December 2001

Evaluating Successful E-Business Change through ERP

Colin Ash
Edith Cowan University

Janice Burn
Edith Cowan University

EVALUATING SUCCESSFUL E-BUSINESS CHANGE THROUGH ERP

Colin G. Ash
Edith Cowan University
c.ash@ecu.edu.au

Janice M. Burn
Edith Cowan University
j.burn@ecu.edu.au

Abstract

The paper reports on a longitudinal study of e-business change management in ERP enabled organisations. Twenty organisations agreed to participate in the study and data was collected through ongoing e-dialogue and face to face interviews over a two year period. An analysis of the findings led to the adoption of a model proposing various antecedents to successful e-business change management in ERP environments. Multiple case studies with varying dimensions of e-business scope are described in context of this model and a detailed case study of an organisation with a highly innovative project is used to illustrate the facilitators that lead to e-business project success.

Keywords: E-business and ERP, change management, organisation performance gains

Introduction

Numerous papers have been written about e-business and how this concept will change the way companies do business. 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, 1998; Jansen et al. 1999; Burn and Barnett, 2000). However, little information is available on how to successfully 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 and Tanis, 2000).

This paper reports 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. A detailed analysis of one major project using this framework illustrates the suitability of using this as a model for evaluating success factors. Rather than emphasising technological issues the focus is now clearly on cultural change and organisational performance issues (Guha et al. 1997).

E-Business Change Management

Kalakota et al. (1999, p. 60) state "the creation and implementation of an e-business project is inextricably linked to the management of change." 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 (eg 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).

Therefore, in any examination of outcomes, consideration should be given to (a) the environmental conditions for change and (b) the ability of the organisation to manage change in those conditions. The model in Figure 1 guides this study in identifying facilitators and inhibitors of successful e-business change. The relationships presented in the framework are based on relevant work in organisational change, strategic management innovation, and information systems.

Methodology

The study used an established theoretical framework from business process change research for selecting and examining the facilitators and inhibitors of successful e-business projects within SAP enabled organisations. "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 (strategy), (2) the project team, (3) the project. This triangulation attempts to validate primary data. The case-studies selection criterion required a major e-business 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 but with the same outcome measures - cost, responsiveness, flexibility, satisfaction, shareholder value, and other e-business metrics – was required.

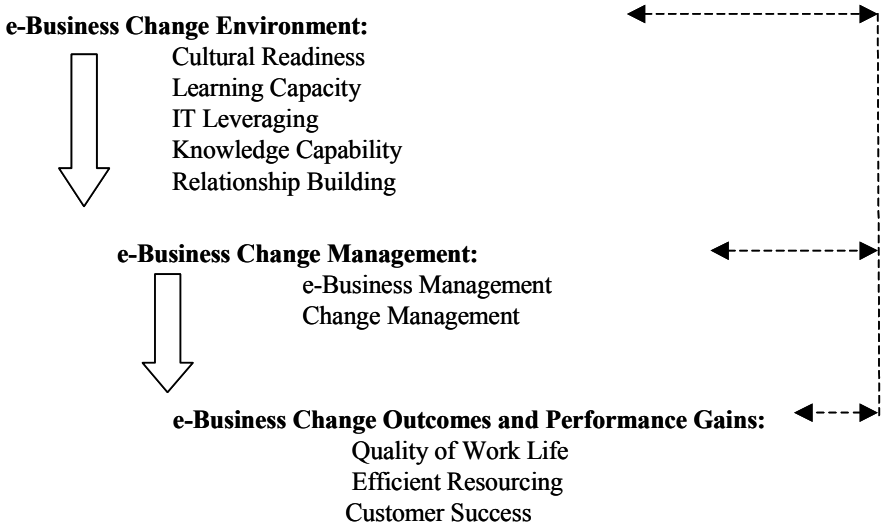

Figure 1. A Theoretical Business Framework of e-Business Change (Adapted from Guha et al. 1997)

Case Selection

To identify the sites, a search using secondary literature, web sites, and SAP related industry consultants were contacted to identify major e-ERP projects. There were three stages to the investigation: the initial stage focussed on ten local (West Australian) organisations and the subsequent development of three mini-case studies; stage two was expanded to include a further ten overseas organisations (with a more restricted selection criteria) and the development of an additional seven mini-cases; stage three was a return visit to eight of the organisations to develop full case histories. In each case a senior IT/SAP project manager was contacted for the purpose of conducting an interview. This paper reports on the results from the final stages.

In November 1999, initial interviews in ten sites, 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 of eight sites was performed in June/July 2000 to collect the detailed information for this study, using the following protocol:

- Multiple archival documents as well as many conversations via e-mail.
- A qualitative structured interview questionnaire was used during the second visits to collect primary data for the study from eight (8) SAP worldwide sites (Table 1).
- In each case the focal point of contact was the most senior level IT/SAP project manager.

