A Model of e-Business Transformation

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ABSTRACT

A staged model of transformation is proposed for guiding organisations through the successful implementation of their e-business strategy. This model is based on the findings from a set of case studies of traditional organisations that pioneered e-business implementations through ERP. These cases span the 'dot.com' era that inspired great expectations for new wealth from e-business opportunities to a new reality of B2B interactions from e-business networks. The case findings demonstrate; the integration of technologies, the differentiation of business models, and the demonstration of value adding in products and services along the customer and supplier chains. The key issue for managers that emerges from the case studies is that employee empowerment and e-business readiness of customers and suppliers is needed for effective e-business transformation.

INTRODUCTION

The aim of the paper is to demonstrate to senior managers of ERP enabled enterprises, what they need to consider during the various stages of e-business development. The paper consolidates three phases of a longitudinal study into organisations that pioneered e-business implementations with their existing ERP systems (e-ERP). A final conceptual framework of e-business transformation is developed that brings together the components of e-business progress from three sources.

The longitudinal study used three interdependent research models; (i) virtual organising, (ii) B2B interaction, and (iii) e-business change. The case findings from exploring these research models identified the various antecedents of the e-ERP phenomena. Each model exhibited factors that have influences at different stages of e-business progress. One in depth case study revealed six stages of progress with e-ERP implementations.

A generic model of e-business transformation (eBM) is now proposed that focuses virtual organising (Venkatraman and Henderson, 1998) as realising the benefits of B2B interaction by utilising the facilitators of successful e-business change. This model of eBM represents a comprehensive view of e-ERP as the union of the three research models, mapped into three stages of e-business adoption. The management focus is on employee empowerment and e-business readiness of customer and supply chains. The paper argues that; successful e-business transformation with ERP occurs when *value propositions* are realised through *integration* and *differentiation, of technologies* necessary to support new *business models* for the delivery of *products and services* online.

THEORETICAL FRAMEWORK

A study was carried out between September 1999 and June 2001 of e-business implementations. The study used three distinct research models to explore the antecedents of e-ERP:
- Virtual organising as an enterprise e-business strategy (Venkatraman and Henderson, 1998)
- e-Business change for management outcomes and performance gains, (Guha et al., 1997)
- B2B interaction for benefits of new e-business models (Carlson, 1995).

Research Models in the Three-Phased Study of e-ERP

Figure 1 illustrates the top-level components of the three research models used in the study. Each model reflects a different business focus that represents an area of organisational theory; strategy, management,

Figure 1: Three Faces of e-ERP Implementations
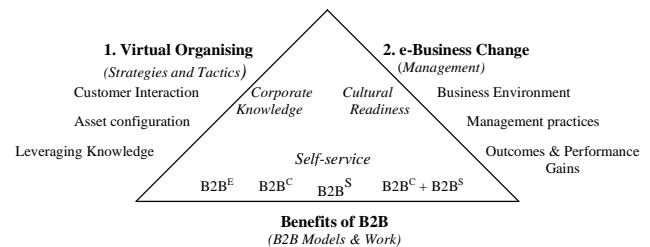
and work practices. Collectively the three models could be used to construct a comprehensive conceptual framework of e-business development or progress. Since each model has such a distinct nature and scope, the difficulty is finding the underlying commonality across the research models:

1. Virtual Organising is illustrated by a three dimensional model (1) of e-business activity that is "applicable to any company". Progress is along the three dimensions of "customer interaction, asset configuration, and leveraging knowledge" (Venkatraman and Henderson, 1998).
2. e-Business Change is illustrated by a flat model (2), in which progress is across eleven interrelated components within three broad sections based on relevant research in the areas of; "organisational change, strategic management innovation, and information systems evaluation" (Guha et al., 1997: 123).
3. Benefits of B2B is illustrated by a two dimensional model (3) in which greater e-business activity occurs within a set of B2B models (Carlson, 1995). B2B refers to the class of business-to-business (B2B) models that include; business-to-supplier (B2B^S), business-to-employee (B2B^E), and business-to-corporate customer (B2B^C), (Ash and Burn, 2001).
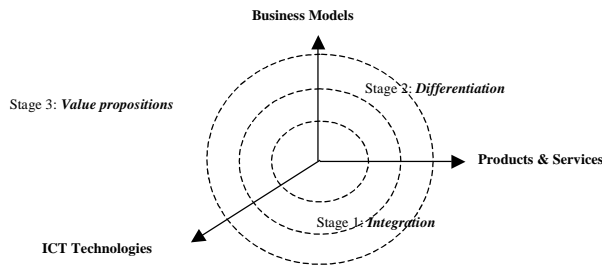
The brief summaries of each model in Figure 1, reveals their distinctiveness but also a common theme of e-business progress. This common thread of e-business progress becomes the focus of a new comprehensive model. It is extended to embrace the spectrum of e-business transformation (eBT). The concept of eBT is viewed as; realising the benefits from the application of virtual organising in B2B models, by utilising the facilitators of successful e-business change. This definition represents a comprehensive staged model of e-business change. It is based on the case studies findings of the three research models for its underlying structure and scope. It includes a unified framework for evaluating success.

