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ICT Investment Evaluation Practices in Large Organizations

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INTRODUCTION

Business-to-business electronic commerce (B2BEC) represents the largest growth sector, that is, 80% of revenues—in e-commerce (Pires & Aisbett, 2003). IDC predicts that Australian B2BEC spending will grow at 70% annually and is likely to reach \$166.25 billion by 2006 (Pearce, 2002). ICT investments in B2BEC are used to assist in the interorganization acquisition of goods into the value chain and to provide interfaces between customers, vendors, suppliers, and sellers (Barua, Konana, & Whinston, 2004). Although B2BEC provides organizations a wealth of new opportunities and ways of doing business, it is extremely difficult to evaluate and therefore, have yet to prove enduring sources of profit (Laudon & Laudon, 2004).

Research studies and practitioner surveys report contradictory findings on the effect of the ICT expenditures on organizational productivity (Thatcher & Pingry, 2004). In particular, measurement of the business value of ICT investment has been the subject of considerable debate among academics and practitioners (Brynjolfsson & Hitt, 2003; Sugumaran & Arogyaswamy, 2004). Although some ICT productivity studies have produced inconclusive and negative results (Zhu, 2004), other research indicated that spending in ICT is directly related to organizational performance (e.g., Hu & Quan, 2005). Some researchers (e.g., Brynjolfsson & Hitt, 2003; Zhu, 2004) suggested that the confusion over ICT productivity is due to, among other things, the lack or inappropriate use of ICT evaluation and benefits realization methodologies or processes.

Given the complexity of the decisions and the large expenditure involved, determining the impact of ICT investment evaluation and benefits realization has been and will continue to be an important research concern for both researchers and senior managers. Therefore,

better understanding of the basis and practice of ICT investment evaluation in large Australian organizations is warranted. The objectives of this chapter are to undertake a study that attempts to: (1) investigate the current practices in managing ICT benefits and evaluation by large Australian organizations; and (2) determine the relationships between the levels of B2BEC support, B2BEC effectiveness, B2BEC resources, and the use of ICT investment evaluation and benefits realization methodologies or processes in large Australian organizations.

BACKGROUND

There appears to be no consistent evaluation and measurement of ICT investment by most organizations (Kim & Umanath, 2005; Lin, Lin, & Tsao, 2005a). Since the evaluation of these ICT investments is a complex tangle of financial, organizational, social, procedural and technical threads, many of which are currently either avoided or dealt with ineffectively (Torkzadeh & Dhillon, 2002). However, according to the 2003 SIM survey, measuring the value of ICT investment remains as one of the top five concerns for senior managers (Luftman & McLean, 2004).

Despite the fact that evaluation of ICT infrastructure in electronic commerce initiatives such as B2BEC has been shown to be critical to successful implementation, the major benefits organizations can gain from ICT investments are inherently qualitative and cannot be easily assessed beforehand and calculated in monetary terms (Lewis & Byrd, 2003). The problem becomes more evident as ICT is used to link the supply chain or to change the structure of industries, and costs and benefits have to be tracked across functional and organizational boundaries (McKay & Marshall, 2004).

This is because that the nature of electronic commerce technology makes it harder for organizations to allocate and assign costs and benefits to ICT projects, further blurring the lines of capital investment and return from ICT spending in the B2B channel (Kleist, 2003; Subramani, 2004; Tsao, Lin, & Lin, 2004). The less precisely bounded environment of B2B electronic commerce technology adds more complexity to the ICT measurement problem as this type of investment is physically distributed between suppliers and customers (Torkzadeh & Dhillon, 2002).

Moreover, many organizations have found that these ICT project costs and benefits can be difficult to estimate and control (Lin & Pervan, 2003; Love, Irani, Standing, Lin, & Burn, 2005). For instance, many organizations face a challenge of measuring and monitoring the performance of the specific contribution of inputs in generating outputs as well as its associated Internet channels (Kim & Umanath, 2005; Lin, Pervan, & McDermid, 2005b). Other less quantifiable items such as loyalty, trust, knowledge, relationships, value creation and customer satisfaction all makes the evaluation even more difficult (Straub, Rai, & Klein, 2004). Efforts to identify the relationships between the evaluation practices and the organizational constraints and benefits and to develop measures for B2B electronic commerce initiatives have been hindered by the lack of necessary conceptual bases (Torkzadeh & Dhillon, 2002).