In this paper we discuss in depth one of the cases - *Biotech.com* (est. 1986 with approx. 240 employees).

Table 1. All Case Organisations Interviewed

Criterion of Project	Bank	Biotech	Charity	Comp-uter	Employ-ment	Engin-eering	Scitech	Society
1 Major e-business project	**B2E**	**B2B**	B2C	B2B	B2E/B	B2E	B2B/C	**B2C**
2. Project completed	Locally	Yes	Sep '00	Yes	Yes	Locally	Yes	Yes
3. Expected breakthrough	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
4. Cross functional focus/ Inter-organisation focus	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
5. Unambiguous outcomes	Yes	Yes	Yes	Yes	No	Yes	Yes	No
Size of Organisation	**Large**	**Medium**	**Small**	**Large**	**Large**	**Large**	**Large**	**Small**

Background

Biotech is a research and development stage pharmaceutical company based in UK. Its mission is to create partnerships with pharmaceuticals companies to complete the development and marketing of its compounds. The primary objective of the SAP Business-to-Business Procurement project was to ease the workload of the company 's procurement department by automating the old, paper-bound purchasing process. With some 3,000 active vendors on their books, the procurement department 's four members were often left floundering hopelessly in a sea of paper. "We were determined to cut this high number of vendors. The next step of the project was to negotiate more favourable conditions with our slimmed-down vendor base and build up closer business relationships with each one." Apart from more efficient purchasing procedures, the company 's buyers would have a more interesting job to do. Biotech's scientists should be relieved of routine paperwork, enabling them to concentrate more on research. "SAP Business-to-Business Procurement will broaden these people 's day-to-day task base considerably. They'll have more time to spend on nurturing relationships with vendors and working on optimisation projects outside their daily round of duties."

Table 2. Summary of Findings for each Component of the e-Business Framework

Business Framework *Components*	**Rating** **+ve / -ve**	**Summary of Comments**
Environment		
Strategic Initiatives	+ve & -ve	A pro-active, incremental, champion emergent project that would have lead to an Internet strategy and e-commerce direction had company not changed direction so drastically
Cultural Readiness	+ve	Being an R&D company meant that the improved efficiency aspects of the B2B introduction was reasonably well accepted by most end-users.
IT Leveragability	+ve	The main driver in this B2B project. Most systems were under reviewed for web-enablement. eg Cost centre manager inquiry system on SAP was already web-enabled.
Knowledge Capability	+ve	Biotech, SAP and vendors involved. New knowledge gained by all from this new business model.
Relationship building	+ve	Various department involved in the pilot (and subsequent roll-outs) have gained a closer knowledge of each others function, hence making for a better working environment.
Learning Capacity	+ve	Classroom, instructor led. Key users in each area also responsible for training/problem solving and subsequently changed this to Intranet documents for users to reference.
Management		
Change Mgt Practice	+ve	Radical change via a well-managed process for change of a committed management.
e-Bus Mgt Practice	+ve	Improvement via feedback loop from pilot project teams, and adequate use of tools.
Performance Gains		
Expectations & actual performance	small gap	No significant gap between effectiveness expectations and actual performance
Working life for professional staff	+ve	Improved employee satisfaction - anecdotal evidence only. Too early to judge accurately.
Business resourcing	+ve	cost savings (+ ve), choice (+ ve), quality (+ ve), reliability (+ve)
Customer interaction	na	In the future…

Key: +ve = facilitator, -ve = inhibitor; + & - = facilitator & inhibitor

Research Findings

At the interview data was collected using a structured questionnaire extracting three levels of detail (Tables 3 4, 5). By analysing the data and comments captured from the interviews, a summary of comments was first constructed (Table 2). Each component of the framework was rated as having a positive (+ve) or negative (-ve) contribution towards the Intranet project.

The results given in Table2 show that an overall level of success was achieved. The column of ratings draws attention to the importance of having positive contribution from all the components (synergy) for the project to be successful (Guha et al. 1997). Only one component was rated as having both a positive and negative influences. 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**.