Model of e-Business Transformation

To develop a precisely defined theory of eBT, we begin by identifying the basic framework from the research findings, as illustrated in Figure 2. The detailed descriptors for each element of the model are mapped into a 3x3 matrix (Table 1). These elements are derived from analysing the research findings.

Table 1 represents a map of the issues distilled from the findings of this three part longitudinal case study. The findings were be mapped along the e-business stages of progress; integration of e-business and

Figure 2: e-Business Transformation Model

Figure 3: Three Stages of e-Business Transformation

In Table 1, the shaded cells in the 3x3 matrix indicate the essential elements of eBT. The other elements contribute to the organisation's performance gains and competitive advantage.

METHODOLOGY

The paper synthesizes the three phases of a longitudinal multi-case study, carried out between September 1999 and June 2001, of organisations that pioneered the use of e-business applications with their existing SAP R/3 systems. A convenient sample of established SAP-based organisations was selected across a wide range of industries and business-to-business models. This sample of eleven case studies was used to test the hypothesis; the strategies and performance objectives of eBT are applicable to all ERP enabled organisations when adopting e-business.

Semi-structured interviews were used to collect the primary research data about the case organizations. The case material collected is used to verify all the strategic characteristics of e-business and to demonstrate the business tactics possible from eBT (Table 1). This is described as closeness of strategic fit. In addition, the case material is offered to illustrate exemplars of e-business tactics.

Data Collection and Analysis Matrix

Data was gathered from three sources; primary, secondary and tertiary:
- Primary data – from semi-structured interviews conducted November 1999 and June 2000, and conference presentations in June 2001.
- Secondary data – from company documents collected or sent via emails.
- Tertiary data – from case articles written by third party authors/ specialists.

After collection, case data was collated and analysed according to; the literature, technology developments and industry insights, findings from B2B models, and reflections of the researcher.

ERP applications, and differentiation products and services as e -business positioning, for realising value propositions.

The management issue focuses on the shift from self-service to empowerment of employees, within a cultural of e-business readiness (e-readiness) with the company and partners - suppliers and corporate customers (Barua et al., 2001).

Figure 2 illustrates eBT as a comprehensive business architecture that focuses on three interdependent dimensions or pillars of online business; *ICT technologies, Products and Services, Business Models* where:

- *ICT Technologies* - refers to the convergence of technologies (IT and CT) for information flow within and between organisations, eg., e-ERP implementations;
- *Products and Services* - refers to asset and competency sourcing for providing cheaper, faster, and quality of products and services;
- **Business Models* – refers to the architecture of the firm and its network of partners for creating, marketing and delivering value.
- * Osterwalder et al., (2002) provides the definition of a business model; "as nothing else than the value a company offers to one or several segments of customers and the architecture of the firm and its network of partners for creating, marketing and delivering this value and relationship capital, in order to generate profitable and sustainable revenue streams."

In the e-business model ontology proposed by Osterwalder et al., (2002) four pillars of e-business are identified; infrastructure, product, customer, and finance. In the eBT model the cost of financing e-ERP infrastructure for an e-business solution is part of the B2B value proposition.

Stages of e-Business Transformation

Each dimension in the eBT model is further detailed at three stages of greater e-business implementation commitment; integration, differentiation, and realisation of value propositions. Progress in the first stage focuses on *integration* for achieving efficiency gains in task units; such as, customer service, purchasing, and new product development. The second stage focuses on *differentiation* by selecting the most effective resourcing and marketing activities. The third stage focuses on demonstration of *value propositions* within an inter-organisational network to design and leverage multiple interdependent communities to create superior economic value (Singh and Thomson, 2002; Venkatraman and Henderson, 1998).

