testing across multiple case studies (Gill & Johnson, 1991; Wilson *et al.*, 2002). In brief, the method involves generating hypotheses or propositions (here, our identification of dynamic capabilities relevant to e-business and the approach adopted to operationalising these capabilities) from the first case study; using the hypotheses generated to inform the collection of data in the second case; comparing the hypothesis against the data collected in the second case; if necessary reformulating or supplementing the hypotheses so as to take account of the data from this case; and so on through the other cases.

Translated into the context of this study, the method can be summarised as follows:

- (1) Five cases within the domain of e-business transformation were selected (listed in Table 1). In addition to a spread in market sectors, to ensure increased applicability of the findings of the study, cases were chosen to provide a spread on a number of dimensions cited as important in e-business studies. The distinction between consumer and business-to-business services is stressed by many authors (see, e.g., Kalakota & Whinston, 1997). These authors, and others (Evans & Wurster, 1999; Porter, 2001) also discuss the importance of recognising the distinction between physical products and services, and those that are largely information based and can therefore be delivered on-line. In addition, studies of e-business in the public sector (Phythian Taylor, 2001; Deakins & Dillon, 2002; McIvor *et al.*, 2002) stress the unique issues facing this domain compared to those facing the private sector.
- (2) All of the business units involved in the study were based in the U.K., although two of the organisations were part of larger multinationals.
- (3) Semi-structured interviews were held with staff involved in e-business activities. In all, 13 managers from the five organisations were interviewed. Inter-

Table 1 Case studies undertaken

Case study	A	B	C	D	E
Industry sector	Travel	Food retailing	Utilities	Telecoms	Local Government
Approx Revenue (2001)	£2 billion	£2 billion	£1.5 billion	£250 million	NA
E-business project	On-line travel portal	On-line shopping service	E-procurement – MRO and operating inputs	On-line store for distributors	Access to services on-line, for example schools, highways
Intended e-business transformation	Portal to become a major part of business, spearheading a new multi-channel approach to customer relationships	On-line channel to be a major part of business, completing a multi-channel offer that lowers business risk	E-procurement part of drive to 'join up' organisation, incorporating also customer-facing and internal e-business	As market commoditises, move to sell more products via low cost channels such as on-line	'Joined-up government'; Fulfilment of UK central government targets – 95% of all public services to be on-line by 2005
Commentary	Follower to high-profile on-line offers in travel sector, for example Lastminute.com. Travel portal part of a multi-channel strategy including agencies, call centres, iTV, WAP	Early entrant to on-line grocery shopping in U.K. market. On-line service to integrate with physical stores, for example, brand, in-store picking, returns	Early user of industry specific vertical e-marketplace. Benefits of e-procurement require end-to-end integration between desk top of users and suppliers' systems	Bespoke nature of products means few sales are made on-line. On-line store to be one of a number of complementary channels for distributors	Many disparate and complex services provided (over 800) and limited use of internet by many citizens. Vision is for citizens to be able to choose how and when they wish to access services
Relative turbulence of underlying market	Medium – significant world and national events have caused severe shocks. Airlines have developed low-cost services encouraging consumers to buy 'separates' rather than package holidays	Low – although margins are under pressure the UK market continues to be dominated by a stable set of large players	Low – although privatisation and liberalisation of the utilities market across Europe is causing major change to the industry, this has happened over a period of years and has been fully anticipated	High – the telecoms market, like other sectors of the electronics industry has been impacted by rapid technology change (e.g. move from analogue networks to voice over IP) and economic trends	Low to medium – UK Central Government's agenda for the modernisation of public services has caused considerable change to local government
Market turbulence due to e-business	High – travel was identified as a market highly suitable for internet selling, resulting in a range of new entrants (Travelocity, Priceline.com etc), which increased pressure on pricing models in the travel industry	High – most of the UK supermarkets have developed on-line services. Currently, they are exploring effective and profitable fulfilment models. While many services are still unprofitable market has potential for significant change	Low – limited pace of change in underlying market and reliance on physical assets limits impact of e-business primarily to improving efficiency of current operations	High – internet has had significant impact on the products in this sector and how they are sold and priced (free internet access, bundled pricing, single fee un-metered access)	Medium – significant pressure from Central Government is moderated by the fact that many services are face to face (care of the elderly, road repairs, schools). E-business offers improvements in efficiency of existing services

views lasted between 1 and 3 h and were tape-recorded and transcribed.

- (4) Managers were asked to describe their organisation's e-business plans (intended e-business transformation), current e-business projects, capabilities they believed were important in achieving e-business transformation and specific instances of successful practice in e-business development.
- (5) Having completed the first case study, the transcript was analysed and data supporting particular examples of dynamic capabilities and of effective practice were identified. If necessary the initial interview guide can be refined at this point; however, in the case of this study such refinement did not appear necessary.
- (6) A second case study was undertaken and the transcript was analysed. Data supporting the dynamic capabilities and effective practices identified in the first case were noted. Where necessary these capabilities and practices were amended to take account of the data from the second case, or additional capabilities and practices were added. Again, the opportunity for refinement of the interview guide was allowed for.
- (7) Step 5 was repeated for each subsequent case. If a change was made to the capabilities or practices identified, it was ensured that such changes were consistent with all previous data, as well as the case under consideration.

All of the five organisations represent pre-existing off-line businesses that wish to achieve significant change through the adoption of e-business, rather than e-business start-ups. We believe that the majority of managers currently addressing e-business are operating within such traditional businesses and hence our findings would have the widest applicability and interest. However, as many of the surviving e-business pure-play businesses mature they are facing many of the challenges of the more traditional businesses, including in many cases the need to switch to a multi-channel strategy, and hence the findings of this study will have increasing relevance for these companies.

Our study is interested in the ability of firms to develop dynamic capabilities that will allow them sustained success in the dynamic environment of e-business. We are therefore interested in studying on-going sequences of e-business developments that collectively amount to a significant modification to business strategy, which we term e-business transformation. However, as is discussed in our findings, many firms are approaching e-business transformation in a series of linked stages comprising individual projects. We therefore collected data at both an individual project level and that of the intended e-business transformation. Collection at the individual project level allowed managers to give specific examples of activities that they knew well (hence aiding internal validity), while data collection at the transformational

level allowed findings to be checked across different projects (hence assisting with external validity).

The underlying or off-line markets in which the five organisations operate display different degrees of dynamism (D'Aveni, 1994; Pisano, 1994), as shown in Table 1. The introduction of e-business had tended to increase the level of dynamism or velocity in the markets studied, providing the catalyst for significant industry change which had not yet stabilised.

