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INTERNATIONAL EXAMPLES OF LARGE-SCALE SYSTEMS - THEORY AND PRACTICE IV: B2B E-COMMERCE IMPLEMENTATION IN THE AUSTRALIAN CONTEXT

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ABSTRACT

Two of the most commonly used classifications in IS research are the factor approach and the process approach. While many studies of IS implementation are undertaken using a factor approach, little research so far examines the process of e-commerce implementation, especially in relation to the implementation of e-commerce in business-to-business (B2B) relationships. A holistic understanding of implementation which combines both the factor and process approaches using a case study method, is suggested as particularly suitable because of its ability to capture the reality of e-commerce implementation in an organisation's natural environment and in much greater detail than is possible using one of these approaches alone. In this paper, therefore, we endeavour to contribute to what we perceive as a gap in the body of theory surrounding the implementation process in the business-to-business e-commerce literature. We describe the findings of multiple case studies involving ten major Australian e-commerce initiators. In addition to confirming our earlier finding of the importance of non-technical factors for the success of the implementation process we also present, through our case studies, the various management and business issues associated with the success or failure of B2B e-commerce implementation.

Keywords: B2B e-commerce, EDI, internet, implementation, process.

I. INTRODUCTION

Although no official figures describe the growth of B2B transaction volumes, the indications from industry commentators are optimistic. For example, Boston Consulting Group [1999] predicted that one quarter of all U.S. business-to-business (B2B) purchasing will be done online by 2003, estimating that between 1998 and 2003, U.S. B2B e-commerce would grow by 33% per annum and would reach US\$2.8 trillion in terms of transaction value. In the Asia-Pacific region alone, the anticipated e-commerce volume is \$US440 billion by 2005 [Hold 2000]. While predictions such as these sound impressive, little is known about real-world B2B e-commerce implementation, a prerequisite for the e-commerce activity which will generate these results.

While it is clear that the success of IT implementation relates to the handling of the implementation process [Ginzberg 1979; Ginzberg 1981], comparatively little research reports on the actual process of e-commerce implementation. Many studies use a factor approach and overlook the 'process' of implementation, especially in relation to the implementation of e-commerce in business-to-business (B2B) relationships. We suggest that a holistic understanding of implementation, which combines both approaches using a case study method, is the most suitable because of its ability to capture the reality of e-commerce implementation in organisations' natural environments in far greater detail than is possible using the factor approach alone.

Such knowledge not only benefits those organisations considering or beginning to engage in e-commerce implementation but, perhaps less obviously, also those organisations which already engage in such implementations, since it can provide them with an understanding of the generalisability of their experiences. Work by Wilkins et al. [2000a; 2000b; 2001] looked at the impact of e-commerce implementation by government agencies on user organisations, with particular emphasis on the social and organisational contexts in which such implementations take place. This body of work offers an insight into the issues surrounding the adoption of mandatory standards and the technical and cultural changes which such adoption requires, but does not focus on providing an understanding of the actual process of implementing e-commerce *per se*. We believe that such understanding is not only important for practitioners, but also offers a significant insight into the complexity of the implementation process of this relatively new technology.

In this paper, therefore, we endeavour to contribute to what we perceive as a gap in the body of theory surrounding the implementation process in the business-to-business e-commerce literature. We describe the findings of a series of case studies on ten major Australian e-commerce initiators. The major discussion of the paper concerns the implementation process, the issues influencing this process, and the organisations' future approaches to B2B e-commerce.

II. THEORETICAL FRAMEWORK

IS IMPLEMENTATION

Researchers in IS implementation used a variety of models to explain the IS implementation process [e.g. Zand and Sorensen 1975; Ginzberg 1979; Ginzberg 1981; Kwon and Zmud 1987; Grover and Goslar 1993]. Viewing implementation as a process of change, we examined a number of organisational change and innovation studies. Some change process models were produced during earlier studies of IS implementation. Even though these models were developed for intra-organisational IS implementations, such as Payroll Systems, Decision Support Systems (DSS), or Material Requirements Planning (MRP) systems, and none specifically focused on e-commerce applications, they contributed considerably to an understanding of what happens during IS implementation. For the purposes of the review, we categorise these existing implementation models into three classes (Table 1):

- organisational change,
- organisational innovation, and
- applied IS implementation models.

Most of these models attempt to explain the process of IS implementation in terms of a number of distinct, sequential stages. However, other researchers [e.g. Keen 1981; Markus 1983; Walsham 1993 Orlikowski 1996] suggest that a much broader view, which takes into account various socio-political influences such as user resistance and political aspects of the implementation, is needed to describe IS implementation better.

Table 1. IS implementation models

Models	Description
<i>The change process models</i> [Lewin 1952; Kolb and Frohman 1970]	Also known as the 'traditional' change process, the original model suggests that the change process consists of unfreezing, moving, and refreezing processes.
<i>Organisational innovation models</i> [Thompson 1969; Pierce and Delbecq 1977; Kwon and Zmud 1987; Borton and Brancheau 1994; Rogers 1995]	Based on the notion of a process to diffuse an innovation (the technology in question). Originally a three-stage process (initiation, adoption and implementation), this model has since been expanded.
<i>Applied models</i> [Shaw 1995; Silver, Markus et al. 1995]	These models were developed by practitioners to represent "real world" implementation environments.

