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IS/IT Investment Evaluation and Benefit Realization Practices in Taiwanese SMEs

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Abstract

This paper investigates the practices of IS/IT benefits and evaluation, critical success factors and the degree of satisfaction with the adoption of IS/IT investments in business-to-business electronic commerce (B2B-EC) by the small and medium-size enterprise (SME) sector in an emerging economy - Taiwan. The survey reveals that the respondents had relatively high usage of IS/IT investment evaluation methodology and low usage of IS/IT benefits realization approaches. In addition, these methodologies or approaches were generally not used widely and effectively within these organizations. Moreover, only a quarter of the respondents were satisfied with their IS/IT investments in B2B-EC. The internal factors which consist of lack of staff resistance, organizational readiness, integrating internet with marketing strategy, and top management support were found to be the critical success factors for the IS/IT investments in B2B-EC by SMEs in Taiwan.

Keywords: IT investment evaluation, emerging economy, e-commerce, SMEs, IT benefits realization

Introduction

Information systems/information technology (IS/IT) is a large investment, with the average organization spending more than 4.2% of annual revenue on IS/IT (Gormoloski et al., 2001). Gartner estimates that global IS/IT spending will rise from US$2.04 trillion in 2001 to $2.53 trillion in 2006 (De Souza et al., 2003). In Taiwan, an emerging economy, the total IS/IT spending in 2001 was US$6.6 billion, up from US$2.7 billion in 1993 (MAIT, 2002).

However, despite the increased spending on IS/IT and the plethora of IS/IT evaluation and benefits realization research undertaken, many managers still do not understand the importance of the IS/IT investment evaluation and benefits realization processes (Lin et al., 2005; Roztocki and Weistroffer, 2004), especially in SMEs (Love et al., 2005). Although the topic has been well researched in general, very little published work has been conducted in Eastern and Central Europe, Africa, the Middle East, Central and South America, and South and East Asia (e.g. Taiwan) (Roztocki et al., 2004). Most of the existing studies on IS/IT investment evaluation and benefits realization have been carried out in developed countries such as UK, USA or Australia (e.g. Lin and Pervan, 2003; Norris, 1996; Ward et al., 1996). Studies carried out in these countries may produce unexpected results (Navarrete and Pick, 2003b). Thus, one significant aspect of this research is to better understand the current trends in the effective utilization and evaluation of IS/IT in an emerging economy - Taiwan.

Furthermore, the SME sector is of enormous importance in the economy of Taiwan, comprising as it does more than 98.06% of non-agricultural business establishments, employing 78.43% of the workforce, and generating 30% of the total value added (SMEA, 2001). While other countries' SMEs still focus on the domestic market, Taiwanese SMEs have been involved

in global competition (Wu and Huang, 2003). Therefore, enhancement of SMEs' competitiveness is always the major issue in Taiwan (Huang 1999). To this end, the research objectives are to: (1) examine current practices and norms in managing IS/IT benefits and evaluation by Taiwanese SMEs; (2) investigate the usage of the IS/IT investment evaluation and benefits realization methodologies or approaches by SMEs in Taiwan; and (3) examine the critical success factors and the degree of satisfaction with the IS/IT investments in B2B-EC by Taiwanese SMEs.

IS/IT Investment Evaluation

IS/IT managers have found it increasingly difficult to justify expansion in IS/IT spending (Counihan et al., 2002). They are under increasing pressure to find a way to measure the contribution of their organizations' IS/IT investments to business performance, as well as to find reliable ways to ensure that the business benefits from IS/IT investments are actually realized (Lin and Pervan, 2003; Smith et al., 2004). This can be due to a lack of understanding of the impact of the proper IS/IT investment evaluation and benefits realization processes in most of the organizations (Roztocki and Weistroffer, 2004; Zhu et al., 2004). Organizations seeking value for money in IS/IT investments have spent a lot of energy, time and money that has largely gone to waste (Farbey et al., 1999).

This problem has become more complex due to unpredictable changes in the social, political, and economic infrastructure (Roztocki and Weistroffer, 2004). For example, to-date the research has delivered contradictory findings on the effect of IS/IT expenditures on organizational productivity (Thatcher & Pingry, 2004). Although some IS/IT productivity studies have produced inconclusive and negative results, or the interpretation of results may depend on many factors (e.g. Stratopoulos & Dehning, 2000), a number of researchers have indicated that IS/IT spending is directly related to organizational performance (e.g. Brynjolfsson and Hitt, 2003; Navarrete and Pick, 2003a) with effective leverage and evaluation of IS/IT investments in e-commerce resulting in improved organizational performance (Melville et al., 2004).