Findings

The first objective of the current study was to identify dynamic capabilities, across different industries, which are necessary for e-business transformation. All of the organisations studied leveraged a bundle of resources that were to a greater or lesser extent consistent with the VRIN attributes necessary for the development and sustenance of value-creating strategies. However, these static resources were not enough to allow these companies to launch into e-business. All of the companies described how they had to reconfigure these existing resources or gain additional resources in order to develop successful e-business services. It would therefore seem that e-business transformation is dependent on the use or development of appropriate dynamic capabilities.

Table 2 shows the specific dynamic capabilities that were identified in the case studies and how frequently these were observed across the five cases. Eight distinct capabilities were identified. Five of these, which are listed first in Table 2, appear to be associated with innovation in order to meet the specific characteristics of the e-business environment and are consistent with the model of innovation capability proposed by Lawson & Samson (2001). Innovative capabilities are required by an organisation in the development of any new product or service, but the innovative capabilities we studied seem to show variations due to the novel characteristics of the e-business environment. Each capability will be discussed in turn.

A rapid strategy/implementation cycle. Fast moving markets have been shown to require correspondingly rapid strategic decision making by managers (Eisenhardt, 1989b; Judge & Miller, 1991). Interviewees described how the rapid changes occurring in their markets due to e-business required them to develop the capability to develop and implement strategies much more quickly than they had been previously required to. Senior managers in the travel company of Case A described how they were asked to develop an on-line consumer strategy in just 3 weeks before they were required to present it to their Board. Although much of this haste originated in the pre-2000 dot.com boom, those interviewed stressed that shorter strategy development times have remained a consistent feature of e-business.

Developing a business case incorporating substantial changes to the business model with uncertain information. However, the effectiveness and the robustness of the resulting strategies are clearly as important as their

Table 2 E-business transformation dynamic capabilities

Dynamic capabilities	Capability observed ^a	Example from cases	Relationship with dynamic capabilities definition – Eisenhardt & Martin (2000, p 1107)	Nature of dynamic capability – Lawson & Samson (2001)
A rapid cycle of strategy development and implementation	A, C, E	<i>Strategy development needed to be and was much quicker. You were told 'we need to develop a consumer strategy – and present it to the management board – you've got three weeks to do it (Case A)</i>	Speed of resource adoption and reconfiguration	Innovative (vision and strategy)
The skill to develop and critically evaluate business cases incorporating substantial alterations to the business model with uncertain information	A, B, C, D	<i>In developing e-business, we now have to fight for funds against other projects based on our business case. In the past it used to be a case of e-business shouting at everybody else whether they wanted to hear or not. (Case A)</i>	Effectiveness of resource reconfiguration	Innovative (harnessing the competence base/directing resources)
The ability to build commitment to a strategic change both within the organisation and with other stakeholders	A, C, D, E	<i>The idea is that the marketplace will enable close working relationships. Suppliers think that they will be hammered on price, but we are not taking that approach. The main focus for us is to actually work closely with our key suppliers to build tighter relationships. In that way both of us will actually get benefits. (Case C)</i>	Involvement/commitment to resource reconfiguration	Innovative (culture and climate)
Iterative development of customer value propositions melding planned and experiential approaches	A, B, E	<i>Initially we had a 'build it and they will come' approach but our initial offer did not meet the needs of the on-line market. Shoppers want to avoid the need to visit a supermarket – so our limited 'top-up' offer on-line was a flawed proposition. (Case B)</i>	Reconfiguration of resources to match market requirements	Innovative (organisational intelligence)
Ability to reconfigure the sales/service process to exploit new channel capabilities	A, E	<i>In the off-line world, the travel industry is sometimes liable to develop sales processes that almost entrap people into buying a product that you want to sell to them. We didn't want to do that on the web – and we didn't feel that internet customers would put up with it anyway. (Case A)</i>	Reconfiguration of resources (distribution channels)	Innovative (creativity and idea management)
Ability to integrate new and existing IT systems without stifling innovation	B, C	<i>Our data warehouse was designed for stores – they don't know about individual customers as we don't have a loyalty card. We [the on-line division] know about individual customers and we are having to bolt that on. (Case B)</i>	Integration of resources (information systems)	Integrative

Table 2 (continued)

Dynamic capabilities	Capability observed ^a	Example from cases	Relationship with dynamic capabilities definition – Eisenhardt & Martin (2000, p 1107)	Nature of dynamic capability – Lawson & Samson (2001)
Tautly coupled e-business and corporate strategy formulation	B, C, E	One of our existing key themes is 'how can we make things better for the public that we serve?' The on-line service is part of this, together with the call centre and the drop-in service. (Case E)	Integration of resource adoption and reconfiguration strategies	Integrative
Ability to integrate new and existing channels to offer multi-channel service	B, C, E	Store managers don't mind the on-line service as it ties in with their incentives. Apart from goods sold from the few dedicated picking centres, goods are picked in-store – so it increases the goods going through the store. (Case B)	Integration of resources (distribution channels)	Integrative

^aCases listed are where explicit data on the capability was found in the interview transcripts.

timeliness. As the management team in the travel company had been boosted specifically to provide the necessary skills, the resulting strategy has proved surprisingly robust in its fundamentals, albeit requiring further rapid strategy/action loops at a detailed level. The additional collective skillset required in this and other cases can be characterised as the ability to propose a modification to business model and evaluate the financial case for that model in an uncertain, rapidly changing market, where there is limited data or prior experience to draw on.

Although business planning theory has long dealt with such issues, this contrasts sharply with much of traditional strategic planning in practice (Johnson & Scholes, 1999), in which, firstly, the business model is generally taken for granted within the company and, indeed, the industry. Most marketing planning methods, for example, start with a map of the industry structure, a positioning of the organisation within that structure, and an analysis of its strengths and weaknesses as compared with its competitors (McDonald, 1999). Consideration of potential transformations to industry structure such as disintermediation or reintermediation, if considered at all, are regarded as 'out-of-the-box thinking' that is high risk and essentially an intuitive bet. By contrast, in several cases, these transformations were evaluated as an automatic, systematised part of the planning process. This required a higher emphasis on transformative techniques such as Porter's 5-forces analysis (Porter, 2001), coupled with new techniques such as e-commerce portfolio analysis (Tjan, 2001) and the opportunistic approach to

strategy formulation suggested by Hackney & Little (1999). As one manager put it:

Despite the difficulties, we don't see why we should bet shareholders' money without applying our minds as well as our gut. Would you want an airline pilot to say, 'We're not going to do any preflight checks today – I feel everything is OK, let's just see what happens'?