Another dimension used to describe IS implementation in organisations includes the popular "stages of growth" theories. Gibson and Nolan [1974], Nolan [1979], Earl [1989], Galliers and Sutherland [1991] all studied the maturity of IS implementation within organisations. They examined the growth and expansion of IS implementation over a period of time and suggested that organisations pass through a number of stages (called stages of growth) in terms of their IS implementations. More recent approaches to the stages of growth theory include McKay, Prananto and Marshall [2000] and Rayport and Jaworski [2002], who proposed an Internet-based stages of growth. These studies provide additional support for the concept developed in the general IS literature that a series of stages exists during the implementation process.

Additional light is thrown onto the process of building and sustaining complex information systems by those researchers who identified issues which arise during the implementation process of inter-organisational systems (IOS). Some examples of these are:

- Cash and Konsynski [1985] investigated inter-organisational relationships and provided the earliest hint of the issue of power in IOS development – an issue which was clarified and extended by Webster [1994; 1995];
- Porter [1980; 1985], Wiseman [1988], Scott-Morton [1991], Ward and Griffith [1996], Applegate, McFarlan, and McKenney [1999] looked into the strategic use of IS (SIS) and pointed out the unanticipated nature of many of the so-called 'strategic' systems of the 1970s and 1980s;
- Finnegan, Galliers, and Powell [1998] and Segars and Grover [1999], *inter alia*, noted the importance of SIS planning, and Galliers, Swatman, and Swatman [1995] extended this concept to the development of EDI systems; Chan and Swatman [1998] discussed the EDI implementation process, including factors influencing implementation.

We selected these theories, which relate to the development of inter-organizational systems, because B2B e-commerce is a relatively new technology and many believe that IS is being used for organizations' strategic objectives, especially when it involves the use of inter-organizational systems (IOS) such as B2B e-commerce. In this paper, we discuss the implementation process of e-commerce technologies and applications, from EDI to Internet-based technologies used in the business-to-business (B2B) relationships.

B2B E-COMMERCE IMPLEMENTATION – FROM EDI TO INTERNET COMMERCE

In Australia, B2B-related technology implementations in the form of Electronic Data Interchange (EDI) were first initiated around 1986-7 by a number of large companies which included the major retailer Coles-Myer, Ford automotive, Australian Paper Manufacturing (APM), BHP Steel, the Australian Customs Service (ACS), and the Australian Quarantine and Inspection Service (AQIS).

From that early beginning the adoption of EDI in Australia is described as very slow by a number of authors [see, for example, Clarke 1993; MacGregor 1996; Chan and Swatman 1999b; Chan and Swatman 2000]. Studies [MacGregor 1996; MacGregor, Bunker, et al. 1998; Walsh and Philma-Enterprises 1999] on EDI adoption showed that fundamental factors [which were identified previously, see Swatman 1993; Parker 1997], such as lack of awareness of the benefits of EDI and lack of willing trading partners, are still contributing to the slow adoption of EDI in Australia. Furthermore, higher implementation costs associated with the establishment and on-going communication costs (e.g., VAN-related charges) are also impediments to the diffusion of the technology.

The introduction of the Internet for commercial use in the mid-1990s offered a solution to this cost-associated problem. Using the Internet as the communications medium for EDI transactions these costs, which include the cost of purchasing the translator software, the establishment of the communications network or subscription to a value-added network can all be reduced. Chan and Swatman [2000] indicate that this cost reduction drives the move from traditional EDI towards Internet-based EDI and enables smaller organisations to afford the implementation more readily.

Currently, the most popular e-commerce applications used by organisations in their business to business (B2B) relationships including:

1. Traditional electronic data interchange (EDI), which is the exchange of formatted electronic documents between organisations using an agreed standard. Various forms of traditional EDI include proprietary file exchange, VAN-based or direct link EDI, and EDI to fax.
2. Internet EDI, which is EDI formatted documents transmitted over the Internet (eg. the use of file transfer protocol (FTP) or email applications to place the EDI messages into formatted documents and transmit them to their intended recipients);
3. Web-forms, which is the use of a web-based form or web intelligent interactive form to exchange business documents over the Internet. Web forms include various organisations' specific document transmissions and exchanges; and
4. XML EDI, which is the Internet-based EDI featuring interactive business document exchange. This form was predicted to be the next mostly used e-commerce for the B2B e-commerce [See, for example, Webber 1998]. Although this technology is not widely used in Australia, Tradegate/ECA, which is the leading e-commerce organization in Australia, stepped into this initiative by working with a number of Australian industries towards the development of the international XML standard proposed by the United Nations: ebXML. This initiative aims to lower the entry barriers to electronic business for small and medium-sized enterprises (SMEs).
5. Other varieties of purely Internet/web-based initiatives such as procurement solution and e-marketplaces, and B2B portals. This type of initiative is often implemented without any reference to EDI. Forrester research [Turban, King et al. 2002] reports about 2500 such initiatives in 2001.