IS/IT Investment Evaluation in SMEs

There is some evidence that the IT adoption has directly or indirectly motivated IS/IT investments in SMEs (Marshall and McKay, 2002). According to Lee and Runge (2001), SMEs that evaluate their IS/IT adoption and investments are better able to exploit the Internet's potential for their organization, and thus create short-term competitive advantages. However, very few recent studies of IS/IT evaluation in SMEs exist and most of these studies were carried out in developed countries (see Appendix 1). Most of the studies carried out indicate that a lack of strategic vision for evaluation as

well as limited access to capital resources are the two inhibitors for SMEs to undertake IS/IT investment evaluation (eg. Ballantine et al., 1998; Hilam and Edwards, 2001). Latinen (2002) argues that employee motivation, customer satisfaction and organizational financial position should be considered in the evaluation processes for SMEs. However, several research studies indicate that most SMEs rely on ad hoc evaluation approaches (e.g. gut feeling or intuition) or useful but less formal approaches (e.g. simple NPV or cost/benefit analysis) and hence, not surprisingly, most SMEs were not satisfied with their evaluation practices (Jensen, 2003; Love et al., 2005; Marshall and McKay, 2002).

IS/IT Benefits Realization

While pre-investment appraisal and post-implementation review are important for evaluation purposes, they are still insufficient in terms of ensuring that the benefits required are realized and delivered to the organization (Ward and Griffiths, 1996). According to Ward et al. (1996, p215), the essence of benefits realization is "not to make good forecasts but to make them come true..... and IS/IT on its own does not deliver benefits." Benefits realization comprises of a range of management activities designed to ensure that an organization realized the benefits it plans to achieve from an IT investments (Farbey et al., 1999; Lin et al., 2005). Benefits may be considered as the effect of the changes, i.e. management of changes - the difference between the current and proposed way that work is done (Ward and Griffiths, 1996). Earl (1992) has also taken the view that benefits are associated with business change and not the technology itself. Things only get better when people start doing things differently.

However, assessing the effective delivery of useful benefits from these services to the business is very difficult. For example, a survey by Seddon et al. (2002) indicates identifying and measuring benefits as the most difficult issue in evaluating IS/IT. Another survey by PriceWaterhouseCoopers (2003) found that organizations achieved expected benefits only 25-75% of the time.

Some of the methodologies for realizing IS/IT investment benefits published in the literature are:

- Cranfield Process Model of Benefits Management (Ward et al., 1996).
- Active Benefit Realization (ABR) (Remenyi et al., 1997).
- DMR's Benefit Realization Model (Truax, 1997): This is a proprietary benefits realization methodology developed by a multinational business consulting firm, DMR Consulting. This model involves a long-term, sustained change effort in how organizations think, manage and act.
- Model of Benefits Identification (Changchit et al., 1998).
- The IT Benefits Measurement Process (Andresen et al., 2000).

IS/IT Investment Evaluation in B2B-EC

According to Subramani and Walden (2000, p230), B2B-EC is an EC initiative which requires the participation of multiple firms and the idea is to form a close relationship that will make some sort of complementary investments to enable one another's EC strategy. Although the effective leverage and evaluation of IS/IT investments in B2B-EC can result in improved organizational performance (Melville et al., 2004; Subramani and Walden, 2000), there is little doubt that the less precisely bounded environment of B2B-EC technology adds more complexity to the IS/IT measurement problem as this type of IS/IT investments is physically distributed between suppliers and vendors, making the evaluation process even more difficult (Kleist, 2003). The problem becomes more evident as IS/IT is used to link the supply chain or to change the structure of industries, since costs and benefits have to be tracked across functional and organizational boundaries (McKay and Marshall, 2004). Moreover, less quantifiable items such as loyalty, trust, knowledge, brand awareness, relationships, the boundaries of interorganizational networks and customer satisfaction all make the evaluation even more difficult (Barua et al., 2004; Kleist, 2003).

