



A strategic framework for the management of ERP enabled e-business change

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Abstract

This paper reviews the results of a three year study into Internet enabled ERP implementations around the world. The study identified different stages of growth with differing sets of problems at each stage. A framework for e-business change was used to evaluate the mature stage of e-ERP in six international organisations. The emergent model proposes various antecedents to successful e-business change management in ERP environments. A case study of the first B2B e-business integration with Dell Computer Corporation and its largest corporate customer is examined in the context of this model. The case demonstrates the integration of ERP and non-ERP systems, using Web-based technologies, to optimise an overall B2B value chain. Finally the paper emphasises the role of change management and cultural readiness when adopting e-business solutions and identifies critical areas for future research.

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1. Introduction

Numerous papers have been written about e-business and how this concept will change the way companies interact, characterised by rapid exchange of information within a virtual network of customers and suppliers working together to create value-added processes (Ticoll et al., 1998; El Sawy et al., 1999; Wigand and Benjamin, 1995; Jansen et al., 1999; Burn and Ash, 2000). However, little information is available on how to success-

fully integrate e-business projects with ongoing ERP implementations or already productive ERP systems (Hesterbrink, 1999; Holland and Light, 1999). As more and more established organisations realise that they need to form alliances with their customers, partners and suppliers over the Internet, e-business integration with ERP systems becomes a critical issue (Gable, 1998; Markus et al., 2000a,b).

This combination of technologies offers established companies the opportunity to build interactive relationships with partners and suppliers, improve efficiency and extend reach, all at a very low cost. For example, GE estimates to save 500 million to 700 million of its purchasing costs over three years and cut purchasing cycles by as much as 50% (Hesterbrink, 1999: p. 3). The Norwegian

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company Statoil, processes more than 350,000 invoices annually, and awards over 40,000 contracts through web enabled ERP commerce. The company expects a considerable improvement in the ratio of invoices to orders as well as a tangible contribution to revenue (SAP, 1999b; Venkatraman et al., 1999). Eventually, both companies expect to buy the majority of their purchases through Web-based bidding systems. Faced with such e-business innovations companies are looking for effective solutions to marry the two technologies for strategic advantage.

Although these technologies are fundamentally different, the fusion of their functionality offers a sound infrastructure for doing business online. We define e-business as “making the key business processes of an organisation available over the Internet” (Boey et al., 1999, p. 1). Although simple, this definition nevertheless encapsulates the necessary integration of e-business and ERP where the organisational knowledge can be accessed both internally and externally through e-ERP systems.

Inevitably, this will have a major impact on the employee workforce, the processes they have to perform and their skill requirements. The workforce will have to embrace a new culture as a knowledge-based community with far more flexible work roles. Increasingly, we are seeing the large traditional organisation breaking up and the emergence of new, networked organisational forms in which work is conducted by temporary teams formed across organisational lines (Markus et al., 2000a,b). In this new climate the implementation of enterprise wide systems, frequently on a global basis, carries with it as many organisational issues as technological ones.

This paper begins by reviewing e-business impacts and their inter-relationship with ERP implementation. A three stage study is examined and we report on the findings from multiple case studies of e-business projects in ERP enabled organisations. The key findings from each case study are captured into a theoretical framework for e-business change management. We then examine a particularly interesting case of two partner organisations, using the Internet to integrate their non-ERP and ERP (SAP R/3) systems for electronic procurement. The case presents a recently

implemented B2B e-business project by Dell to be used to supply computer equipment to one of its customer companies, Customer.com. This case highlights the specific need for such integration to be focused on cultural change and organisational performance issues (Pereira, 1999; Krumbholz et al., 2000) rather than solely emphasising technological issues. In particular, the case illustrates the factors that empower employees to support large-scale change and the implications for management in the learning organisation. Finally, we examine the implications for future research in this area and evaluate the use of multiple research frameworks in this socio-technical context.

2. e-Business and ERP

Kalakota and Robinson (1999) states “the creation and implementation of an e-business project is inextricably linked to the management of change” (Kalakota and Robinson, 1999, p. 60). This requires systematic attention to learning processes, organisational culture, technology infrastructure, people and systems thinking. Hesterbrink (1999) further emphasises the importance of alignment of those dimensions with respect to ERP and e-Business implementations. e-Business change is defined here as an organisational initiative to design an e-business project “to achieve significant breakthrough improvements in performance (e.g. quality, responsiveness, cost, flexibility, satisfaction, shareholder value, and other critical e-business measures) through changes in relationships between management, information, technology, organisational structure, and people” (Guha et al., 1997, p. 121). Planning and managing such systems requires an integrated multi-dimensional approach across the e-business and the development of new business process models (Kumar and Crook, 1999; Scheer and Habermann, 2000).