For example, investigation by Sohal and Ng (1998) found that in large Australian organizations the potential of ICT has not been utilized to meet the competitive challenges due to inadequate and inappropriate appraisals/evaluation of the proposed ICT investment projects. Moreover, they reported that 45% of the responding organizations did not evaluate whether ICT systems were still consistent with business objectives and 59% did not determine whether expected benefits were being achieved. Some of the major problems associated with ICT investment evaluation are: (1) there is a lack of understanding of the impact of the proper ICT investments evaluation and benefits realization processes in most of the organizations (Ward & Daniel, 2006; Willcocks & Lester, 1997); (2) traditional financially oriented evaluation methods (e.g., ROI, NPV) can be problematic in measuring ICT investments and quantifying relevant benefits and costs (Bardhan, Bagchi, & Sougstad, 2004); (3) organizations often have neglected to devote appropriate evaluation time and effort to

ICT as well as to deal with the extended investment time frame (Stamoulis, Kanellis, & Martakos, 2002); (4) working with new technology introduces higher levels of risk, which affects timing, costs and delivery deadlines (Peacock & Tanniru, 2005); and (5) it is very difficult to evaluate intangibles and make relationship between ICT and profitability explicit (Murphy & Simon, 2002).

Furthermore, ICT investment evaluations alone are insufficient in terms of ensuring that the benefits identified and expected by organizations are realized and delivered (Ward & Daniel, 2006). This is because ICT is just one enabler of process change (Grover, Teng, Segar, & Fiedler, 1998) and it only enables or creates a capability to derive benefits. The essence of benefits realization process is to organize and manage so that the potential benefits arising from the use of ICT can actually be realized (Ward & Elvin, 1999). Benefits may be considered as the effect of the changes, the difference between the current and proposed way that work is done. Indeed, good management of organizational change is important to ensure successful ICT investment evaluation and benefits realization processes (Dhillon, 2005). Finally, effective use of ICT benefits realization processes also allows organizations to constantly focus on the planned ICT benefits and by making sure that ICT investments remain aligned with business goals as well as to make strategic adjustments in resources in a changing environment.

RESEARCH HYPOTHESES AND METHODOLOGIES

As mentioned earlier, the current practices of the Australian organizations to manage and evaluate their ICT investments and their ability to realize the benefits from these investments in an increasingly competitive market are of interests to the researchers and senior executives. Therefore, there is a pressing need for undertaking a survey research to investigate the relationship between the B2BEC and the use of ICT investment evaluation and benefits realization methodologies or processes. The following four hypotheses are proposed:

H1: Organizations with higher levels of usage of ICT investment evaluation methodologies will lead to higher levels of usage of ICT benefits realization processes.

H2: Organizations with higher levels of B2BEC benefits will lead to higher levels of usage of ICT investment evaluation methodologies.

H3: Organizations with higher levels of B2BEC resources will lead to higher levels of usage of ICT investment evaluation methodologies.

H4: Organizations with higher levels of B2BEC readiness will lead to higher levels of usage of ICT investment evaluation methodologies.

Questionnaires were sent to ICT managers/CIOs of 900 Australian organizations randomly selected from top 2000 Australian organizations (Dun and Bradstreet mailing list) in 2005. The survey was conducted to investigate many aspects of ICT investments evaluation and benefits realization practices in large Australian organizations. In total, 176 responses were received, representing a response rate of 19.6%. In addition, late returns were compared with other response received earlier in order to check for nonresponse bias (Armstrong & Overton, 1977). No significant differences were detected between two samples.

Respondents were asked to indicate their agreement on a 5-point scale (1 for strongly disagree and 5 for strongly agree) with statements concerning five main constructs: (1) B2BEC benefits; (2) B2BEC resources; (3) B2BEC readiness; (4) ICT investment evaluation methodology; and (5) ICT benefits realization process. The reliability analysis was conducted on these constructs (see Table 1).