A paper focussing on B2B e-commerce [Strader, Lin, et al. 1999] suggested the use of the Internet to support various supply chain networks. Based on process analysis rather than empirical data, the authors analysed the required mechanisms for supply chain management and suggested a framework which utilises various B2B applications such as EDI, WWW, intranet, and extranet for these processes. Although this framework is intuitively appealing, Threlkel and Kavan [1999] believe a number of difficulties affect implementing the proposal in its present form. These factors include insufficient standards for Internet transaction, uncertain legislation, reliability of data transmission, and security.

The discussion in this section raises the question of how the B2B e-commerce implementation process actually functions in organisations. What factors influence its process and how do organisations manage such issues? Combining theory, previous IS implementation studies, and empirical data; we present ten case studies in an attempt to answer these questions. Although

these data relate to the Australian e-commerce experience, they provide a starting point for researchers investigating this phenomenon around the world.

III. RESEARCH APPROACH

The study reported in this paper uses a combination of single and multiple case study research approaches. Initial understanding of the implementation process was synthesised from the literature to provide an initial framework for the study. Benbasat, Goldstein, and Mead [1987] suggest that a single case study for a pilot is useful in a highly exploratory research study. An in-depth investigation into one major case study was undertaken to obtain a "real world" context of the conceptual understanding formed from the literature survey. During this single case study, which covered the three-phase e-commerce implementation experience of BHP Steel, one of Australia's largest companies (and arguably its most sophisticated from an e-commerce point of view), direct observations, pertinent internal and external documentation (during 1989-1999), and intensive interviews were all used as sources for data collection. Extensive interviews with 15 key personnel involved in the implementation were undertaken during 1998. The use of a variety of methods of data collection increased the reliability and validity of the information obtained. Information collected from the interviews was cross-referenced with the information obtained from the documents to eliminate the weakness of human memory when dealing with history. Using pattern analysis techniques, the information was structured to identify the stages involved in each e-commerce initiative and to identify factors influencing the process. This part of the overall project is reported in Chan and Swatman [1999] and Chan and Swatman [2000].

Following this major case study, a multiple case study approach was undertaken involving ten organisations from a variety of industries around Australia. The objective of this multiple case study was to provide cross-case analysis and to refine the understanding which resulted from the initial, single case study. Yin [1989] and Benbasat et al. [1987] believe that multiple case studies are appropriate means of refining the initial propositions of a study. The selection of sites for the multiple case studies was largely based on the length of the organisation's experience with B2B e-commerce implementation (at least 5 years), the type of industry, company size, and the level of the e-commerce implementation.

In this multiple case study, key personnel in each organisation were interviewed during 1999-2000 utilising a semi-structured method, which made use of the interview protocol shown in Appendix I. In addition to these face-to-face interviews, the project documentation and company literature were also used as sources of information. During the analysis process, we compared and contrasted the findings with the literature and the previous single case, taking into account both the positive and negative findings.

IV. THE IN-DEPTH SINGLE CASE – DEVELOPING THE FRAMEWORK

As discussed in Section II, the theoretical framework for this study was derived from a combination of change process theory, diffusion of innovation theory, and studies in strategic information systems. In reviewing this literature, a number of implementation models were examined and factors influencing technology implementation were summarised. This review formed the basic understanding of an IS implementation and provided the foundation for our understanding of the specifics of e-commerce implementation. We then undertook a two-stage empirical investigation, comprising an in-depth single case and multiple cases.

We were particularly interested to discover whether the B2B e-commerce implementation process in major organisations could be considered a 'standard' process which would be similar for firms of all sizes and in all industry sectors, or whether there were identifiable differences between sectors and firm types.

We therefore used the single case study as a pilot to provide an initial "real world" understanding of e-commerce implementation. The model shown in Figure 1 describes the B2B e-commerce implementation process based on this single case.