Increasingly, organisations are realising that importance must be given to improving quality of work-life issues. If effectively managed, employees should ultimately be more productive in their work tasks and better able to serve customers, suppliers, and business partners. The key constructs that can be probed here are: gaps between effectiveness

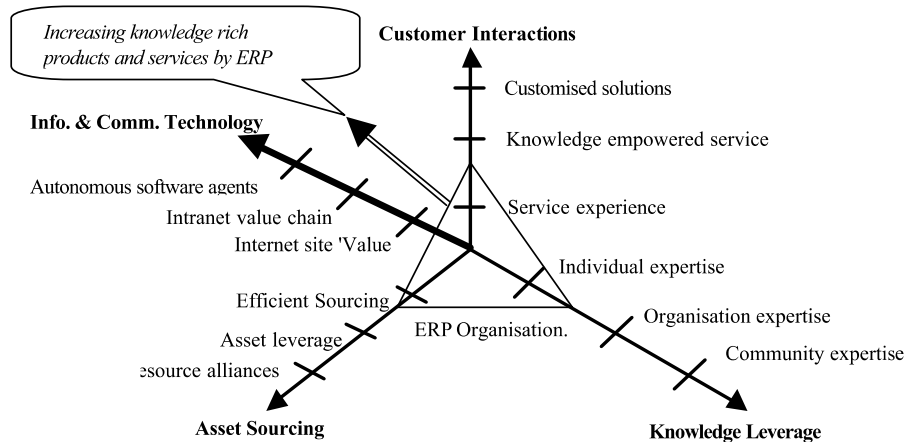


Fig. 1. e-Business and ERP (adapted from Venkatraman and Henderson, 1998).

expectations and actual performance improvements, with respect to employee work satisfaction, efficient resourcing, and customer interaction (Venkatraman and Henderson, 1998).

These aspects are reinforced in the ERP literature with studies on ERP implementation increasingly identifying people and organisational issues as critical features to be addressed for successful systems integration (Southwick and Sawyer, 1999; Markus et al., 2000a,b; Bunker, 2000; Bhattacharjee, 2000). Sarkar and Lee (2000) highlight three key enablers for success as: strong and committed leadership, open and honest communication and a balanced and empowered implementation team. Similar studies examining ERP cases stress the need for organisational change management, business process re-engineering, knowledge transfer and management, effective measurement approaches, alignment of people and roles and decision-making (Gattiker and Goodhue, 2000; Baskerville et al., 2000; Lee and Lee, 2000).

Venkatraman and Henderson (1998) have defined an e-business model for the learning organisation that promotes harmony over three vectors—customer/market interaction, asset sourcing and knowledge leverage supported by a strong information technology platform. They see this as the virtual organising model for the ICT empowered organisation with ERP as the backbone.

Fig. 1 gives a view of an organisation using an ERP system such as SAP, as an integrated system to enable knowledge management across the three vectors of the organisation.

Customer interaction (B2C) refers to the extent to which you virtually interact with the market defined at three levels of greater virtual progression:

- Remote product/service experience.
- Product/service customisation.
- Shaping customer solutions.

Asset sourcing (B2B) refers to competency leveraging from:

- Efficient sourcing of standard components.
- Efficient asset leverage in the business network.
- Create new competencies through alliances.

Knowledge leverage (B2E) refers to access to expertise from:

- Maximising individual experience.
- Harnessing organisational expertise.
- Leveraging of community expertise.

The ERP backbone progresses through a staged growth model adopting Internet technologies across a virtual value chain. This model was used to guide our investigations at the initial stage

examining the extent to which local SAP installations were integrating their ERP adoption across all three vectors of their business applications.

3. Initial results

3.1. Investigations of local SAP sites

In early 1999, ten Western Australian SAP-based organisations were contacted with a view to gathering information about the state of e-business developments within SAP R/3 environments. Significantly, SAP's R/3 system dominates the local ERP landscape. A structured interview approach using open-ended questions (based around Venkatraman and Henderson's framework) was used to capture information of current and future use of R/3 with Internet technology. In constructing an appropriate interview questionnaire, the issue of benefit maximisation was paramount and the focus of this was towards supply chain automation based around business-to-business models.