Measurement items used in the *B2BEC effectiveness*, *B2BEC resources*, and *B2BEC support* scales were partly derived from scales used by Chan and Swatman (2000) and Eid, Trueman, and Ahmed (2002), and

the rest were created by the researcher. These scales measured the organizations' levels of B2BEC benefits, resources, and readiness.

The *ICT investment evaluation methodology and benefits realization process* scales were derived from Ward, Taylor, & Bond (1996). These scales measured the organizations' usage, wide use and effective use of ICT investment evaluation methodology and ICT benefits realization process.

DATA ANALYSIS AND RESULTS

In the following discussion of results the percentages referred to normally represent the proportion of valid (answered) cases only and did not indicate missing values. SPSS (v11) and LISREL VIII (Jöreskog & Sörbom, 1993) were used to analyze the data collected.

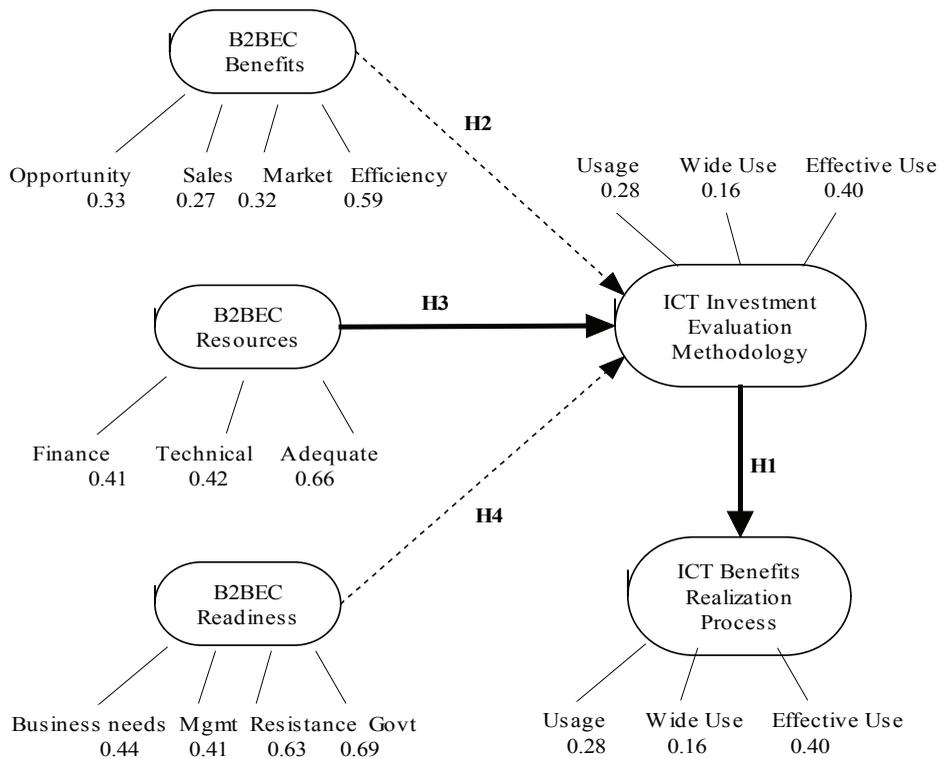
The results indicated a reasonably high adoption of methodologies for ICT investment evaluation (63.1%) and processes for ICT benefits realization (40.4%). In addition, respondents indicated that ICT investment evaluation methodologies were widely used (selected 4 or 5 out of a five-point scale ranging from “totally disagree” to “totally agree”) in only 50.5% of cases. However, this percentage is a lot higher than the surveys conducted in large Taiwanese organizations (22.6%) (Lin, Pervan, Lin, Tsao, 2004) and in large UK organizations (36%) (Ward et al., 1996). Moreover, respondents indicated that ICT benefits realization processes were widely used in only 28.1% of cases. This result is mostly consistent with findings of two SMEs Australian studies by Jensen (2003) and Marshall and McKay (2002) where the ICT benefits realization processes were not widely used by virtually all respondents.