Figure 3 is used to illustrate the interdependencies of the three stages of eBT.

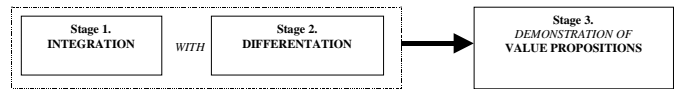### Essential Elements of e-Business Transformation

The model of eBT specified by Table 1, shows business focused at three stages of development with outcomes and performance gains for greater virtual progression:

Stage 1 – Integration of technologies is essential for cost reductions and operating efficiencies;

Stage 2 – Differentiation of products and services is essential for e-business market positioning and effective sourcing;

Stage 3 – Realising value propositions within B2B interactions is essential for superior economic and virtual value.

Table 1: Matrix of e-Business Transformation for ERP-based Organisations

	Stages of e-Business Transformation		
	(1999 -)	(2000 -)	(2001 -)
Business foundations (Virtual Dimensions)	**Stage 1: Integration**	**Stage 2: Differentiation**	**Stage 3: Demonstration of Value Propositions**
1. Technologies (virtual infrastructure)	* e-ERP ERP with e-Sales & e-Procurement apps.	Differential Resourcing ASP v's cost of ownership on the outsourcing spectrum	Innovative Technologies ERP and non-ERP networks for e-marketplaces
2. Products/Services (virtual experience)	e-Malls e-Mall integration and information exchange	* e-Branding Customerisation v's standardisation, Brand identity & integrity	e-Communities Foster customer, supplier, and employee expertise. Emerging collaborative online communities
3. Business Models (virtual B2B interactions)	e-Commerce Integration B2B Integration of e-Sales & e-Procurement systems B2B^C + B2B^S	e-Positioning B2B positioning within open vs private e-marketplaces	* e-Enterprise One2Many v's One2One Distinct focus of One2One partnerships
Business Focus	**Work-unit**	**Organisation**	**Inter-organisation**
Examples	Remote experience of e-catalogues. More tasks, "group ware" skills for online communication.	Assemble and coordinate assets; through effective use of online integration	Business network to design and leverage interdependent e-communities. Dependent on relationships
Outcomes and Performance Gains	Improved operating efficiency (ROI)	Effectiveness through empowerment (QWL)	Virtual and economic value added (EVA)

Key: Return on investment (ROI), Quality of working life (QWL), Economic value added (EVA)

* The complete details of eBT matrix are mapped with essential elements "shaded in"

Research Question	Data Collection Instrument	Data Analysis
Do the strategies with e-ERP implementations fit the model of eBT?	Semi-structured interviews questionnaires; Nov 1999	Match case content to each dimension and within each level.
a. Are the *dimensions* and the *stages* of eBT appropriate for e-ERP implementations?	Structured interviews questionnaires; June 2000	Cross-case content analysis to verify the *dimensions* and the *stages* of eBT
b. Are the *outcome objectives* appropriate for e-ERP implementations?	A final case interviews; June 2001	Cross-case content analysis to demonstrate the issues with outcomes & performance gains

Target organisations

All eleven cases are mapped against the project selection criteria updated from Guha, et al (1997) study of "business process change". The key criterion was changed from a 'cross-functional' to an 'inter-organisational' focus. Therefore the eleven cases are exhibited in Table 3, by ascending order of B2B interaction. This ranking is based on the findings developed in the second stage of the study.

The e-Business project selection criteria

The selection and contact of potential organisations was performed as convenience sampling. In November 1999, initial interviews of eleven 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" (Ash and Burn, 2001). A repeat visit to each site was performed between June and July 2000 to collect the detailed information for this study, using the following protocol:

- Qualitative structured interview questionnaires were used during the two visits to collect primary data for the study from eleven (11) SAP worldwide sites
- Multiple archival documents, as well as many conversations via e-mail.
- In each case the focal point of contact was the most senior level IT/SAP project manager.