In general, the responses from IT managers interviewed revealed views and expectations of future developments similar to the key findings of the Nolan and Norton Institute Australian industry based study (NNI Report, 1998):

- Integration across the entire organisation is the key to large efficiency gains.
- Transparency of implementation and change process is important, both in terms of acceptance of the change and achieving the expected efficiency gains.
- Distinguish between striving to win new markets or customers and gaining cost efficiencies.
- Develop a benefits register and measure achievements against it.

The information gathered from the first interviews gave rise to a generic graph of IT strategy, Fig. 2. The graph reflects the perceived benefits of a two stage plan, where an R/3 implementation is followed by a second wave of Internet extensions. This evolutionary approach is observed to be the norm in Australia, for the "follower" type organisation (NNI Report, 1998). The actual benefits

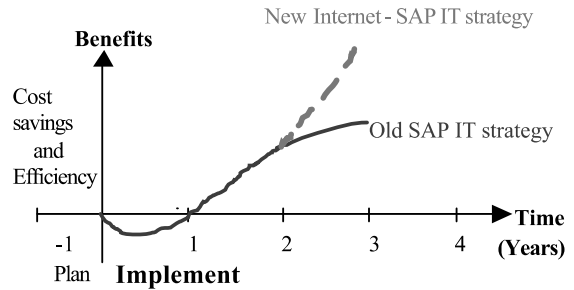


Fig. 2. Benefits from Internet extended SAP R/3 implementation.

achieved from adopting e-commerce technologies proved very disappointing. "The largest gaps between expected and actual benefits are related to supply chain, product development and customer service". It is in these areas of business practice where ERP systems are regarded as being traditionally strong (Rosemann and Watson, 2002; Davenport, 1998).

It became apparent during this stage of the research that local organisations were still, for the most part, at the beginning of the experience curve where benefit expectations greatly outweighed actual performance returns to-date. As a result, the search for successful implementations was expanded overseas and a more specific set of criteria used to select appropriate sites with more mature usage of e-ERP to provide a more detailed picture of different stages of ERP implementations and perceived levels of success (Markus et al., 2000a,b; Bhattacharjee, 2000). Interview feedback also indicated the importance of environmental conditions for e-business change. For example, the capability to share knowledge, importance of the learning organisation, as well as the activities of change management teams were all deemed highly important but also problematic. Although information gathered was qualitatively rich, attempts at analysis further emphasised the need for a more comprehensive and structured model of e-business change.

3.2. The new research model

The ongoing study makes use of an established theoretical framework taken from business process

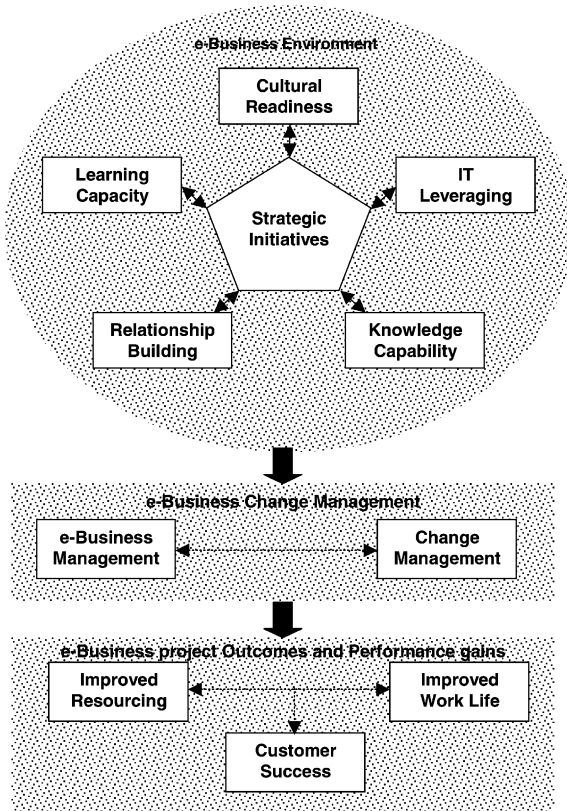


Fig. 3. Theoretical framework of e-business Change Management (adapted from Guha et al., 1997).

change research. Fig. 3 shows the adapted framework that was used as a tool for identifying the facilitators and inhibitors of successful e-business projects within ERP enabled organisations. The relationships presented in the framework are based on relevant work in organisational change, strategic management innovation, and information systems. The general thesis of the framework is adapted from Guha et al.'s (1997) work on business process change management:

Any significant business process change requires a strategic initiative where top managers act as leaders in defining and communicating a vision of change. The organisational environment, with ready culture, a willingness to share knowledge, balanced network relationships, and a capacity to learn, should facilitate

the *implementation* of prescribed e-business management and change management. Both of these are requisite for customer success and ultimately in achieving measurable and sustainable competitive performance (Guha et al.'s (1997), 121).