LISREL VIII was then used to analyse the model shown in Figure 1. Each construct in the model was analysed separately and the fit of indicators to the construct as well as construct validity were evaluated to achieve a acceptable fit. The model achieved an acceptable level of fit: $\chi^2(222) = 485.86$, $p=0.000$, $RMSEA=0.083$, $GFI=0.804$, and $AGFI=0.756$. The analysis revealed that B2BEC benefits and B2BEC readiness did not have a significant and positive impact on the use of ICT investment evaluation methodology ($\beta = 0.06$, $t = 0.77$ and $\beta = -0.08$, $t = 78$, respectively). Therefore, **H2** and **H4** were rejected. However, the analysis indicated that the path from B2BEC resources to ICT investment evaluation methodology was positive

Table 1. Scale reliabilities for the five main constructs

Constructs	Scale reliability
B2BEC benefits	0.83
B2BEC resources	0.72
B2BEC readiness	0.69
ICT investment evaluation methodology	0.84
ICT benefits realization process	0.85

Figure 1. Structural equation model results



Note: All coefficients are standardized.
All solid line path coefficients are significant at $p < 0.05$. (The dotted line coefficient is non-significant.)

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and significant ($\beta = 0.30$, $t = 3.29$), suggesting that the provision of more B2BEC resources to the responding organizations had led to higher usage of ICT investment evaluation methodology. Furthermore, there was also a positive relationship between ICT investment evaluation methodology and ICT benefits realization process ($\beta = 0.81$, $t = 7.85$), indicating that the evaluation of B2BEC would lead to a higher level of ICT benefits realization activities by the responding organizations. Thus, **H1** and **H3** were supported.

DISCUSSION AND CONCLUSION

The results showed relatively high usage of ICT investment evaluation and benefits realization methodologies

or processes by large Australian organizations. However, these methodologies were generally not used widely and effectively within the responding organizations. Most ICT evaluations were carried out to ensure that the expected benefits/objectives were met and the quality of their ICT investments improved. In addition, the structure equation modeling (SEM) analysis revealed that there was a direct positive relationship between the use of ICT investment evaluation methodologies and benefits realization processes or activities.

Moreover, most respondents were not satisfied with their use of B2BEC. The results demonstrated that there was a significant positive relationship between the use of ICT investment evaluation methodologies and the B2BEC resources held by the respondents. However, it was also found that the level of B2BEC

effectiveness and supports did not have a significant relationship with the use of ICT investment evaluation methodologies.

Finally, this study took place at a particular point in time. Further research can be conducted to determine whether or not there are relationships between other factors related to the adoption of B2BEC (e.g., degree of satisfaction), the usage of ICT investment evaluation methodologies, and benefits realization processes or activities.

FUTURE TRENDS

More recent evidence suggests that many organizations simply got carried away with ICT and spent money unwisely in the last few decades. The future trend is that more successful organizations will analyze and evaluate their economics carefully and continue to explore new ICT applications in order to gain competitive advantage. These organizations will spend on only those ICT applications that would deliver productivity gains and evaluate their ICT investments carefully through a disciplined approach with innovative management practices.

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KEYWORDS

B2BEC: Business-to-business electronic commerce. Business conducted through the Internet between companies.

Benefits Realization: It is a managed and controlled process of making sure that desired business changes and benefits have been clearly defined, are measurable, and ultimately to ensure that the changes and benefits are actually realized and delivered.

Electronic Commerce: The paperless exchange of business information using the Web and related technologies in business.

ICT Benefits Realization Processes: Approaches that are used to ensure that benefits expected in the ICT investments by organizations are achieved.

ICT Investment Evaluation Methodologies: Approaches that are used to evaluate organizations' ICT investments.

ICT Productivity Paradox: Despite large investments in ICT over many years, there have been conflicting studies as to whether or not the ICT benefits have actually occurred.

Investment Evaluation: This is the weighing up process to rationally assess the value of any acquisition of software or hardware which is expected to improve business value of an organization's information communication systems.