CASE FINDINGS: VERIFICATION OF E-BUSINESS TRANSFORMATION MATRIX

Stage 1: Integration

e-ERP

The findings show to achieve savings and cost reduction enterprise application integration is essential 'back-end' to 'front-end'. Integra-

Table 3: Target Organisations in Order of B2B Interaction

*#. Case Alias	B2B Sub-class	e-Business Example	No. of Users
1. Society.com	B2C to members	e-Sales for wines sales and services to registered members.	~60 staff
2. Charity.com	B2C to citizens & corporate.com	1st Australian charity Web site for sales of greetings cards, gifts	~35 employees +30 volunteers
3. Engineer.com	B2B[E] professionals	HR reporting and tracking of skilled contractors	~1100 staff
4. Bank.com	B2B[E] employees	Networking of employees across very large bank	~45,000 bank employees
5. Media.com	B2B[E] employees	Networking of employees across a global media corp.	~33,000 media employees
6. Biotec.com	B2B[S] researchers	B2B procurement of bio-chemicals items as core business.	~240
7. Pharma.com	B2B[S]	B2B procurement of chemicals	~2,000
8. O&Gas.com	B2B[S] B2B[E],	B2B Procurement, and updated by Intranet access to Personnel data	~18,000?
9. Employee.com	B2B[S] B2B[E]	B2B Procurement with Intranet access to Personnel data	~14,000
10a Comptec.com (cross-divisional)	B2B[C]	e-Store across a global network of divisions, within a conglomerate	~11,000
10b Comptec.com business networks	B2B[C]	e-Mall of 3 e-Store divisions across a global network	~11,000
10c Comptec.com (linked to) SAP.com	B2B[C] with B2B[S]	Private e-marketplace- order request system integrated with SAP procurement system	~11,000 22,000
11. PCsell.com with Customer.com	B2B[C] with B2B[S]	Customised online sales integrated with customers MRO procurement	~27,000 ~14,000

11 Cases representing 9 industries, ordered by increasing level of B2B interaction

tion of the system architecture is made possible through a variety of 'back-end', 'sell-side' and 'buy-side' systems [All 11 cases, especially PCsell].

e-Malls

In their study of Australian e-Malls Singh and Thompson (2002) concluded, "it is apparent that for effective exchanges, standards for interoperability between business partners, technology integration for information exchange on goods and services is essential" [Comptec:-Integration of group's materials systems].

e-Commerce Integration

Integration of e-business models, B2B[C] with B2B[S] is essential to maximise efficiency gains, from supporting technology infrastructure, to enable people to do their job efficiently. Also, the study emphasise the synergistic benefit stream from B2B integration, the interaction of inter-organisation e-business solutions [PCsell and Comptec].

Stage 2: Differentiation

Differential Resourcing

Segev and Gebauer (2001: p.249) argue that "the mid points of the outsourcing continuum are the most challenging". From case observations they describe the continuum as a wide range from "do it yourself" (DIY) to complete outsourcing, with an increasing number of possibilities. In the one case study at the extremity of the ASP spectrum, the ERP and complete management by the application provider needs to balance the loss of control against the cost of ownership [Charity and Comptec]

e-Branding

The e-business tactics for positioning in the virtual space (e-positioning) companies were found to;
- differentiate between corporate customers and end consumers.
- deliver customerised products and services using standard components,
- differentiate between brand identity and brand integrity (e-branding) becomes a critical issue. [Charity, PCsell and Comptec].

e-Positioning

PCsell with its largest corporate Customer shows a second dimension. The tendency of the pioneers was seen to be a starting with development of public relationship building then shifting to private relationship building between suppliers and buyers. Comptec repositioned itself into the computer industry through e-sales. This is observed to be more than a passing phase. Further, had not the product lines of high technology then it is more than likely the degree e-readiness would have been too low to even consider the value proposition [PCsell and Comptec].

Stage 3: Demonstration of Value Propositions

Innovative Technologies

Two cases of B2B e-business integration with a global computer supplier and its largest corporate customer demonstrate a more complex model. These exemplar cases demonstrate the integration of ERP and non-ERP systems with other ERP systems (Fan et al., 2000). Web-based technologies, were used to provide the infrastructure needed to optimise the overall B2B value chain.