Secondly, strategy tools need to take account of uncertainty (Gottschalk, 1999). This can require use of those investment appraisal techniques that allow for risk (Dempsey *et al.*, 1998). In the case of the telecoms manufacturer of case D, the justification for the on-line store for distributors was based on a cost/benefit analysis, despite the lack of previous experience from which to derive the necessary underlying figures. The sale of networking systems via distributors to small businesses was increasingly becoming a commodity business, where transaction volumes were high and margins were low. It was therefore important to be able to take and service these orders as cost effectively as possible, and on-line sales offered that opportunity. The organisation estimated that if 10% of current orders less than £5000 were transferred to the web, then the system would make considerable savings in order processing staff costs within a year. Even taking into account the risk inherent in these estimates, it was rational for the board to proceed.

Building internal and external commitment to a strategic change. E-business transformations tend to be multi-functional and indeed multi-organisational across the supply chain, hence necessitating the capability to build the commitment of internal and external stakeholders

such as suppliers to strategic changes (Johnston & Gregor, 2000). A counter-example occurred in the food retailer's on-line division (case B), when some crucial cooperation from the high-street channel was not forthcoming due to a lack of foresight as to the motivations of the relevant staff.

A common technique for enhancing this capability was to engage in benefits analysis techniques as part of the planning process, which identify benefits to stakeholder groups and analyse how best to communicate with them. In the utility of case C, managers described how their e-procurement initiatives were based upon an incremental approach driven by benefits identification:

We agreed that e-procurement is an important part of our strategy but we couldn't justify a big bang approach to it. So we developed an incremental view, implementing projects as and when they would deliver the necessary benefits to those within and outside the business.

A specific benefits analysis technique used within two cases (A and C), the Benefits Dependency Network (Ward & Peppard, 2002), while not specifically developed for e-business, was reported as particularly well suited to such multiple-stakeholder scenarios.

Iterative development of the value proposition melding planning and experience. Any new service will require a definition of the customer value proposition (Van der Heijden *et al.*, 2003). However, the managers interviewed described the highly challenging nature of this in the on-line world. In many markets, relatively few customers as yet use on-line channels, and their experience is not yet sufficient for them to be able to articulate what value offering would be optimal, although when they find a service disappointing they will abandon it very quickly (Reichheld & Scheffer, 2000; Agrawal *et al.*, 2001). Additionally, it has been found that the effectiveness of on-line product presentation will vary with consumer personality types (Jahng *et al.*, 2002). Companies must therefore develop the capability of creating new services that customers will value without the market research that they might traditionally rely on. How can they do this without resorting to guesswork? A key seems to be a more experiential approach (Eisenhardt & Tabrizi, 1995), which involves hypothesising a value proposition and then trialing it rapidly in the marketplace and using feedback from customer interactions to validate and tune the proposition. In the case of the local authority of Case E, although the on-line services were quickly made available publicly through its web site, in the first instance they were deliberately promoted very little, allowing the authority to test and refine the services with a modest amount of users before they were taken up more widely.

Such experience can complement and refine traditional strategic thinking. In the travel company (case A), this included a perceptual map plotting early players in the on-line space against two dimensions: whether the service offered basic transactions or added value services;

and whether the product set was limited or broad. Taking into account the organisation's brand and competences, a high-value/broad product positioning was defined which differentiated the value proposition from its competitors, a differentiation which proved sustainable over a substantial period. The vision was to be a 'one-stop shop' for travel on-line, and – radically for a company which thought of itself as a holiday 'manufacturer' – would include offering competitors' packages alongside their own if this was in the customers' interests:

The starting point was how we could look to position ourselves as the travel authority. So, if people are thinking about travel on-line, we wanted them to think about us. We wanted to offer a broad range of products, from Butlins through to Lama trekking in Peru, backed up by a range of added value content.

This mix of planning and experience shares much with launching a new-to-the-world product, and one appropriately flexible planning tool inspired by product strategy but recently adapted to the needs of channel strategy is Kim & Mauborgne's (1999) value curve.

The ability to reconfigure the sales/service process. E-business aids certain redefinitions of customer communications, such as enabling a two-way dialogue in place of previous broadcast communications (Kenny & Marshall, 2000). This requires of firms the capability to redesign sales processes to exploit fully this opportunity. Butler & Peppard (1998) suggest, for example, that a re-designed sales process should include the ability for the customer to initiate the dialogue with the firm, rather than assuming the contact will begin the other way around with advertising, direct mail and other prospecting activities. Having defined their customer proposition, the travel company's on-line management team realised that they would need to change their selling processes:

We felt strongly that on-line you need to be transparent in terms of your sales strategy and give as much power to the customer as possible. In the offline world, the travel industry is sometimes liable to develop sales processes almost to entrap people into buying a product that you want to sell them. We didn't want to do that on the Web – and we didn't feel that Internet customers would put up with it, anyway.

This switch turned out to be decidedly non-trivial: it seems that the sales process can be deeply embedded within organisational structure, reward systems and processes, so the capability to reconfigure it is not simply a matter of drawing a new chart.

Integration with existing systems without stifling innovation. By contrast with these innovation-related capabilities, the last three capabilities listed in Table 2 are associated with integrating e-business into the existing activities of the organisation. Firstly, as is the case in other IT-enabled domains, e-business initiatives require integration with existing systems (Oorni, 2003; Venkatraman, 1994). However, in the case of e-business the level of business transformation often requires that such integration is with a wider range of systems and that

data are shared in real-time, allowing true e-enterprises to make 'decisions by wire' (Earl, 2000). E-business also frequently requires the ability to integrate systems with business partners (Poon & Swatman, 1999). The utility's procurement systems were integrated with those of its suppliers, allowing the organisations to share data on stock holdings:

Rather than sending an order to a supplier for a certain amount of goods then to find out that they haven't got those goods in stock, with a fully integrated end to end system, you can see that that supplier's out of stock. You can also see which other suppliers have got stock and so order from them.

Perhaps counter-intuitively, systems integration does not necessarily seem in tension with the need for swift innovation. The local authority, for example, had an integrated architecture from an early stage; far from holding back innovation, this seemed to provide a solid platform on which innovations at the process level could be readily made. Some organisations, though, have preferred to spearhead innovation with systems that are 'stand-alone', leaving integration to a next-generation system. Although those in our sample such as the travel company who adopted this approach subsequently regretted it, further study is needed to check whether a deliberately impure, fragmented architecture can on occasion assist innovation in the early stages of a new channel.