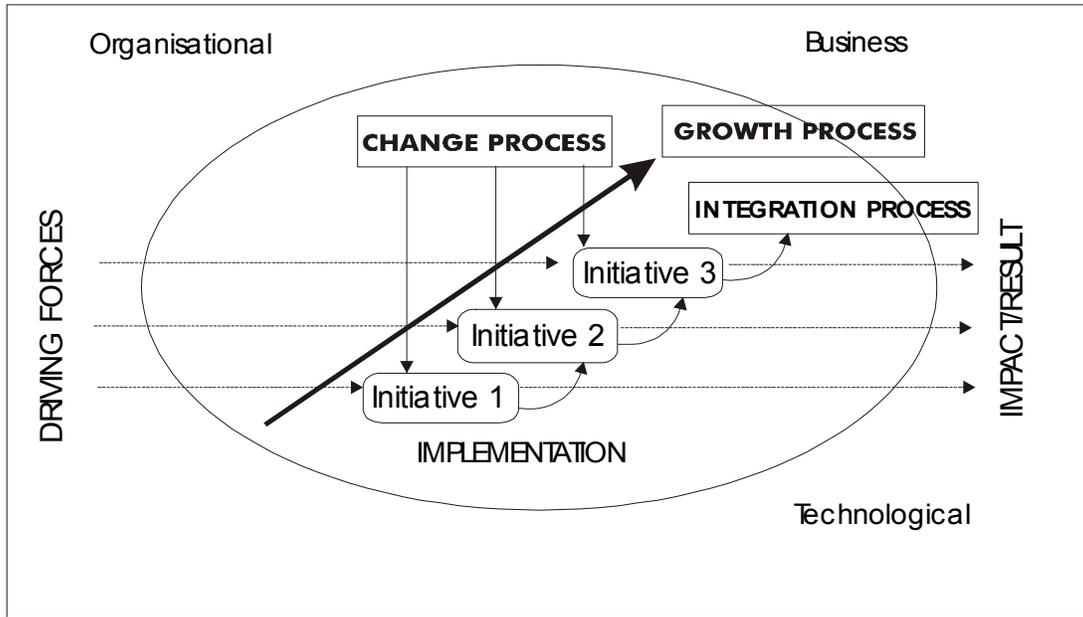


Figure 1. E-commerce Implementation Model Derived from the BHP Steel Case Study

The model illustrated in Figure 1 shows that the implementation of e-commerce is not a single process (nor, indeed, a single project), but rather a continuous series of stages or projects, for which different driving forces can trigger the initiatives. This model represents the three sub-processes of the implementation:

- the change process,
- the growth process and
- the integration process.

The change process describes the process of change which results from the introduction of a new technology or policy. Based on the findings of the single case, we believe that this process can be divided into four stages (Table 2).

Table 2. Change Process

Change process	Description
Initiation	Initial change process, which often includes experimentation and a feasibility study. Initiation follows the decision to adopt or not to adopt the technology.
Systems development	Installation and development of the systems, which includes the systems study, systems design, and systems testing
Utilisation and routinisation	The process of utilising or using the technology, which often involved user resistance and training management
Diffusion and expansion	The process of diffusing and expanding the use of the technology into the organisation's various business units and externally to trading partners.

The growth process describes the maturing process of a company in implementing an e-commerce initiative. This process refers to the way in which a company approaches the adoption, develops a strategy, and manages the technology. In the majority of e-commerce initiatives, a company usually begins an e-commerce initiative with a simple bilateral relationship on a single application. Later, this initiative is extended to more complex multilateral relationships involving various e-commerce applications. In this study, such a process is designated the 'growth process'.

The integration process is the process of incorporating a new business process into existing business processes or from the new initiative to the previous one. The major issue is related to internal application integration processes, which include data conversion activities. The data conversion process involved a complex process through the development of an application program interface (API) and data mapping activity. In e-commerce implementation, this integration process could relate to the integration of Internet-based B2B initiative(s) into existing traditional B2B activities, such as EDI.

Figure 1 also shows the importance of other factors in affecting the adoption and implementation of e-commerce technology. In an earlier paper [Chan and Swatman, 2000] technology, management, and business-related were issues believed to affect e-commerce implementation. Business issues are increasingly considered as the major factor indicating the maturity of the implementation.

Although we do not discuss the impact of the implementation process in this paper, we believe that the impact of such implementation is sometimes difficult to measure because of the intangible nature of the benefits, such as enhanced relationships with trading partners and benefits of the learning process.

V. MULTIPLE CASE STUDIES – FURTHER CONFIRMATION

Ten Australian organisations (summarised in Table 3), undertaking more than 40 e-commerce projects, were used for the second stage of the research project. While the organisations concerned are not identified because of commercial confidentiality, four case studies were located in Sydney, three in Melbourne and three in Canberra. The unit of analysis is the process (and the factors influencing this process) of the company's B2B e-commerce initiative implementations over the past 10-15 years.

Table 3. Multiple Case Study Overview

Case	# Years	Technologies implemented	Industry
1	12	Traditional EDI	Govt
2	12	Traditional EDI, Internet EDI, Web forms	Govt
3	12	Traditional EDI	Govt
4	6	Web form, e-marketplace	M
5	10	Traditional EDI, Internet EDI, Web forms	M
6	12	Traditional EDI	M
7	11	Traditional EDI, web form, e-marketplace	W
8	11	Traditional EDI, Internet EDI, Web forms, XML-EDI	T
9	12	Traditional EDI (F-EDI)	F
10	11	Traditional EDI, Internet EDI, Web forms	R

Note: Govt-federal government, M-manufacturing, W-wholesaler, T-transport and logistic, F-finance, R-retail

DRIVING FORCES

Table 4 compares the findings of the single case and the multiple cases. The new finding is presented in italics.