The model identifies three areas to be examined: the change environment, the management of business process change and the outcomes and performance gains. Within each of these there are a number of components and within each component salient dimensions are identified as constructs. During application of this model in a case study, each construct is probed so that the organisation can be classified into one of several categories. For example, one of the constructs for the 'strategic initiatives' component is stimuli, and the resulting probe classifies an organisation into one of two categories: proactive versus reactive.

The research challenge, here, was one of leveraging existing, but still emergent, theory to examine such a complex research domain and explore the diverse attributes of e-business adoption and ERP integration.

4. Methodology

"Embedded" multiple case-study analysis was chosen to investigate the research questions concerning the complex phenomenon of e-business change projects. Embedded approaches enlist the use of multiple units of analysis: (1) the company, (2) the project team, (3) the project (Yin, 1989; Eisenhardt, 1989). This triangulation attempts to validate primary data. The case-studies selection criterion required a major e-ERP project, which had organisational implications. Also, as the focus was on studying antecedents to organisational performance, a homogeneous set of projects (having similar initiatives) with variance across cases on the outcome measures—cost, responsiveness, flexibility, satisfaction, shareholder value, and other e-business metrics—was required. This enabled 'theoretical' replication with contradictory results in order to examine any differences that might exist in antecedents (Yin, 1989).

4.1. Overseas case selection

To identify the sites, a search using secondary literature, web sites, and SAP related industry consultants was initiated to identify major e-ERP projects. Sixteen such organisations were identified as prime candidates with ten agreeing to participate in the study and take part in the first interviews. This number was subsequently expanded to thirteen while exploring extended networks of organisations. In each case a senior IT/SAP project manager was contacted for the purpose of conducting the initial interview and this led to a number of further contacts with users and team members.

The final detailed case studies were drawn from six organisations found to be of particular interest. These agreed to second interviews and subsequent follow-up over a further 18-month period. This paper focuses on the results found in these six cases. The cases are shown matched against the e-ERP initiatives selection criteria in Table 1. The projects covered a range of e-business initiatives in different sized organisations. Initially all had high significance but this was not always the final evaluation as shown. The extent to which the ERP system had been used as an inter-organisational system was also found to have a strong impact on the significance and subsequent success.

4.2. Data collection

In November 1999 initial interviews were conducted in person by visiting each organisation at

their headquarters. Senior e-business project managers were questioned about “the benefits and barriers arising from extending their R/3 business processes onto the Internet”. A repeat visit to each site in June/July 2000, was performed to collect the primary information for this study, using the following protocol:

- A qualitative structured interview questionnaire was used during the second visits to collect primary data for the study.
- Multiple archival documents, as well as many conversations via e-mail were processed.
- In each case the focal point of contact was the senior level IT/SAP project manager but other project team members and users were also interviewed.

A brief overview is provided of each of these six cases and a summary analysis provided against the change management framework before we look at one case in detail (Dell and partner) chosen because of its scope in terms of organisational size and project content.

- *Case 1: Bank* (large) B2E “Employee Intranet”
- *Case 2: Biotech* (medium) B2B “e-Procurement”
- *Case 3: Society* (small) B2C “Online ordering”
- *Case 4: Engineer* (large) B2E “Employee tracking”
- *Case 5: Dell & Customer* (large) B2B “e-Procurement”
- *Case 6: Comptec* (large) B2B “Order and request”

Table 1
All case organisations interviewed

Criterion of project	Bank	Biotech	Dell & Cust	Engineering	Comptec	Society
1. Major e-business project	B2E	B2B	B2B	B2E	B2B	B2C
2. Project completed	Locally	Yes	Yes	Locally	Yes	Yes
3. Expected breakthrough	Yes	Yes	Yes	Yes	Yes	Yes
4. Cross functional focus	Yes	Yes	Yes	YesYes	Yes	
Interorganisational focus	No	Yes	Yes	No	Yes	No
5. Unambiguous outcomes	Yes	Yes	Yes	Yes	Yes	No
Size of organisation	Large	Medium	Large	Large	Large	Small
Significance of project	Medium	High	VeryHigh	Innovative	High	Medium