Integration across channels to enable multi-channel service. E-business adds some subtleties to other necessary integration capabilities, particularly with regard to channel and strategy integration. Integration of multiple distribution channels is proving an important aspect of e-business (Daniel *et al.*, 2001). Most companies now recognise the importance of leaving the customer in control of channel choice and timing, and customers generally expect that they will receive consistent information and levels of service across all distribution channels. This channel integration is often considered as an issue for those firms operating both physical channels, such as stores and branches, and on-line services, termed 'clicks and mortar' or 'bricks and clicks' (Gulati & Garino, 2001). And indeed, for the local government case for example, an important success criterion was integration between physical facilities such as drop-in centres at council offices and the remote facilities of the web site. However, even operations that would be considered e-business pure-plays, such as the on-line banks (e.g. Wingspan in the U.S. and Egg in the U.K.), commonly also operate call centre operations as an adjunct to the on-line operation. Tight integration between such channels is equally important to these firms. So it proved for the food retailer of case B, where the home shopping customer expected to be able to telephone about an Internet order, or to enquire on-line about a telephone order.

The nature of the required integration across channels did, though, show some idiosyncrasies across the cases. While the telecoms company, for example, perceived the

necessity for an integrated service across all channels, others found that the need for integration varied between customer segments and product offers. The food retailer found little demand for integration at the customer interface between high-street and home-shopping channels, although back-office process integration was vital to achieve efficiencies and deliver competent services. The travel company found that different customer groups required different combinations of channels, which they expected to work seamlessly, but that some product offers with a strong price proposition could happily be put purely through the lower-cost on-line channel.

It seems that price-based offers have a higher requirement on process integration – through the supply chain as well as within the firm – whereas differentiation-based offers have a higher premium on integration across channels in the customer experience. It also seems that the universal prescription of 'bricks and clicks' channel integration is as misleading as the previous championing of pure-play strategy. The more correct synthesis would seem to be that channels need to be integrated insofar as this is necessary to deliver the value proposition for given segments. Further research is needed to check these observations across a wider range of channel strategies; but as a minimum, it is clear that a dynamic capability of channel integration is at least commonly required, although perhaps subject to idiosyncratic details.

Tightly coupled corporate strategy and e-business strategy formulation. Integration at the level of business strategy forms another difference from much information systems research. Partly, this seems simply an issue of aligning e-business with the corporate strategy. The food retailer found in its early e-commerce offering, for example, that it was in danger of confusing the market with different brand values on-line from off-line, so some strategic thought was required as to whether brand perceptions should be evolved across all channels, or whether to sub-brand the on-line offering. However, in more transformative applications of e-commerce, it is not sufficient to derive e-business strategy from overall strategy: rather, a tauter integration is required. The utility operates a formal feedback loop in its planning from e-business strategy to corporate strategy, to ensure that opportunities for transformation are captured. For the local government authority, the multi-channel proposition is a key part of its formal strategy. This point adds depth to the King & Teo (1997) survey finding that information systems planning is most successful when it and business planning are 'indistinguishable', occurring 'simultaneously and interactively'.

Our second objective was to identify what practices in developing these capabilities are both effective and common across companies, and might therefore be considered as 'best practice'. Table 3 identifies the approaches or practices adopted by the case study firms in developing the identified capabilities and their frequency of occurrence across the case studies. It can

Table 3 Factors influencing development of dynamic capabilities

<i>Approaches to dynamic capabilities</i>	<i>Capability observed^a</i>	<i>Examples from cases</i>
Learning-by-doing in balance with learning-before-doing appropriate to market velocity	B, C, D, E	<i>We want to revisit our strategy regularly. We want to break it down into projects or phases – like with the 3100 project – then we will see at the end of it where we are and where the market is. (Case D)</i>
Creating cross-functional e-business teams	A, B, C, D, E	<i>We work in mixed teams – some IT and some business. If you want to carry on selling the products you currently make to the same customers then you have to pull people out of the business – they will know what the business challenges are that should be addressed. (Case D)</i>
Managing outsourcing to maintain control and strategic flexibility while enhancing innovation	A, E	<i>We have built skills transfer into the outsourcing arrangement. Apart from the people, we own everything that operates the call centre. If we had to we could take it in house or give it to someone else. We have done this particularly well. (Case E)</i>
Developing a flexible architecture	A, B, D, E	<i>You have to plan, but have to plan to be flexible. You have to make sure that anything you do isn't going to be a roadblock to change because it is a turbulent market and you need to react quickly. (Case D)</i>
Developing new competencies across a wide range of staff, including broad input to strategy formulation	C, D, E	<i>We wanted to increase the familiarity with PCs and the internet right across the organisation – the difference in the training for someone who uses a PC at home and someone who doesn't is incredible. So, we introduced a PC leasing scheme for hard-headed business reasons. (Case C)</i>

^aCases listed are where explicit data on the capability was found in the interview transcripts.

be seen that certain approaches were common across a number of the companies studied. The frequency of occurrence of these practices and the positive reflections on them given by the interviewees, suggest that these can start to form a 'best practice' approach to e-business transformation.

Eisenhardt & Martin (2000) assert that in high-velocity markets, dynamic capabilities become highly experiential. In contrast, in more stable markets these same capabilities are characterised by processes that are highly analytical. Our findings provide further empirical evidence for this. As we have already discussed with respect to strategy formation, the e-business activities we studied were characterised by a staged or incremental approach, where companies were 'learning by doing' (Pisano, 1994), rather than analysing a situation and then acting upon the data that they had collected ('learning before doing'). In all cases except that of the travel company, the organisations had divided their e-business transformation down into a series of sequential phases or projects, the outcomes of which would be used to determine future projects. The telecoms company described how, due to the rapid changes in their marketplace caused both by e-business and the changing technology of their products, they wished to 'revisit their strategy regularly'. This they intended to achieve by undertaking their e-business developments as a series of linked projects, at

the end of which they could review their progress and the state of their market.

All of the organisations created multi-functional teams in order to address their e-business developments, consistent with the observation by Eisenhardt & Martin (2000) that in high-velocity markets, dynamic capabilities rely on cross-functional relationships. These cross-functional teams, with representatives from operating groups, support functions and information technology, ensured that a rapid cycling between a knowledge of the business and a knowledge of what e-business technology could offer could be achieved by rich interaction between members of the team.

The need for functional balance in such teams was shown by the travel company, which admitted that its initial team was light on technical input. The result was a marketing strategy that stood the test of time, but technological infrastructure decisions that had to be expensively undone. Presumably, an opposite mistake is also possible, if e-business is put under the charge of an isolated IT department, but this mistake was not observed in our cases: where e-business strategy was formally controlled within the IT department, as in the utility, great care was taken to create an overarching cross-functional committee to provide balance.