Critical Success Factors for the Adoption of IS/IT Investments in B2B-EC

In addition to investigating the processes of IS/IT investment evaluation and benefits realization, it is also important to identify those factors that are most critical to B2B-EC success. According to Butler and Fitzgerald (1999), critical success factors (CSFs) are the functions or areas where things must go right to ensure successful competitive performance for an organization. Several ways of identifying such factors or determinants are in use, including analysis of industrial structure, scanning of environments, industrial expert opinion, best practice analysis, analysis of competitors, assessing the internal feeling or judgment of companies, and data gathering about profit impact on market strategy (Leidecker and Bruno, 1984). The literature furnishes many attempts at critical factor identification. For example, Eid et al. (2002) list twenty-one and classify them into five categories: marketing strategy, web site, global, internal, and external. Wirtz and Kam (2001) and Paulson (1993) identify fifteen and classify them into four categories: marketing strategy, internal, information technology, and governmental support. For the purpose of this study, six major factors that are critical to the successful adoption of B2B-EC (Chan and Swatman, 2000; Eid et al., 2002; Paulson, 1993; Wirtz and Kam, 2001) are:

- Integrating Internet with marketing strategy.
- Top management support.
- Organizational readiness.
- IS/IT investment evaluation and benefits realization.

- Staff resistance.
- Governmental support.

Research Methodologies and Design

SMEs have been typically defined by the number of people they employ (Chau, 1994; Fink, 1998; Love et al., 2005). In this study, the authors have used the official Taiwanese definition of SMEs as employing less than 200 people (SMEA, 2003).

The survey method was adopted to obtain an overview of IS/IT investment and benefits management processes and practices in Taiwanese SMEs. Survey was chosen because it has the advantage of being able to focus on problem solving and pursue a step-by-step logical, organized, and rigorous method to identify problems, gather data, analyze the data, and draw valid conclusions (Sekaran, 1984).

The first two parts of the questionnaire (questions 1-17 in Appendix 2) were based on previously validated questionnaires by Ward et al. (1996) and Ramaseshan et al. (2003). Some of the items in the third part of the questionnaire (question 18 in Appendix 2) were taken from previous studies (e.g. Chan and Swatman, 2000; Eid et al., 2002; Thatcher and Foster, 2002) and the rest were created by the researchers. Since most of the items were included from instruments used in previous studies in English, it was critical to ensure that a systematic approach was taken to develop the research instrument. The initial draft questionnaire was first assessed for cultural compatibility for a Taiwanese sample. In particular, we focused on the relevance of concepts and terms used (Douglas and Craig, 1983). To ensure translation equivalence, one bilingual person translated the questionnaire back into Chinese, and a second person translated it into English (Bhalla and Lin, 1987; Douglas & Craig, 1983). The original and backward-translated versions were compared for conceptual equivalence, and the Chinese translation was refined when necessary.

This survey, undertaken from March 2004 to September 2004, targeted Taiwanese SMEs involved in B2B-EC activities. Prior to determining the sample size for the survey, a pilot survey of IT managers/CIOs of 12 SMEs was conducted. The comments about the questionnaire were very positive. Therefore, no further major changes were made to the questionnaire. For the main survey, 400 SMEs were randomly selected from a list published by a private human resources organization, the 104 Company Information Centre (104Info, 2003). One hundred and one responses were received, representing a response rate of 25.3%. Late returns were compared with the responses received earlier in order to check for non-response bias. No significant differences were detected between two samples (Armstrong and Overton, 1977).

Measurement

For the third part of the questionnaire (question 18 in Appendix 2), respondents were asked to indicate their agreement on a 5-point scale (1 for totally disagree and 5 for totally agree) with statements concerning six main constructs: (1) integrating internet with marketing strategy (q18a-b); (2) top management support (q18c-d); (3) government support (q18e-f); (4) IS/IT investment evaluation and benefits realization (q18g-h); (5) staff resistance (q18i-j); and (6) organizational readiness (q18k-m). The reliability analysis was conducted on these six main constructs (see Table 1).

The *integrating internet with marketing strategy* scale was derived from Chan and Swatman (2002) and Eid et al. (2002). The scale has two items and the alpha value for this scale is 0.78, indicating acceptable values of internal consistency (Nunally, 1978). According to Eid et al. (2002) and Ramaseshan et al. (2003), integrating the Internet with a clear marketing strategy is an important factor for successful implementation of B2B-EC. Successful SMEs are those who build systems that can integrate and interact easily with existing Internet or applications and serve the needs of the suppliers and customers (Chan and Swatman, 2002; Jennex et al., 2004). This scale measured the data transferability among internal B2B-EC systems and the ease of interaction among the companies, suppliers and customers.