5. Case background

- *Case 1: Bank* is one of the world's leading financial services groups, with head-quarters in Switzerland. The SAP Internet solution (employee portal) for internal address management covers all organisational information within the bank and is the most used Web application, available for all 45,000 employees, with 300,000 transaction calls per day. This e-business application has proven to be a major tool for supporting the merger processes of two banks into a new Bank.com.
- *Case 2: Biotech* is a research and development pharmaceutical company based in UK. Its mission is to create partnerships with pharmaceutical companies to complete the development and marketing of its research worldwide. Founded in 1986, Biotech currently employs approximately 250 staff and is listed on the London and NY stock exchanges.
- *Case 3:* Established in 1937, *Society* is a not-for-profit Australian company serving its members with wine products and services. The immediate focus is to try and make the Society more relevant to members and to overhaul the society's total business processes from sales order to inventory and delivery. This e-business project uses SAP R/3 with Internet integration and is designed to achieve management goals: total integration of the society's business processes including Internet mailings and orders by leveraging R/3; the ability to utilise membership data in the selecting and marketing of products; improved inventory accuracy to maintain a competitive advantage with a growth of at least 50%.
- *Case 4:* A large global engineering company with headquarters in the USA. Engineer is a global leader in energy equipment, energy services, engineering, and construction. It had three main goals to achieve with its initial SAP R/3 implementation: (i) to standardize business processes globally across business units and functional lines, (ii) to move engineer to a process-driven organisation, and (iii) to provide managers across engineer with easy access to decision-quality information. It has about 17,000 SAP users worldwide, with the potential

for this figure to increase to about 26,000 users (SAP, 1999a). The specific country group examined was based in Norway.

- *Case 5:* Dell is a leading PC and server provider in the United States, no. 2 server provider in the US and no. 3 worldwide. Customer.com is one of the largest customers of Dell (the largest at the time of interview). They are one of the foremost global suppliers of custom, high-performance semiconductors and partner with customers to build complete systems on a single chip.
- *Case 6:* Comptec is a global leader in IT equipment, has its headquarters in Amsterdam, Netherlands. With extensive European manufacturing facilities, customer-focused companies in 25 European countries and more than 9000 experienced employees, Comptec is aiming to be the "no. 1" computer company in its home market in Europe, by the year 2002. Comptec provides the industry's most complete portfolio of best-in-class IT products, from the smallest notebooks to the most powerful data centre solutions. Developed and manufactured in Europe for European customers, the product portfolio benefits from the technologies and worldwide sourcing networks of the parent companies. The specific country group examined was based in England.

6. Research findings

By analysing the raw data captured from each case interview, a summary Table 2 was derived to enable the researcher to focus on the core components of the research or business framework. For each case, the core components were rated for its contribution or influence to the success of the project, using a 3-point scale; "low" or "medium" or "high". The analysis technique used here focuses on the positive and not the negative contributions.

The results from Table 2 showed that Customer and Dell, Bank, Engineering and Biotech achieved success in their projects, whereas Comptec rated their success only moderate and Society found their implementation to have failed to achieve any reasonable success. However, making comparisons

Table 2
Summary of findings for each component of the business framework

Components and constructs	Bank	Biotech	Dell customer	Engineering	Society	Comptec
Environment						
Strategic initiatives	High	High	High	High & Low	Low	Medium
Cultural readiness	High	High	High	High & low	Low	Low
IT leveragability	High	High	High/medium	High	Medium	High
Knowledge capability	High	High	High	High	Medium	Medium
Relationship building	Medium	High	High	High	Low	Medium
Learning capacity	High	High	Very high	High	Medium	Medium
Management						
Change mgt practice	High	High	High	High	Low	Low
e-Business mgt practice	Very high	Very high	High/medium	Very High	Medium	Medium
Performance gains						
Quality of working life	High	Medium	Very high	High	Low	Low
Business resourcing	Not yet	High	High	N/A	Not yet	Not yet
Customer interaction	Not yet	Not yet	High	N/A	Medium	High
Gaps between expectations and actual performance	Small gap	Small gap	None/Small	Small gap	Varies	Small gap
Significance of project e-Business success						
	Medium	Very high	Very high	Innovative	High	Very High
	High	High	Very high	High	Low	Medium
Success scale:	Low	Medium	High			

is neither relevant nor valid. More importantly, Table 2 draws attention to three key components (highlighted in bold) for more in depth discussion: *Cultural readiness* from *Business environment*, *Change management* from *Management*, and the three dimensions of *Performance gains*.

One case in particular that stands out and is now discussed in greater detail is the Dell partnership with one of their customers (referred to as customer.com). Perhaps the most interesting thing about this case was that Dell was part of the original sixteen organisations contacted for the study but declined since they had ceased to be SAP users. However, the success of the B2B project with their partnering organisation (one of the ten original cases) was such that the authors were invited to interview Dell for their side of the story and both partners were included in the final set of detailed cases.