Table 4. E-Commerce Driving Forces

Single case	Multiple cases
Technological benefits (Savings and efficiency)	Technological benefits (Savings and efficiency)
Strategic-related reasons (competitive advantage, getting closer to the customers)	Strategic-related reasons (competitive advantage, getting closer to the customers)
	<i>Government mandate, regulation and policy</i>

While technological benefits such as savings and efficiency were the major motivations for e-commerce initiatives in government organisations, strategic-related reasons such as competitive advantage, getting closer to their customers, and improving customer service were the principal driving forces for the commercial organisations other than retail. We also found that two of the organisations (cases #8 and #9) believed that the major driving force was a mandate from the government, which requires certain industries and business processes, such as document submission, to be undertaken electronically.

During the more advanced stages of development, which include the adoption and use of more up-to-date B2B technologies such as Internet-based applications, organisations appreciated the benefits resulting from the use of the technology more. However, strategic-related factors are still the major driving forces in non-government organisations, especially within the manufacturing industry.

IMPLEMENTATION PROCESS

In all but one case, the companies had ten or more years of experience with B2B e-Commerce. One organisation only implemented e-commerce for the past 6 years through its Internet-based ordering systems. This organisation was selected nonetheless because it was a major alliance of the largest e-marketplaces in Australia.

The Change Process – The Critical Expansion Stage

The process of each implementation can be viewed in terms of the four phases already identified:

- In *the initiation stage*; Six cases (#1-5, 10) appear to take a very thorough approach to their implementation. Depending on the initiatives in which they were involved, they set up an e-commerce unit (e-commerce or supply chain management) to undertake the preliminary feasibility studies. These feasibility studies investigated the capability of the technology and infra-structure of the initiative – and to predict its adoption. Although these feasibility studies were then used to decide whether or not to proceed with the implementation, many of the companies found that uncontrollable factors such as political and regulatory moves, arising after the decision was made, could potentially affect the implementation. For example, one Internet-based ordering system is going to be abolished after three years of implementation, because of lack of participation. This initiative was introduced after extensive feasibility studies into both the technological and business capabilities of the trading partners. Reasons blamed for the failure of this initiative include the introduction of a Goods and Services Tax (GST) in Australia during 2000 which made this initiative less important for the potential users.

- *Systems development*; Those companies which began the implementation process with EDI started their early implementation with a PC-based stand-alone system which was later replaced with mainframe-based (or distributed systems) and fully-integrated business applications – a confirmation of Swatman's [Swatman 1993] stages of EDI integration model. The majority of the cases involved in-house systems development and coding (in a few cases, there was industry-wide co-development) assisted by consultants. In two cases (case #5 and #6), the experiences learned from its associated US and European companies were utilised.
- *Routinisation and utilisation*; This stage relates to the process of using e-commerce technology in daily business activities. The primary activity is managing the change process as users are encouraged to perform business activities with the technology. Depending on the technology employed, routinisation often involved education and training processes for system users. Nine cases agree that friendlier applications such as web-based applications tend to be routinised more quickly. However this "easy to use" technology does not significantly increase the uptake of the initiatives.
- *Diffusion and expansion*; This last stage is considered the most crucial, with uptake rate being seen as the measure of success. In this process, the companies must continuously introduce, attract, and market their initiatives to their trading partners or clients. Various non-technical issues often occur during this stage, such as lack of interest, financial constraints, or even difficulty in agreeing on a suitable business model. In a few initiatives, the organisations even needed to persuade their trading partners or clients with some incentives such as discounts on products/services, or by covering communication costs.

The Growth Process - from EDI to Internet Commerce

In general, the e-commerce implementations started with only 1-2 applications (e.g. purchase orders) in the traditional EDI initiatives. The number of applications was later expanded to include various documents such as shipment notices and payment instructions. In some cases, the process involved developing new messages (especially in those industries where standards did not evolve sufficiently).

Until today, EDI-related application is still the most common B2B initiative implemented. For example, one government agency introduced fourteen B2B initiatives since its introduction of EDI and currently still maintains eleven EDI initiatives. In contrast to Ho's [Ho 1997] study, which discovered that the use of the web in business-to-business (B2B) transactions is "unexplored territory", we found six cases (Table 3) which had started Internet-based initiatives, while three others also initiated planning for such ventures. While introducing their Internet-based initiative, all cases (except one which did not commence its e-commerce activities with EDI) still maintain their traditional EDI related initiatives (including those based on proprietary standards). One organisation (#8) has even started exchanging XML format documents over the Internet.

FACTORS INFLUENCING THE IMPLEMENTATION

To varying degrees, the majority of issues previously identified in the single case study were confirmed by the multiple case studies. All cases experienced these issues to some extent, depending on the industry and the type of e-commerce initiative involved. Table 5 shows the factors found to influence implementation.