Engineer.com's HR Intranet ERP system demonstrated a B2B[E] value proposition. This innovation was bottom-up driven and from both sides B2B[E] and B2G of the value chain. This then required by a top-down approach for providing the company's global e-ERP infrastructure [Engineer.com].

e-Communities

PCsell opened their first SAP Center of Expertise in Austin, Texas and the Dell Competence Center at the SAP PartnerPort in Walldorf, Germany, two facilities where customers can validate system design and configuration without disrupting their live computing network. These

facilities act as collaborative eCommunity to provide customers with systems design and application tuning support and allow them to test various hardware and software configurations before making a purchase decision. These Web-based centres offers complete solutions including program minimizes time-to-benefit by combining the speed and ease Accelerated Solutions - SAP's offering with *PCsell's* hardware [PCsell].

e-Enterprise Model

A pilot approach to demonstrating a value proposition is shown in One2One relationship formed by Dell and a large corporate Customer. Also, the study is used to emphasize the synergistic benefit stream from B2B integration, the interaction of inter-organisation e-business solutions. In the short term it may be better to adopt e-commerce implementations (e-sales and e-procurement) with new customers and suppliers. This has the capability of persuading existing customers and suppliers that are more resistant to e-business change of the win-win value propositions [Comptec with SAP, PCsell and Customer]. In these two 'twin' cases studies the focus was on building a One2One relationship. The creation of a 'win-win' value proposition was observed to be a model for other B2B partnering.

General Measures within eBT model

The eBT matrix (Table 1) describes the generic outcomes and performance gains as;
- improved efficiency, with
- greater effectiveness , for realising
- value adding that refers to complementary benefits realised for all network partners, along the value chains, when do business online (Figure 3).

The performance gains for e-procurement were achieved from two sources; 25% cost savings, and reduced cycle time from 2 weeks to 2 days, from customer access (24x7) to supplier data via e-ERP technology. The project enabled efficiency gains from minimising of delays in customer orders, and effectiveness gains from optimising employee/ staff time. The cost savings through operational efficiencies of all equipment resourcing, compare favourably to those cost savings (efficiencies) in other e-procurement case studies. However, improvements for staff quality of work life comes from; learning of new skills, understanding of processes and acceptance of new responsibilities.

Figure 4 shows the generic e-business outcomes and performance gains and the relationships between them.

By taking a more holistic approach, executives can turn these facets of a company's operations into the drivers of e-business excellence. To this end managers should assess the company's operations by looking at both the traditional and e-business measures. For example PCsell and Comptec to less extent, used the same internal performance measures in both e-business and traditional business operations.

Strengths and Limitations of the eBT Model

A new research framework of e-Business transformation is used to identify the antecedents of successful of e-business implementations within ERP environments. Although limited to discrete snapshots of each organisation's e-business transformation, nevertheless the proposed model of eBT serves the purpose of demonstrating the transition rather well. A model that represents a documented comprehensive and long term plan that should assist managers of ERP-based organisations, in migrating their company towards a successful e-business enterprise.

It is essentially a diagnostic tool for identifying factors that contribute to success from adopting new e-business models. It is not seen as a prognostic tool. It specifically explores all areas related to the successful learning organisation where the key issues remain as people oriented organisational issues. Empowerment and e-readiness of partners and emergent change management are two key factors for influencing people working effectively with new e-business processes.

Figure 4: Criteria for eBT (matrix) Outcomes and Performance Gains
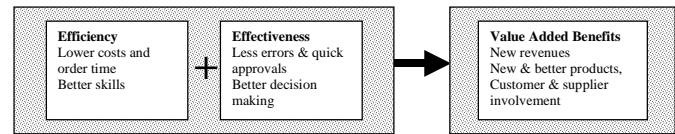
CONCLUSION

The proposed model of e-Business transformation (eBT) can be used as a detailed criterion to direct and evaluate the progress in the virtual space for traditional organisations or new entrants. The nature and value of the model is based on a set of exemplar SAP-based organisations, (innovators and early adopters) that pioneered e-business implementations through their ERP systems for sustained competitive advantage.

Although the research findings are presented here in a time frame; from integration, to differentiation, and finally the demonstration of value propositions, the recommendation to executive managers is that eBT matrix is a structured roadmap for achieving e-business goals. The model should be viewed as a comprehensive plan, in which improvement along the three dimensions should be interpreted as; *integration* should be tempered by *differentiation*, for realising B2B *value propositions*. The management focus progresses through the exploitation of self-service, the empowerment of employees, and the e-readiness of business partners necessary for accommodating emergent change.

eBT should be focused on business models, and not technology. It will vary in terms of the business focus of the organisation, such as customer focused, or product focused. No one element of the eBT matrix adequately captures the potential opportunities of e-Business. The elements along the diagonal of the matrix; *the integration of information technologies, the differentiation of products and services, and the demonstration of value propositions with business models*, although rarely practiced, are viewed as essential to eBT. Improving performance along all dimensions *integration, differentiation, and the demonstration of value propositions* is necessary for maximising benefits.

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