6.1. A case study: B2B integration

In 2000 Dell pioneered its first business-to-business “B2B e-Business integration” with an

established customer company. The information gathered on this case forms the basis of the discussion for rest of this paper. This case is chosen here because it illustrates a comprehensive approach to inter-enterprise computing. This example of an integrated architecture is made possible through a variety of backend systems and procurement systems.

How does it work? One of Dell’s customers, Customer.com, is leveraging its existing SAP backend system and SAP business Connector powered by webMethods technology, to communicate directly with Dell’s e-business system. The integration between Customer.com’s SAP ERP and SAP B2B procurement application to its customer Dell catalogue automates the procurement of Dell products via the Internet (Dell, 2000).

6.2. Technology fit

This particular case is one where one would expect the “technology fit” issue to be of paramount importance, yet, this proved not to be the case. In adopting an enterprise information system,

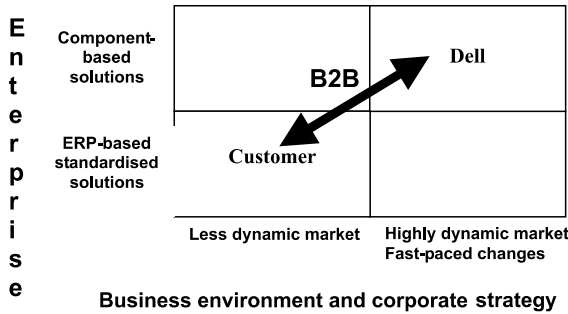


Fig. 4. Decision matrix for Dell and customer partner.

technology is only half the picture. Organisational perspective is equally important. Fig. 4 illustrates the issue of business or enterprise information systems fit versus organisational performance. *Customer* implemented SAP as its enterprise business system. However, unlike *Customer* Dell sees itself “as competing in a very dynamic environment with ever *changing* technology, customer tastes, and supplier relationships” (Fan et al., 2000, p. 29).

For this reason, Dell chose to abandon its early development in SAP and in 1996 started to use COM as a standard in developing its component-based enterprise solution. Dell strongly believes that the company has to adopt the most flexible approach, in order to fit IT to its overall corporate and operation strategy and integrate with customers. The integration issues which were highlighted throughout the interviews related to cultural and change management processes required for successful implementation of a strategic initiative.

6.3. Analysis of findings

At the case interviews information was collected using a structured response sheet broken down into three levels of detail: strategic components, the constructs within these components and a selection of corresponding categories. The interviewees selected the category that most readily described their experience. Tables 3–5 present the full details.

By analysing the data and comments captured from the interviews, a qualitative rating was de-

rived. The comments helped focus on the contributions of the individual components of the research framework. Each component was rated as having a positive (+ve) or negative (–ve) contribution to the e-business project.

The results given in Tables 3–5 show a high overall level of success was achieved. The column of ratings draws attention to the importance of having positive contribution from all the components for the project to be successful. To understand these summarised findings, a more in depth discussion follows for each of the three main dimensions of e-business change—the *change environment*, the *management of change*, and the *outcomes and performance gains*.

6.3.1. Strategic initiatives

This IT innovation sprang from the insights of one of Dell’s IT professional staff. This IT manager acted as an “ideas champion”. The champion had the drive and energy to make the project happen (Mintzberg and Westley, 1992). Also, the “ideas champion” received decision making support from the central administration board. She had the motivation to communicate and sell the vision for the project to others in the organisation so that they were willing to provide their support. While this was viewed as a normal incremental change process in Dell it was deemed revolutionary in the customer organisation and took some time to gain acceptance by management and staff. The extra time saved by the new integrated system enabled the IT manager to devote far more time to quality decision making procedures rather than on the job ‘fire-fighting’.

6.3.2. Cultural readiness

In the project, the staff showed a desire to be part of change—“to project a new business image”. However, this did not happen overnight in *Customer.com* with considerable efforts devoted to meetings and a gradual development of an inclusive change process. The change agent was the practical leadership of the management staff. “We are very proud of this ERP integrated e-business solution.” This was the view of both partners.