Table 5: Factors Influencing the Implementation

	Single case	Multiple cases
Technology-related	Complexity Compatibility	Complexity Compatibility <i>Various levels of trading partner capability</i> <i>Rapid development of technology</i>
Management-related	Mgt support and commitment Change related issues (change agent, training, trust)	Mgt support and commitment Change related issues (change agent, training, trust) <i>Existing business structure and culture</i> <i>E-commerce perceived as a lower priority</i>
Business-related	Trading relationships Cost/benefit issues	Trading relationships Cost/benefit issues (including <i>Spending appropriateness</i> in government institution) <i>Slow adoption/uptake by the business community</i>

Technological Issues – Non-Technical Solutions

The findings indicate that complexity and compatibility are the major technological issues experienced – and are critical variables for successful e-commerce implementation. Trading partners (both within Australia and overseas) are currently using a variety of different standards and platforms, which increase not just the cost of the implementation but also the complexity of the process. Two possible solutions, currently being used by some of our cases, have been suggested to overcome this impediment:

- Ensuring the right decision is made in terms of technology, so that there is no difficulty with later integration issues (integration of the new technology with prior initiatives)
- Multiple ways to interact with and service a range of different technologies. Kalakota and Robinson [2001, p.323] refer to this strategy as “channel fragmentation” and point out that such a strategy could lead to inefficiencies.

Management/Organisational Issues – Commitment, Change and Priority

In all cases, commitment was suggested as the most important factor for implementation success. Two relevant forms of commitment are referred to here:

- commitment of organisations to e-commerce initiatives, needed to support the process of implementation (specifically, resource commitment); and
- trading partner (or client) commitment to the project.

This study found that in addition to trust, developing a sound business plan and achieving sign-off were suggested by respondents as methods for gaining these commitments.

Other management issues which arise are primarily related to managing change to ensure system acceptance. These issues are often classified as partly controllable factors [Winston and Dologite 1999] such as education and training, and uncontrollable factors such as trust [Keen, Balance et al. 2000].

Depending on the type of initiative, education, and training can be critical. For example, user’s training is critical for the EDI-related applications including Internet-EDI, but not quite critical for open Internet-related applications such as web forms, e-marketplace and specific business

documents exchange. This user training relates to not just within organisation change but also extended to trading partner organisations. Case #10, for example, must perform regular training sessions for its suppliers.

As pointed out by Keen [2000 p.9]

“The more complex your environment, the more you have no choice but to trust”.

Implementation of e-commerce is closely related to the ability of organisation to gain trust from trading partners. Case #10 is a major customer and believes that gaining trust from its suppliers is critical to expand the implementation. The suppliers must trust that the company chose the right system, standard and process that would allow them to gain benefits from the implementation.

Various levels of trading partner capability, company culture, and business processes made the change process activity a complex exercise. Of the cases, one (case #4) found extreme difficulty in marketing its online ordering initiative, which traditionally was undertaken by a sales person. Although the organisation is aware that a broader approach, such as resource allocation planning, needs to be used, such a change in approach was extremely difficult due to the popularity of the current business process with the company's customers.

All cases also believe that e-commerce was seen as a lower priority than the organisation's core business-related activities. While the cases agreed that e-commerce is integral to improving business performance, convincing top management was not an easy task. In the non-commercial organisations, where profits are not the major objective, the issue is one of balancing priorities for systems development in relation to the organisation's core business.

The Inter-Related Business Issues – Slow Adoption and Cost/Benefit Justification

In both single and multiple cases, trading partner relationships played crucial roles for the success of the implementation. Being an initiator (or sponsor organisation) could mean that the organisation provides support to its trading partners to gain a successful implementation.

The majority of cases appreciates the benefits of e-commerce implementation. However in case #8, where the implementation was initiated by government mandate, there was a strong belief that the e-commerce initiatives provided more benefits to the government than to the business community, which has been left with little choice but to comply with the requirements. While there was an initial reluctance to participate in such mandated initiatives, in the more recent developments, the case appreciated the benefits of such systems and the initiatives successfully obtained participation from business. Others [e.g., Wilkins, Swatman et al. 2001] also believe that such participation, after initial lack of enthusiasm, frequently became wholehearted over a period of time.

The majority of the cases also constantly suggested the need for continual reinvestment because of the rapidly changing technology and the slow uptake of the e-commerce initiatives. In the commercial organisations, these issues led to difficulties in terms of cost/benefit justification, while in the government organisations, they tended to be related to the appropriateness of spending at a certain time (such as during an election year).

“Justifying benefits in the short term is difficult...it is a long process”(case #5).

“At this stage, suppliers have made no specific demand for an automated system, although this feature is being developed”(case #3).

While there is no agreement on how businesses can speed up their adoption of e-commerce, a few cases suggested the involvement of the federal government to speed up the process, using such incentives as tax exemptions for e-commerce, or an industry-wide approach. Others were skeptical and believe that it is up to businesses to take the initiative in getting e-commerce off the ground.

Slow adoption of the initiative affected cost/benefit justification for the company implementing e-commerce. Companies in the cases overcame these issues through a variety of approaches. An

extreme approach taken by one company (case #1, a government agency) was to outsource its B2B e-commerce initiatives such as EDI. The organisation believed that outsourcing would reduce the cost of implementation and make it easier for the institution to justify the appropriate costs charged to its clients. One particular company (case #10) even decided not to proceed with its SME Internet-based initiative following the pilot implementation, because it was unable to justify the cost of labour and network supports for its suppliers. However, in general, the majority of case participants suggested focussing on improving the business processes within organisations because this is both easier to control and to manage.