Table 3. Findings in the *Change Environment* of the Business Framework

Component *Constructs*	**Categories**
Strategic Initiatives	
stimuli	**pro-active** v's reactive
Formulation scope	**incremental** v's revolutionary
Decision making	autocratic, bureaucratic, **champion emergence**
strategy led	Onset (?), eventually, none
Cultural Readiness	
Change agents	+ / -
leadership	+ / -
Risk aversion	cautious, **welcomed**, aggressive
extent of open communication	+ / -
IT Leveragability	
role of IT	enabling, socio-technical, **dominant factor**
use of Internet technology	poor, **adequate**, superior
Network Relationships	
Balancing	
inter-organisational linkages	**cooperative**, competitive
cross-functional cooperation	poor, adequate, **superior**
Learning Capacity	
Improve efficiency	**learning by doing**
adaptation	**response to IT change**, learning from others
Learning type	**Single-loop, double-loop**, deutero
external information use	boundary spanners, **technology gate-keeper**, customers, none
Organisational knowledge	**R&D resources & IT devel.**, knowledge base, focus on core competencies

Strategic Initiatives This IT innovation sprang from the need to remove paper based requisitioning reduce costs, create closer relationships with smaller number of vendors, enable management of the procurement process with reduced central service, remove "maverick" purchasing. Decision making came from pro-active proposals by individuals for presentation to various project teams lead by the IT manager – the project "champion".

Cultural Readiness In the project, the various project teams showed a desire to initiate change and the IT manager acted as a visionary agent for change. This very much supports previous findings into change leadership (Mintzberg and Westley, 1992). For Biotech.com the leadership showed inspiration for the development of a practical solution that overcame boring admin overloads.

IT Leveragability and Knowledge Capability For Biotech.com, the project demonstrated positive local leadership, superior IT design for improved learning, and business-to-vendor communication, but with little end-user resistance. To overcome resistance to change, each must be aligned (along with the enabling technology) to the strategic initiatives to overcome resistance to change (Hesterbrink, 1999)

Network Relationships For Biotech.com, the project demonstrated an improvement in cooperation with its procurement vendors (synergy) and the beginnings of cross-functional cooperation with the procurement and HR departments. Various department involved in the pilot (and subsequent roll-outs) gained a closer knowledge of each others function, obvious but has made for a better working environment.

Learning Capacity In the project, learning by doing and learning from others helped improve the professional end-user IT skills. This enabled professional staff to focus on the quality of their research procedures.

Table 4. Findings of *Change Management* in the Business Framework

Component *Constructs*	**Categories**
Change Mgt Practice	
Mgt's. readiness to change	**committed**, participative, resistant
Pattern of change	+ / -
Scope of change	improvement, **radical change**
Managed change	alleviation of dissatisfaction, vision for change, evolutionary or revolutionary change tactics, **a well-managed process for change**
e-Business Mgt Practice	
e-business measurement	use of e-business metrics, e-business information capture, **audit**, **improvement feedback loop**
use of tools and techniques	poor, **adequate**, superior
use of team-based structures	**individual** / group

Change Management The pattern of change 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 by HR professionals and eventually arriving at a well managed process:

alleviation of dissatisfaction,
↳ vision for change,
↳ evolutionary change tactics,
↳ a well-managed process for change

e-Business Management Data is being captured on the benefits of the project, but it is to early to judge accurately. The company's systems are being reviewed for web-enablement. The cost centre manager inquiry system on SAP already web-enabled. The user friendliness of web-enabled SAP had positive influence on the use by casual professional users.

Table 5. Findings of *Outcomes and Performance Gains* in the Business Framework

Component *Constructs*	**Categories**
Outcomes	
Quality of work life	**(+ve) employee satisfaction**, dissatisfaction, neutral
Performance Gains	
Business resourcing	cost savings(+ / -), choice(+ / -), quality (+ / -), reliable (+ / -)
Customer Success	customer base, remote service, collaboration

Outcomes It was reported that from the outset the project showed an improvement in one of the outcome constructs - the quality of work life (QWL). Because it is used primarily to procure chemicals and lab equipment, the new, automated purchasing process means that Biotech's scientists can concentrate on their research rather than wasting valuable time on purchase-order

administration. Improved business resourcing was seen as a significant (positive). And indeed, not a single member of the procurement department has been forced out of a job by the new systems. As a measure of its success and/or acceptance, this extranet solution was expanded to include the staff "timesheet" system.

Performance Gains The performance gains were achieved from two sources; time and cost reductions through the new vendor arrangements, and access to reliable (real-time) catalogue data via extranet. The project enabled efficiency gains from lowering the order-to-delivery time from 10 days to less than 3 days, and effectiveness gains from optimising opportunity for staff to increase their job satisfaction.

Having achieved shorter lead times, Biotech no longer needs to keep such large stocks of materials, so expenditures are down and cash flow is healthier. Indeed, the company expects to save between ten and 15 percent on the cost of purchasing materials. Another goal of the business-to-business project was to build more long-term links with preferred vendors. So far, the company has identified three such vendors. Their Internet sites are to be linked into the SAP procurement system, allowing Biotech employees to use SAP Business-to-Business Procurement on the company 's own intranet and to purchase from both the internal catalogue and external online catalogues. This will be made possible by a specially developed open catalogue interface. The procurement department already attributes one major success to its new procurement process: It has been able to hike the discounts previously offered by its three preferred vendors a further five percent.