For *Customer.com* the leadership showed inspiration for the development of a practical

Table 3
Findings of the change environment in the business framework

Component and constructs	Supplier organisation “Dell”	Customer organisation “Customer.com”
Strategic initiatives		
Stimuli	Pro-active	Pro-active
Formulation scope	Incremental	Revolutionary
Decision making	Champion in place	Champion emergence
Strategy led	Onset	Onset
Cultural readiness		
Change agents	+ve	+ve
Leadership	+ve	+ve
Risk aversion	welcomed	welcomed
Extent of open communication	+ve	+ve
IT leveragability		
Role of IT	Enabling	Enabling and socio-technical
Use of Internet technology	Superior	Adequate
Knowledge capability		
External information use	Boundary spanners	Technology gate-keeper
Declarative knowledge	Focus on core competencies	Focus on core competencies
Relationship building		
Inter-organisational linkages	Cooperative	Cooperative
Cross-functional cooperation	Adequate	Adequate
Learning capacity		
Improve efficiency	Learning by doing	Learning by doing
Adaptation	Learning from others	Response to IT change
Learning type	Double-loop	Single loop

Key: +ve = facilitator, -ve = inhibitor; + and - = facilitator and inhibitor.

Table 4
Findings of the change management in the business framework

Component and constructs	Supplier organisation “Dell”	Customer organisation “Customer.com”
Change mgt practice		
Mgt’s. readiness to change	Committed	Participative
Nature of change	+ve	+ve
Scope of change	Improvement	Radical change
Managed change	Alleviation of dissatisfaction	Revolutionary change tactics
e-Business mgt practice		
e-Business measurement	Use of e-bus metrics (BSC)	Audit
Use of tools and techniques	Superior	Adequate
Use of team-based structure	+ve	+ve

Table 5
Findings of outcomes and performance gains in the business framework

Component and constructs	Supplier organisation “Dell”	Customer organisation “Customer.com”
Quality of work life	Employee satisfaction	Employee satisfaction
B2B resourcing	Cost savings (+), choice (NA), quality (+), reliable (+)	Cost savings (25%), choice (+), quality (+), reliable (+)
B2C networking	First B2B customer	First B2B supplier

solution that overcame management obstacles. However, there remained the problem of training employees. A culture of acceptance to change was introduced for the benefit of all staff, including senior management and not just the clerical employees.

6.3.3. *Relationships building and learning capacity*

For Customer.com the project demonstrated positive cooperation with the interstate sub-branch of the organisation, and the beginnings of cross-functional cooperation. In the project, learning by doing and learning from others helped improve the professional end-user IT skills. Again, this meant a cultural change where the company was seen to be responding to technology induced change rather than business change. The IT department assumed greater power in the decision making process.

6.3.4. *IT leveragability and knowledge capability*

Interestingly, although the project demonstrated superior IT design and advanced use of Internet technology in Dell, the customer company felt that their use of technology was only adequate and placed far greater emphasis on the enabling role of ICT in a social context. Within Dell, IT had long been a facilitator for external knowledge building whereas in Customer.com IT was protective of systems integration with their external customer interfaces. For Customer.com, the project demonstrated positive leadership and good business-to-employee communication, but acknowledged initial employee resistance. To overcome this, each of these components, must be aligned (along with the enabling technology) to clearly demonstrate their link to strategic initiatives (Hesterbrink, 1999).

6.3.5. *Change management*

The pattern of change at Dell was reported to be a participative change tactic resulting in an evolutionary change. This was viewed as a “waterfall” progression of change, starting with an alleviation of dissatisfaction from the staff and eventually arriving at a “well managed” workflow:

alleviation of dissatisfaction,
vision for change—“doing business in a new
and improved way”,
evolutionary change tactics,
a well-managed process for change.

This was confirmed as the pattern within Customer.com “however, time frames were too restricted” to be considered “well managed” and from the user viewpoint the change was viewed as radical and revolutionary.

6.3.6. *e-Business management*

The use of computer graphics in combination with the web tools and techniques also had a positive influence most noticeably, on use by casual users. Outcomes of e-business change can be measured at various levels within the broad complex phenomenon of an e-ERP project. However, one tool found in Dell to be highly effective was the use of the balanced score card (BSC). The use of BSC for strategic enterprise management is a significant departure from traditional performance management programs that are tied to financial frameworks. It was felt BSC provides the discipline that helps executive teams to articulate and better understand their strategies. In addition, BSC enables organisations to introduce a new governance and review process that is focused on strategy and not on tactics. The governance process emphasises learning, team problems solving and coaching (Kaplan and Norton, 2001). This was viewed as too revolutionary for Customer.com who retained an audit based measurement process using traditional cost benefit techniques.