VI. APPROACHES FOR B2B E-COMMERCE INITIATIVES – FROM OPTIMISTIC TO PRAGMATIC

As we analysed our cases on the basis of their initiatives, we categorised three types of approaches used by our case companies for e-commerce initiatives: optimistic, cautiously optimistic, and pragmatic.

A positive (or optimistic) attitude was found in two cases. One (case #2) is one of the country's largest government agencies. As it is of great importance to the public, its aim is to improve its services through the use of B2B e-commerce technologies, which are well supported by the government. The other case (case #4) is the company which started its implementation with Internet-based applications. This organisation became excited by the introduction of the WWW and generated three major initiatives. Both cases involve a very positive attitude and believe that even though their Internet-based initiatives do not yet deliver what they expected, they will see positive results in the longer term. Therefore, they are prepared to continue their leadership role in the e-commerce initiatives with which they are involved.

A cautiously optimistic attitude was found in five cases. Two cases (case #1 and case #3) are inter-related government organisations. Because of the amount of paperwork they handle, a cost-effective solution is the objective for their initiatives. EDI-related initiatives satisfied their needs. However, these organisations will need to move toward Internet-based technologies because of government policy and joint cooperation with other government agencies. Three other cases (case # 4, #5 and #7) were more cautious in adopting new Internet-based B2B. While they believe that the Internet will be the focus for their upcoming initiatives, they are uncertain when critical mass will be achieved. These cases experienced both traditional EDI and Internet-based B2B e-commerce and suggest that they are least satisfied with the benefits resulting from their Internet-based initiatives. Further, they continue to believe that the business community would not abandon traditional EDI as the Internet-based applications are "too clumsy" for detailed information exchange. Therefore, they intend to move to Internet/web capable gateways, which could accommodate both traditional EDI and Internet-based B2B (rather than replacing the traditional EDI systems with Internet-based systems). They would rather see what industry trends develop and what their trading partners' / clients' views and actions are before they make precipitate decisions.

A pragmatic attitude was found in three cases (case #6, #8 and #9). Two cases have obvious reasons for being pragmatic and not worrying about the technology – case 6, which has its e-commerce strategy planned by its European head office; and case 9, which implemented e-commerce because of government and industry requirements. The other case is quite interesting, because they believe that a pragmatic attitude is the only way to manage the technology. This organisation used to be extensively involved in industry initiatives, but decided to be more cautious about being involved than it was formerly, due to the uncertain direct benefits it receives. The organisation believes in its pragmatic approach and will only implement technology for immediate, measurable benefits (e.g., significant cost and time reductions in the delivery process) or inevitable/mandated reasons (e.g., government regulation or a request from a major customer).

VII. CONCLUSION

Regardless of the high expectations concerning the use of Internet-based B2B e-commerce in Australia, we found that the over-riding issue was its relatively slow adoption by almost all our case study participants. This "slow adoption" further confirms recent studies undertaken overseas [Pisanias and Wilcocks 1999] and within Australia [MacGregor 1996; MacGregor, Bunker et al. 1998; MacGregor, Bunker et al. 1999; Walsh and Philma-Enterprises 1999]. Additionally, three points arise from the previous discussions.

Understanding IS implementation is an enormous task, due to the complexity of the process. In this paper, we attempted to describe this complexity through case studies, which we believe to be the ideal method for such an issue. We suggested three dimensions for this process: growth process, change process, and integration process. The most crucial part in the change process is the last stage, which involves the diffusion and expansion of the system – and which decides whether the initiative is successful.

The factors identified influence the implementation process to various extents. The influence depends on the type of organisations involved and on their initiatives. For example in manufacturing and retail organisations, customer and supplier inter-relationships are crucial for the uptake of the initiative. In government organisations, by contrast, the issue of public concern and the associated political issues related to elections and party politics play important roles in the implementation process.

Another unanticipated result was that implementation costs associated with VAN-based EDI, as indicated by previous research (Section II), might not be the major barrier for SME implementation – two of the four cases implementing Internet-based e-commerce suggested that their Internet-based initiatives were not as successful as they expected, while two others were still waiting to see the results of their Internet-based initiatives. This finding suggests that the cheaper, Internet-based alternatives are themselves less than satisfactory in some way(s). Clearly, more research is needed to investigate this point.

Although all case participants believed that business must drive e-commerce implementation, in terms of the organisation's future approaches to B2B e-commerce initiatives, the firms' own experiences formed their attitude toward their next initiative. For example, those organisations involved with EDI implementations tended to compare their EDI initiative(s) with their Internet-based initiatives and were rather more cautious in their hopes for the future. By contrast, an organisation (case #4), with no prior EDI experience and just started its e-commerce activity through the Internet-based initiatives, was significantly more enthusiastic and confident in the system. It is clear, therefore, that a learning process occurs which shapes the organisation's attitude toward implementation.

Our multiple case studies thus confirmed our earlier findings (based on a single, in-depth case study) concerning the complexity of the e-commerce implementation process and the importance of non-technical factors (i.e., management and business) for the success of this process.