Whether the management team should form a board for a separate or semi-autonomous business unit, or a

'dotted-line' team within a traditional structure based on functions, product groups, markets or channels, seems to depend on the nature of the multi-channel integration required by the value proposition. The food retailer found that its home shopping business unit, integrated across the catalogue and Internet channels but managed separately from the store business unit, was probably about right, although inevitably it was subject to the disadvantage of making process integration harder. By contrast, because most of the travel company's propositions needed to cross boundaries of channels, it found that its initial semi-autonomous 'dot-com' division needed to be integrated back into the main business. This point adds a market focus to the various advantages and disadvantages of separation discussed by Gulati & Garino (2000) and Venkatraman (2000).

For companies that do not have the requisite technology and skills in-house, outsourcing provides an opportunity to access the best possible architecture and systems quickly without large investments (Nee, 1999; Fantasia, 2000). However, the reliance on outsourcing, which is particularly common in the e-business domain due to the rapid change in technology (Kakabadse *et al.*, 2000), requires companies to develop skills in managing it. The local government organisation of Case E recognised this and took particular steps to ensure that they did not become 'locked-in' to the services of an outsourcing provider.

Sanchez (1995) emphasises that strategic flexibility relies on flexible technologies. In our study, the development of a flexible technology architecture or platform and outsourcing were also linked to the step-wise, experiential approach to e-business. It was recognised by our respondents that, although the next stages of their e-business developments were not yet certain, it was important that their IT infrastructure and systems should allow them to develop in a number of possible directions and not act as a barrier to further development. Ideally, the IT architecture and systems should provide a platform that would support future new channels such as a move to interactive television or WAP services. As we touched on earlier, it seems that a tautly controlled, centrally designed IT architecture can actually increase the flexibility of the processes that run above it – a point consistent with Wilson *et al.*'s (2002) findings in a study of CRM systems. We have noted that the travel company's on-line management commenced on-line operations with a rigid architecture that prevented them from being responsive to customers and limited future development opportunities. They have now recognised the need for greater technical flexibility and are consequently developing a new system, one which will also reduce their reliance on outsourcing:

The new architecture will give us control in-house so we can react to news that's going on there and then. We can do live edits on the website, we can control our own banners and we can control the customer journey by serving up dynamic

templates that can be controlled by a manager sitting in this building.

Finally, e-business developments often impact a large number of staff throughout the organisation. For example, the utility developing an e-procurement solution intended that the service should be used by a wide range of operational staff in their production plants, and not just a limited number of procurement specialists based at head office. This wide impact requires that relevant competencies are developed in a large number of staff. These competencies do not just relate to operational procedures. According to Eisenhardt & Martin (2000, p. 1112), an additional challenge of high-velocity markets is that extant knowledge from experts cannot be relied upon and 'new knowledge from those involved in the process and the external market' must be obtained. Consistent with this, the utility described successful initiatives to encourage staff to contribute ideas to e-business strategy formulation, based on their specific knowledge of the business processes or the needs of the stakeholders with whom they deal.

Discussion

The purposes of this study were to identify dynamic capabilities present across different industries that are necessary for e-business transformation, and to identify practices in developing these capabilities that are both effective and common across companies, and might therefore be considered as 'best practice'.

Dynamic capabilities are not of value to organisations *per se*, rather it is their contribution to sustained competitive advantage that is of interest. The RBV of the firm is predicated on two underlying assertions: that resources and capabilities possessed by firms differ (resource and capability heterogeneity) and that these differences may be long lasting (resource and capability immobility) (Wernerfelt, 1984; Barney, 1991; Mata *et al.*, 1995). If a firm possesses a resource or capability that is not possessed by competing firms (heterogeneity), this can provide at least a temporary competitive advantage. If the second condition of immobility is met, so that firms without the resource or capability face a cost or time disadvantage in developing or acquiring it, then sustainable competitive advantage is possible (Mata *et al.*, 1995).

Three broad reasons why resources and capabilities are likely to be immobile and hence provide sustained competitive advantage have been suggested: history, causal ambiguity and social complexity (Barney, 1991; Mata *et al.*, 1995). History can play a role in preventing competitors from copying or purchasing the resources and capabilities of a firm, since many such attributes have been developed over a considerable period of time and cannot be recreated quickly. Causal ambiguity arises when it is not clear what the precise cause of the sustained competitive advantage is, and hence what should be copied by competitors. This ambiguity may

arise because the competitive advantage is based upon tacit attributes of the firm (Reed & DeFillippi, 1990) or it is composed of 'a large number of small decisions and actions, rather than a few large [imitable] ones' (Mata *et al.*, 1995, p 493). Resources or capabilities that rely on the combined view or action of many individuals, such as company culture or its reputation among suppliers and customers, are termed socially complex and are also difficult to copy or acquire.

The dynamic capabilities identified in this study, which are listed in Table 2, are likely to be constituted, managed and executed in different ways in different organisations, that is they can be expected to fulfil the condition of heterogeneity and hence can offer at least temporary competitive advantage. Furthermore, the capabilities identified also appear to possess elements of social complexity, causal ambiguity and extended development (history). For example, rapid strategy development and implementation for e-business transformation suggests that competent strategy development capabilities already exist within the firm. This process is typically characterised by a multitude of small decisions and actions, both explicit and tacit, taken throughout the organisation and dependent on earlier strategies and actions (Bailey & Johnson, 1996; Johnson & Scholes, 1999). The dynamic capabilities identified would therefore appear to be to some extent immobile and hence provide an opportunity for sustained competitive advantage.

Owing to the paucity of previous studies of dynamic capabilities in the e-business domain, the study adopted an inductive approach. We have identified various respects in which the resulting innovation capabilities, although corresponding broadly to factors identified by Lawson & Samson (2001), have specific characteristics that are important in the e-business sphere. Significantly, though, we have also found that integrative capabilities are critical to e-business transformation. Organisations must not only be able to find how to do things in new ways, but they must bring those ways into their standard way of operating, if their organisation is going to achieve real transformation. This appears to create a tension, which was recognised by a number of the managers interviewed, for example:

We have to produce standard products – the regulator requires that from us – but there is a lot of [e-business] innovation in the company, so we have these two opposing forces, standardisation and innovation. (Case C)

In some cases, this tension is managed temporally, a period of concentration on innovation being followed by a period of consolidation and integration. However, as we have also observed respects in which integration can actually provide a platform supportive of innovation, the ideal resolution seems to be more complex than this pendulum approach. Models of innovation in other spheres (Kanter, 1989) have suggested that the 'mainstream' activities of an organisation and the 'newstream' associated with innovation can be loosely coupled. We would expect from dynamic capability theory that this tension between innovation and integration would increase with increasing market dynamism or velocity.