This type of cost saving through purchasing efficiencies for Biotech's sourcing of materials, compares favourable to those cost savings (efficiencies) in the other e-procurement case studies. Finally, the benefits are by no means all one-sided: SAP B2B Procurement enables vendors to do direct selling.

Conclusions

An established research framework of e-Business change is used to identify the factors for success of e-business projects within an ERP environment. The results confirm that a successful project was found to have facilitators in all components of the business framework, including the change environment and project management. Further there is the implication that the least successful e-business projects will have inhibitors in both dimensions, especially in the area of cultural readiness and change management. In this case study apart from more efficient purchasing processes, the company 's buyers would have a broader and more satisfying job to do. Also scientists were relieved of routine paperwork, enabling them to concentrate more on research and on nurturing relationships with their vendors.

The case presented was used to test the suitability of an established research framework for gathering evidence to identify the factors for success of an e-business project. In order to avoid an original IT-centric position, we emphasise the importance of managing the change of e-business projects. This 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. It would appear to have some use by business professionals/consultants in e-business change scenarios.

The first wave of competitive advantage through cost savings from the automation of B2B (eg e-procurement) transactions is now common place. In the future, e-business activities such as corporate portals for empowering employees will be considered an economic necessity. The next wave of economic advantage lies in revenue generation from new business opportunities in other business-to-business models, such as business-to-consumer for customer satisfaction. These are complex problems that can never be solved with technology alone. They require leadership, appropriate problem solving skills, lots of hard work, executive commitment and a culture that embraces the ideals of the learning organisation (a team and community oriented work process). The organisational design, learning environment, and human-to-human communication and collaboration must be aligned to the enabling technology. "One should always keep in mind the balance between people, business processes, and technology" (Carlson, 1995).

References

Burn, J. M. Barnett, M. L. "Emerging Virtual Models for Global e-commerce - world wide retailing in the e-grocery business," Special Millennium Issue of Journal of Global Information Technology Management, (3:1), 2000, pp. 18-32.

Carlson, DA "Harnessing the Flow of Knowledge," 1995, http://www.dimensional.com/~dcarlson/papers/KnowFlow.htm

El Sawy, O. A., Malhotra, A., Gosain, S. Young, K. M. "IT-Intensive Value Innovation in the Electronic Economy: Insights from Marshall Industries," MIS Quarterly, (32:3), 1999, pp. 305-335.

Gable, G. G. "Large Packaged Software: a neglected technology?" Editorial, Journal of Global Information Management (6:3), 1998, pp. 3-4.

Guha, S. Grover, V. Kettinger, W.J. Eng, J.T.C. "Business Process Change and Organisational Performance: Exploring an Antecedent Mode," Journal of Management Information Systems, (14:1), 1997, pp. 119-154.

Hesterbrink, C. (1999) e-Business and ERP: Bringing two Paradigms together, PriceWaterhouse Coopers, Sept., 1999.

Holland, C. P. Light, B. "Generic Information Systems Design Strategies," Americas Conference on Information Systems, Milwaukee, August 1999

Jansen, W., Steenbakkers, W. Jagers, H. "Electronic Commerce and Virtual Organisations" Special Issue of eJov, (1:1), 1999, pp. 54-68. http://www.virtual-organization.net

Kalakota, R. Robinson, M. e-Business: Roadmap for Success, Addison-Wesley Longman, MA, USA, 1999, pp. 52-61.

Kumar, R. L. Crook, C. W. A. "Multi-Disciplinary Framework for the Management of Interorganizational Systems," The Data Base for Advances in Information Systems, Winter, (30:1), 1999, pp. 22-37.

Markus, M. L. C., Tanis, C. "Multisite ERP Implementations," Communications of the ACM (43:40), 2000, pp. 42-46.

Pereira, R.E. "Resource View Theory Analysis of SAP as a Source of Competitive Advantage for Firms," *The Database for Advances in Information Systems,* (30:1) Winter 1999, pp. 38-46

Scheer, A. W. Habermann, F. (2000). "Making ERP a Success," Communications of the ACM (43:4), 2000 pp 57-61.

Ticoll, D. Lowry, A. Kalakota, R. "Joined at the Bit," in Blueprint to the Digital Economy creating wealth in the era of e-Business, Tapscott, D. Lowry, A. Ticoll, D. McGraw-Hill, 1998

Wigand, R.T., Benjamin, R.I. "Electronic Commerce: Effects on electronic markets," Journal of Computer-Mediated Communication [On-line], (1: 3), 1995 Available: http://www.ascusc.org/jcmc/vol1/issue3/wigand.html.