The major limitation of the present study relates to the generalisability of the research findings. The study involved only ten organisations in Australia. In two industries (financial and freight forwarding), only one organisation was involved. This focus on a single country and a limited number of cases is the major weakness of the study, as it tends to be for many multiple case analyses. A further limitation is our reliance on the information provided by the senior e-commerce officers in the organisations and the organisations' published documentation. This dependence on a sole source was not the situation with the single case, where data collected are believed to be more accurate due to the multiple data collection techniques employed. Nonetheless, the material gathered provides both substantial confirmation of the findings from the single case study, and a starting point for future research in this area – both within Australia and in other countries.

The project offers at least two primary strengths:

1. The overall study is longitudinal. The single case study involved two separate projects over a period of more than 8 years on a single organisation: the present research project, undertaken during 1997-2000 and an earlier project which focused on EDI [Swatman 1993]. Because the study was undertaken over such a long period of time, the transformation of driving forces between earlier systems and later systems could be observed. For example, the transformation of drivers from earlier systems implementation compared with the drivers which were found to be important/useful later in the process (i.e. the move from strategic to technological benefits or, indeed, vice versa).
2. The organisations involved in the multiple cases were carefully selected on the basis of their e-commerce maturity. This choice allowed a more detailed analysis of the cases rather than a snap shot measurement.

A further study, which investigates in detail the inter-relationships between each factor, identified in this study and the degree to which it affects the success of e-commerce implementation in various industries should now be undertaken to obtain a more detailed picture of the process. This study should perhaps be undertaken within a specific industry segment to enable a more focused understanding.

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APPENDIX I. INTERVIEW PROTOCOLS FOR MULTIPLE CASE STUDY

A. ABOUT YOUR COMPANY

1. What is your company's core business (ie. Manufacturing, banking, etc)?
2. How many people does your company employ?
3. What is your sales annual turnover during the past three years?
4. How many suppliers does your company have?
5. How many customers does your company have?

B. CURRENT USE OF E-COMMERCE APPLICATIONS

1. What type of E-commerce applications does your company use (e.g. EDI, EFT, Web based applications, etc)?
2. For what purposes do you use the E-commerce technologies and applications (eg. information sharing, purchasing, selling, others)?
3. What is your network connection/s (e.g. Own gateway, VAN, internet)? Please provide necessary information.
4. How many customers are involved in that type of E-commerce applications?
5. How many suppliers are involved?
6. Are there any other trading partners involve (e.g. Government, etc)?
7. What issues do you have to deal with the implementation (e.g. not enough trading partners, technology complexity, high cost of the technology, etc)?

C. THE PROCESS OF E-COMMERCE IMPLEMENTATION

1. When did you start using E-commerce applications?
2. What was the first application used (e.g. PC based EDI, database sharing, etc)?
3. Why did you do it (e.g. Suggested by suppliers, to become more efficient, everyone did it, competitive necessity)?

4. Who was the initiator (e.g. purchasing department, top manager, etc)?
5. How did you do your first implementation? (e.g. trial and error, assisted by suppliers, assisted by professionals, etc)
6. What difficulties did you experience during this time (e.g. lack of expertise, lack of understanding, technology complexity, high costs, C/B justification, changing culture, etc)?
7. What project/s has been following this implementation (e.g. bar-coding integration, internet based applications, etc)? How does it happen (e.g. benefits gained, etc)? or why did the project was followed by other implementation?
8. With each of those following projects, what problems did you have to manage and how did you do it?
9. What was the impact of these implementation (e.g. shorter lifecycle, better customer service, etc)?

Example:

The application	Impact	Issues arising
EDI	shorter order cycle from 10 days to 24 hours	Technological, standard, etc
Barcode	error reduction, etc	Technical, cost, etc
Internet EDI	increase no. of trading partners involved	Security, integration
Web EDI	better customer service	Integration

D. EVALUATION OF THE E-COMMERCE IMPLEMENTATION

1. How important is the E-commerce technology in the overall growth of the company? Provide figures if possible.
2. How important is the E-commerce to your suppliers? Customers? Others?
3. What is the overall impact of the E-commerce implementation? Are you happy with these results? Is it worth the efforts and the costs?
4. What lessons did you learn from the overall implementation (e.g. Different expectation of suppliers and customers, the technology was too complex, unwillingness of customers, cost associated should be justified, etc)?
5. Do you think the issues of implementing e-commerce are shifting from technology to management to business? Or you may have different theory based on your experiences.
6. What is the most important issue that you believe to be crucial in any implementation?

E. FUTURE USE AND EXPECTATION

1. Does the company intend to expand the use of E-commerce in the organisation? If so, how?
2. What are the main reasons for expanding the use of the applications (e.g. Growing confidence in the technology, enhancing customer service, strengthening contact with key trading partners, improving efficiency, etc).
3. What type of technologies and applications does your company intend to expand (can be supplied with the E-commerce business plan if you have one).

F. ABOUT THE INTERNET

1. Do you implement any Internet related applications? If yes, what are they and how do you integrate it with your previous systems. If not why?
2. What is the role of the Internet on the business to business e-commerce

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