Dynamic capability theory also provides at least a hint of how this tension might be managed. In high-velocity markets dynamic capabilities become simple, experiential and iterative (Eisenhardt & Martin, 2000). This was found to be the case in the companies studied here, as shown by the findings in Table 3. The companies approached e-business by setting an overall, clear and simple vision for their intended transformation. This was then broken down into a series of smaller projects, to which the companies applied a 'learning by doing' approach. Subsequent stages of development, rather than follow a pre-determined linear sequence, would iteratively depend upon the outcomes and learning produced from earlier projects.

Our findings therefore suggest that a contingent approach to e-business transformation is required, in which the formality of procedures is delicately balanced to the extent of turbulence in the market environment and the degree of innovation that this requires of the organisation. Our observations from the case studies of how the activities critical to e-business transformation vary depending on market turbulence are summarised in Table 4.

Table 4 also summarises how managers might operationalise the findings of this study. In markets made increasingly turbulent by e-business, managers must move from the mode of operation described in the middle column to that described by the right-hand column. Rather than highly formal and analytical approaches that typify IS strategy development in traditional markets (Ward & Peppard, 2002), in turbulent markets managers must set a clear vision and allow e-business strategy to develop in a more emergent way. The ability for e-business to alter the strategy of the organisation, perhaps radically, must also be recognised. Rather

Table 4 Variations in e-business dynamic capabilities by market turbulence

	<i>Less turbulent markets</i>	<i>More turbulent markets</i>
E-business strategy	Planned, analytic	Light procedures but clear vision
Relationship with corporate strategy	E-strategy enables corporate strategy (through feedback loop)	Taut coupling to maximise transformative opportunities
Emphasis in capabilities	Linear execution	Iterative execution (prototyping/trialling)
Emphasis in market sensing	Market research/attitudinal customer service surveys	Live behavioural/operational data
E-business management structure	Dotted-line team	Dedicated team, but plan to rein in later

than IS strategy being derived from business strategy (Ward & Peppard, 2002), in such markets there should be an opportunity for e-business to form an 'input' to the business strategy development process, such that the two form a tightly coupled system. E-business developments should be undertaken iteratively, with an emphasis on rapid prototyping and trialing. Such trials could well be undertaken by dedicated teams, but on proof of the validity of the idea, the development should be incorporated into the 'mainstream' of the business. This may require incorporating the development team in the mainstream business, or passing the idea onto existing business and IT staff to rework into a system and service that is no longer developmental but robust enough for continued operations. Such trialing and rapid handover can provide a balance between the need for innovative and integrative capabilities identified in this study.

Conclusions

This study has identified eight distinct dynamic capabilities associated with e-business transformation. These capabilities fall into two groups. One group is associated with the need for innovation due to the characteristics of the e-business environment, while the second group relates to the need to incorporate or integrate e-business in the existing operations of the business. These latter capabilities may have been particularly emphasised in our sample because the companies studied were 'bricks and clicks', that is they were off-line businesses that were undergoing transformation due to e-business adoption.

An important finding of the study is that e-business presents organisations with a tension between two distinct groups of dynamic capabilities that must be balanced. On the one hand, organisations need to develop innovative services that change the way the company operates and how it interacts with its stakeholders, and on the other hand, they need to keep the organisation operating as a single, coherent entity so as to maximise synergies and deliver consistent service.

Our identification of competing dynamic capabilities also gives weight to the warning that in dynamic markets, the threat to the survival of firms may come less from the external marketplace than from tension within the firm (Eisenhardt & Martin, 2000). However, if harnessed, Pascale (1990) states that such tension, or constructive contention as he terms it, can offer firms the opportunity to generate variety within their organisation by recognis-

ing multiple points of view and approaches, rather than a single option. Drawing from the field of cybernetics, he suggests that organisations that can foster internal variety are better able to withstand external variety and can therefore withstand changes in their marketplace.

The concept of dynamic capabilities has aroused considerable interest in the strategic management field and appears to provide pragmatic and valuable lessons for practitioners. To our knowledge, this paper represents one of just two studies that apply this concept to the e-business domain. Clearly, other studies of e-business have addressed related issues (e.g. Dutta, 2000; Earl, 2000; Kumar et al., 2000; Kanter, 2001; Teo & Pian, 2003), but we believe the language and insights of the dynamic capabilities literature add a valuable discipline which can help both internal rigour and cross-study comparisons.

Limitations of current study and future research directions

While offering a rich understanding of a few individual organisations, case study research is often thought to lack the wide applicability and 'general truth' associated with random statistical sampling and large-scale observations (Hussey & Hussey, 1997). Our study is positioned as an exploratory one seeking to extend the theory of dynamic capabilities to the domain of e-business. We would therefore welcome further studies to refine and extend our findings. Being preliminary in nature, this study cannot be exhaustive and further studies should endeavour to uncover additional dynamic capabilities important in e-business transformation and the best practices in developing such capabilities. In particular, our inductive study identified five of the seven innovation elements cited by Lawson & Samson (2001). Further studies, particularly of those in other markets and perhaps more deductively led, may identify capabilities related to the other elements that they propose, and will enable the differences we have discussed according to market turbulence to be further explored.

A comparison within such further studies of these e-business dynamic capabilities with those uncovered in other areas of innovation (e.g. Brown & Eisenhardt, 1998; Petroni, 1998; Majumdar, 2000; Luo, 2000; Griffith & Harvey, 2001; King & Tucci, 2002) would illuminate the capabilities specific to the domain of e-business transformation and would provide further understanding of this challenging domain.

References

- AMIT R and ZOTT C (2001) Value creation in e-business. *Strategic Management Journal* 22, 493–520.
- AGRAWAL V, ARJONA LD and LEMMENS R (2001) e-Performance: the path to rational exuberance. *McKinsey Quarterly* 1, 31–43.
- BAILEY A and JOHNSON G (1996) Patterns of strategy development. *Cranfield School of Management Working Paper Series SWP1/96*, Cranfield, U.K.
- BARNEY JB (1991) Firm resources and sustained competitive advantage. *Journal of Management* 17(1), 99–120.
- BROWN SL and EISENHARDT KM (1998) *Competing on the Edge, Strategy as Structured Chaos*. Harvard Business School Press, Boston, U.S.A.
- BUTLER P and PEPPARD J (1998) Consumer purchasing on the internet: processes and prospects. *European Management Journal* 16(5), 600–610.