As with other leading firms that have begun to undertake e-ERP projects to meet strategic goals both organisations recognised that they only accomplish their objectives through committed people. The team based structure supported this and found that employees became ultimately more productive in their work tasks and better able to serve customers, suppliers, and business partners.

6.3.7. *Outcomes*

It was reported that from the outset the project showed an improvement in one of the outcome constructs—the quality of work life. However,

within the area of *performance gains*, improved customer response and an expanding customer base was seen as most significant. As a measure of its success and/or acceptance, this e-business solution is now being extended to include the B2B e-procurement of office equipment and supplies.

6.3.8. *Performance gains*

The performance gains for e-procurement were achieved from two sources; 25% cost savings, and reduced cycle time from 2 weeks to 2 days, and access to (real-time) customer data via ERP technology. The project enabled efficiency gains from minimising of delays in customer orders, and effectiveness gains from optimising employee/staff time. For example; fewer complaints, improved management of the customer, increase to 50% with online orders (sales), and a growth in corporate sale of 45% (Dell and Fredman, 1999). Also, access to online real-time data for deciding on the optimal employee orders. The cost savings through operational efficiencies of all equipment resourcing, compare favourably to those cost savings (efficiencies) in other e-procurement case studies. In the *Biotech* case study the gains appear similar: 20% cost savings, and reduced cycle time from 2 weeks to 4 days while improvements for staff in the quality of work life dimension appear the same.

The case study shows how Customer.com is currently using B2B integration with Dell and its SAP system to provide immediate process efficiencies, and should provide a model for use with all Dell's other suppliers. This e-business solution is made possible by an integrated architecture using a variety of backend systems and procurement applications. Both organisations believe that the primary beneficiaries were the corporate customers, through the automation of B2B e-procurement and customer details management.

In the future, e-business with ERP technologies will play an integral part in helping established enterprises build and operate B2B e-procurement solutions, and eventually lead to the development of electronic marketplaces. Also as e-business adoption becomes common place, corporate portals for empowering employees will be considered an economic necessity. When these corporate front-end systems begin to look and feel the same,

the real competitive advantage will ultimately come from the ERP back-end systems.

7. Conclusions

7.1. *Implications for practice*

The results confirm the previous findings from studies in the area of business process change (Sarkar and Lee, 2000; Bhattacharjee, 2000). Successful implementation of e-ERP projects requires attention to both technical and social dimensions and their interaction within an environment of managed change. In this study, the most successful e-ERP projects were found to have facilitators in all components of the business framework, including the technological infrastructure, organisational change environment and project management. Further there is the implication that the least successful e-ERP projects will have inhibitors in these dimensions, especially in the area of cultural readiness and change management (this was found to be a highly significant factor in the Society case and to a lesser extent in Biotech and Comptec). In the Dell and Customer.com case study, employee satisfaction was derived from an overall acceptance of change both to the administrative functions and processes that impacted on their roles but also to the increased dependency on IT and its major support role. This highlights the need to encourage the balancing of conflicting technological, organisational and people needs, when contemplating the implementation of e-business solutions (Sumner, 2000).

As e-business adoption becomes common place, corporate portals for empowering employees will be considered an economic necessity, providing facilities such as e-procurement for employees. The next wave of economic advantage lies in revenue generation from new business opportunities in other business-to-business models (Carlson, 1995). These are complex problems that can never be solved with technology alone. They require executive commitment, leadership, with appropriate problem solving skills, and employee friendly communication to form the basis for the development of an extended network of e-business

relationships both within and without the organisation.

7.2. Implications for research

This study was both evolutionary and longitudinal. As the study progressed the researchers found the need to adopt different frameworks for research (Venkatraman and Henderson, 1998; Guha et al., 1997). These frameworks allowed for the focus to be both technocentric and sociocentric. This need was driven by the ongoing research results and incorporated continuous feedback from the organisations that participated in the study. The researchers also found a need to take multiple perspectives over different stages in time from each case organisation. The findings from these are now being incorporated into a staged maturity model of e-ERP success (Ash and Burn, 2002).

The case presented in this paper was used primarily to test the suitability of the emergent research framework for gathering evidence to identify the factors for success of an e-ERP project. The research framework was chosen as a methodology for its ability to examine complex phenomena. It is seen as evolutionary in nature, and was content driven. It is primarily a diagnostic tool for identifying factors contributing to success of new business models. It is *not* seen as a prognostic tool.

The multiple methodologies approach is seen as a way forward for future research to ensure that richness is not sacrificed to fit structured strategic frameworks. Complex phenomena underlie e-ERP success and future studies should endeavour to capture these through more innovative approaches to case research.

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