- CALDEIRA MM and WARD JM (2003) Using resource-based theory to interpret the successful adoption and use of information systems and technology in small and medium-sized enterprises. *European Journal of Information Systems* 12(2), 127–141.
- DANIEL EM, WILSON HN, WITH McDONALD MHB and WARD JM (2001) *Marketing Strategy in the Digital Age: Exploiting e-commerce in your business*. FT Pearson Press, London, U.K.
- D'AVENI R (1994) *Hypercompetition*. Free Press, NY, U.S.A.
- DEAKINS E and DILLON SM (2002) E-government in New Zealand: the local authority perspective. *The International Journal of Public Sector Management* 15(4–5), 375–398.
- DEEDS DL, DeCAROLIS D and COOMBS J (2000) Dynamic capabilities and new product development in high technology ventures: an empirical analysis of new biotechnology firms. *Journal of Business Venturing* 15(3), 211–229.
- DEMPSEY J, DEVORAK RE, HOLEN E, MARK D and MEEHAN WF (1998) A hard and soft look at IT investments. *The McKinsey Quarterly* (1), 126–138.
- DUHAN S, LEVY M and POWELL P (2001) Information system strategies in knowledge-based SMEs: the role of core competencies. *European Journal of Information Systems* 10(1), 25–36.
- DUTTA S (2000) Success in Internet time. Working paper, INSEAD, Fontainebleu.
- DUTTA S and SEGEV A (1999) Business transformation on the internet. *European Management Journal* 17, 466–476.
- EARL M (2000) Evolving the e-business. *Business Strategy Review* 11(2), 33–38.
- EISENHARDT KM (1989a) Building theories from case study research. *Academy of Management Review* 14, 532–550.
- EISENHARDT KM (1989b) Making fast strategic decisions in high-velocity environments. *Academy of Management Journal* 32(3), 543–576.
- EISENHARDT KM and TABRIZI BN (1995) Accelerating adaptive processes: product innovation in the global computer industry. *Administrative Science Quarterly* 40(1), 84–108.
- EISENHARDT KM and MARTIN JA (2000) Dynamic capabilities: what are they? *Strategic Management Journal* 21, 1105–1121.
- EVANS PB and WURSTER TS (1999) *Blown to Bits: How the New Economics of Information Transforms Strategy*. Harvard Business School Press, Boston, MA, U.S.A.
- FANTASIA A (2000) Decoding ASPs. *Harvard Business Review* 74(6), 33–42.
- GARUD R and KOTHA S (1994) Using the brain as a metaphor to model flexible production systems. *Academy of Management Review* 19, 671–698.
- GILL J and JOHNSON P (1991) *Research Methods for Managers*. Chapman, London, U.K.
- GOTTSCHALK P (1999) Strategic information systems planning: the IT strategy implementation matrix. *European Journal of Information Systems* 8(2), 107–118.
- GRANT RM (1996) Toward a knowledge based theory of the firm. *Strategic Management Journal* 17, 109–122.
- GRIFFITH DA and HARVEY MG (2001) A resource perspective of global dynamic capabilities. *Journal of International Business Studies* 32(3), 597–606.
- GULATI R and GARINO J (2001) Get the right mix of bricks and clicks. *Harvard Business Review* 78(3), 107–114.
- HACKNEY R and LITTLE S (1999) Opportunistic strategy formulation for IS/IT planning. *European Journal of Information Systems* 8(2), 119–126.
- HEDMAN J and KALLING T (2003) The business model concept: theoretical underpinnings and empirical illustrations. *European Journal of Information Systems* 12(1), 49–59.
- HOSKISSON RE, HITT MA, WAN WP and YIU D (1999) Theory and research in strategic management: swings of a pendulum. *Journal of Management* 25(3), 417–446.
- HUSSEY J and HUSSEY R (1997) *Business Research*. Macmillan Business, Hampshire, U.K.
- ILNITICH A, D'AVENI R and LEWIN A (1996) New organisational forms and strategies for managing in hypercompetitive environments. *Organization Science* 7, 211–220.
- JAHNIG JJ, JAIN H and RAMAMURTHY K (2002) Personality traits and effectiveness of presentation of product information in e-business systems. *European Journal of Information Systems* 11(3), 181–195.
- JARVENPAA SL and LEIDNER DE (1998) An information company in Mexico: extending the resource based view of the firm to a developing country context. *Information Systems Research* 9(4), 342–361.
- JOHNSON G and SCHOLES K (1999) *Exploring Corporate Strategy* (5th ed.). Prentice-Hall, U.K.
- JOHNSTON RB and GREGOR S (2000) A theory of industry-level activity for understanding the adoption of interorganizational systems. *European Journal of Information Systems* 9(4), 243–252.
- JUDGE WQ and MILLER A (1995) Antecedents and outcomes of decision speeds different environmental contexts. *Academy of Management Journal* 34(2), 449–463.
- KALAKOTA R and WHINSTON A (1997) *Electronic Commerce; A Manager's Guide*. Addison-Wesley, Reading, MA.
- KANTER RM (1989) Swimming in newstreams: mastering innovation dilemmas. *California Management Review* 31(4), 45–69.
- KANTER RM (2001) *Evolve! Succeeding in the Digital Culture of Tomorrow*. Harvard Business School Press, Boston, MA.
- KATZ M and SHAPIRO C (1986) Product introduction with network externalities. *Journal of Political Economy* 94, 822–841.
- KENNY D and MARSHALL JF (2000) Contextual marketing: the real business of the internet. *Harvard Business Review* November–December, 119–125.
- KIM WC and MAUBORGNE R (1999) Creating new market space. *Harvard Business Review* January–February, 83–93.
- KING WR and TEO TS (1997) Integration between business planning and information systems planning: validating a stage hypothesis. *Decision Sciences* 28(2), 279–308.
- KING AA and TUCCI CL (2002) Incumbent entry into new market niches: the role of experience and managerial choice in the creation of dynamic capabilities. *Management Science* 48(2), 171–186.
- KAKABADSE A, KORAC-KAKABADSE N and MACAULAY S (2000) Outsourcing: current and future practice. Information Systems Research Centre, Cranfield School of Management, November, Number ISRC-200020.
- KAPLAN S and SAWHNEY M (2000) E-Hubs: the new B2B marketplaces. *Harvard Business Review* May–June, 97–103.
- KUMAR N, SCHEER L and KOTLER P (2000) From market driven to market driving. *European Management Journal* 18(2), 129–142.
- LAWSON B and SAMSON D (2001) Developing innovation capability in organisations: a dynamic capabilities approach. *International Journal of Innovation Management* 5(3), 377–400.
- LOCKE K (2001) *Grounded Theory in Management Research*. Sage Publications, London, U.K.
- LUO Y (2000) Dynamic capabilities in international expansion. *Journal of World Business* 35(4), 355–378.
- MADHOK A and OSEGOWITSCH T (2000) The international biotechnology industry: a dynamic capabilities perspective. *Journal of International Business Studies* 31(2), 325–336.
- MAJUMDAR SK (2000) Sluggish giants, sticky cultures and dynamic capability transformation. *Journal of Business Venturing* 15(1), 59–78.
- MATA FJ, FUERST WL and BARNEY JB (1995) Information technology and sustained competitive advantage: a resource based analysis. *MIS Quarterly* 19(4), 487–505.
- McDONALD MHB (1999) *Marketing Plans: How to Prepare Them, How to Use Them*. (4th ed.). Butterworth Heinemann, Oxford.
- McIVOR R, McHUGH M and CADDEN C (2002) Internet technologies: supporting transparency in the public sector. *The International Journal of Public Sector Management* 15(3), 170–187.
- MINTZBERG H (1978) Patterns of strategy formation. *Management Science* 24, 934–948.
- NEE E (1999) Webware for rent. *Fortune* 140(5), 215–224.
- NGAI EWT and WAT FKT (2002) A literature review and classification of electronic commerce research. *Information & Management* 39, 415–429.
- OORNI A (2003) Consumer search in electronic markets: an experimental analysis of travel services. *European Journal of Information Systems* 12(1), 30–40.
- PASCALE RT (1990) *Managing on the Edge: How Successful Companies Use Conflict to Stay Ahead*. Viking Penguin Inc., New York, U.S.A.
- PEREIRA RE (1999) Resource view theory analysis of SAP as a source of competitive advantage for firms. *Database for Advances in Information Systems* 30(1), 38–46.

- PETRONI A (1998) The analysis of dynamic capabilities in a competence-orientated organization. *Technovation* **18**(3), 179–189.
- POON S and SWATMAN PMC (1999) An exploratory study of small business internet commerce issues. *Information and Management* **35**, 9–18.
- PORTER ME (1979) How Competitive Forces Shape Strategy. *Harvard Business Review* **57**(2), 137–145.
- PORTER M (2001) Strategy and the Internet. *Harvard Business Review* **75**(3), 63–78.
- PISANO GP (1994) Knowledge, integration and the locus of learning: an empirical analysis of process development. *Strategic Management Journal* **15**, 85–100.
- PRAHALAD CK and HAMEL G (1990) The core competence of the corporation. *Harvard Business Review* **68**(3), 79–91.
- PRIGOGINE I and STENGERS I (1984) *Order Out of Chaos: Man's New Dialogue with Nature*. Bantam Books, New York, U.S.A.
- PHYTHIAN MJ and TAYLOR WGK (2001) Progress in electronic service delivery by English District Councils. *International Journal of Public Sector Management* **14**(7), 569–584.
- RAYPORT JF and SVIOKLA JJ (1995) Exploiting the virtual value chain. *Harvard Business Review* November–December, 75–85.
- REED R and DEFILLIPPI RJ (1990) Causal ambiguity, barriers to imitation and sustainable competitive advantage. *Academy of Management Review* **15**(1), 88–102.
- REICHHELD F and SCHEFTER P (2000) E-Loyalty: your secret weapon on the web. *Harvard Business Review* July–August, 105–113.
- RINDOVA VP and KOTHA S (2001) Continuous morphing: competing through dynamic capabilities, form and function. *Academy of Management Journal* **44**(6), 1263–1280.
- ROSENBLOOM RS (2000) Leadership, capabilities and technological change: the transformation of NCR in the electronic era. *Strategic Management Journal* **21**(10/11), 1083–1103.
- SANCHEZ R (1995) Strategic flexibility in product competition. *Strategic Management Journal* **16**, 135–160.
- SHAPIRO C and VARIAN HR (1999) *Information Rules: A Strategic Guide to the Network Economy*. Harvard Business School Press, Boston, MA, U.S.A.
- TEECE DJ, PISANO G and SHUEN A (1997) Dynamic capabilities and strategic management. *Strategic Management Journal* **18**(7), 509–533.
- TEO TSH and PIAN Y (2003) A contingency perspective on internet adoption and competitive advantage. *European Journal of Information Systems* **12**(2), 78–92.
- TJAN AK (2001) Finally, a way to put your internet portfolio in order. *Harvard Business Review* February, 76–85.
- VAN DER HEIJDEN H, VERHAGEN T and CREEMERS M (2003) Understanding online purchase intentions: contributions from technology and trust perspectives. *European Journal of Information Systems* **12**(1), 41–48.
- VENKATRAMAN N (1994) IT enabled business transformation: from automation to business scope redefinition. *Sloan Management Review* **35**(2), 73–87.
- VENKATRAMAN, N (2000) Five Steps to a Dot. Com Strategy; how to find you footing on the Web. *Sloan Management Review* **41**(3), 15–25.
- WARD JM and PEPPARD J (2002) *Strategic Planning for Information Systems*. John Wiley and Sons, Chichester, U.K.
- WERNERFELT B (1984) A resource based view of the firm. *Strategic Management Journal* **5**(2), 171–180.
- WILLIAMSON OE (1975) *Markets and Hierarchies*. Free Press, New York.
- WILLIAMSON OE (1985) *The Economic Institutions of Capitalism*. Free Press, New York.
- WILSON H, DANIEL EM and McDONALD MHB (2002) Factors for success in customer relationship management (CRM) systems. *Journal of Marketing Management* **18**(1–2), 193–220.
- WISE R and MORRISON D (2000) Beyond the exchange: the future of B2B. *Harvard Business Review* November–December, 86–96.
- YIN RK (1989) *Case Study Research: Design and Methods*. Sage, London, U.K.
- ZHANG MJ and LADO AA (2001) Information systems and competitive advantage: a competency-based view. *Technovation* **21**(3), 147–156.
- ZNANIECKI F (1934) *The Method of Sociology*. Holt, Rinehart and Winston, New York. Reprinted 1968, Octagon, New York.
- ZOLLO M and WINTER S (1999) From organisational routines to dynamic capabilities. Working Paper WP 99-07, University of Pennsylvania, Philadelphia, U.S.A.