Table 1: Scale reliabilities for the six main constructs

Constructs	**Scale reliability**
Integrating internet with marketing strategy	0.78
Top management support	0.86
Government support	0.73
IS/IT investment evaluation and benefits realization	0.90
Staff resistance	0.80
Organizational readiness	0.72

The *top management support* scale was derived from Eid et al. (2002), Hope et al. (2001), Paulson (1993), and Soliman and Janz (2004). This two-item scale has the alpha value of 0.86. According to Hope et al. (2001) and Soliman and Janz (2004), top management support is a key factor for successful implementation of B2B-EC. According to Eid et al. (2002), there appears to be a positive correlation between the financial support given by top management and the revenue received by the company. This scale measured the managerial and financial support given by the top management to the adoption of B2B-EC systems.

The *government support* scale was derived from scales used by Jennex et al. (2004) and Thatcher and Foster (2002). The alpha value for this scale

is 0.73. According to Jennex et al. (2004), government support can play a major role in the B2B-EC adoption decision in companies. According to Thatcher and Foster (2002), the extent of government intervention and assistance (e.g. education, financial and human resources) can affect the implementation of B2B-EC systems in Taiwan. This two-item scale measured the education and financial support offered by the Government.

The *IS/IT investment evaluation and benefits realization* scales were derived from Marshall and Mckay (2002) and Ward et al. (1996). The alpha value for this scale is 0.90. The scale measured the use of IS/IT investment evaluation methodology (IEM) and IS/IT benefits realization methodology (BRM) by organizations seeking to adopt B2B-EC. IEM concerns with making investment decisions and monitoring the performance of the IS/IT projects whereas BRM ensures benefits are delivered once a decision to invest has been taken.

The *staff resistance* scale was derived from scales used by Lawrence (1997) and Slade and Van Akkeren (2001). The alpha value for this scale is 0.80. According to Lawrence (1997) and Slade and Van Akkeren (2001), staff resistance to change can affect the successful implementation of B2B-EC in Australian SMEs. This two-item scale measured the staff resistance to change and staff motivation and interest in the implementation and use of B2B-EC.

The *organizational readiness* scale was derived from Bui et al. (2002), Iacovou et al. (1995), and Jennex et al. (2004). The scale has three items and the alpha value for this scale is 0.72, indicating acceptable values of internal consistency (Nunally, 1978). According to Bui et al. (2002) organizational readiness in B2B-EC is the aptitude of an organization to use Internet-based computers and information technologies to migrate traditional businesses into the new market, a market that is characterized by the ability to perform business transactions in real-time – any form, anywhere, anytime, and at any price. In addition, there is a definite and positive correlation between the performance of an organization and its readiness to use B2B-EC to leverage competitiveness (Bui et al., 2002; Iacovou et al., 1995). This scale measured the data transferability among internal B2B-EC systems and the ease of interaction among the companies, suppliers and customers.

Results and Discussion

SPSS was deployed to analyze the quantitative data collected through the survey. A number of general descriptive methods and tools were used to summarize and analyze patterns in the responses of people in a sample. One-Way ANOVA was also used to test that several independent groups came from populations with the same mean. For example, it was used to test whether the organizational type was the same for responding organizations which had implemented two different methodologies. In the following discussion of results the percentages referred to normally

represented the proportion of valid (answered) cases only and did not indicate missing values.

Most responding organizations were from manufacturing (50.5%), services (29.7%) and information communication technology (14%) sectors. About 40% had fewer than 50 employees, 29% between 51 and 150, and 40% between 151 and 199. The average annual net revenue was about US$65.3 million but the average annual spending on IS/IT-related investments (e.g. B2B-EC) was only US$0.1 million. The annual spending on IS/IT-related investments was highly correlated with the organizational size in terms of number of employees (0.602).

The ANOVA revealed that firm size in terms of number of employees did not significantly vary with net revenue and the spending on IS/IT-related investments, but significant differences were found between net revenue and the spending on IS/IT-related investments ($p < 0.00$). The results from this study and other similar studies were summarized in Table 2.

Table 2: Summary of findings from this study and other similar studies

Questions	**This Study**	**Love et al. (2005)**	**Lin & Pervan (2003)**	**Ward et al. (1996)**	**Willcocks (1992)**
Response rate/ responses	25.3%/101 Taiwanese SMEs	52.0%/130 Australian SMEs	13.8%/69 Lrg Australian Organizations	24%/60 Large UK Organizations	?/50 UK Organizations
Usage of: • IEM • BRM	 41.6% 42.6%	 67.7% –	 65.7% 32.8%	 60% 12%	 >50% –
Wide use of: • IEM • BRM	 18.8% 20.8%	 – –	 54.5% 22.7%	 36% –	 – –
Effective use of: • IEM • BRM	 22.7% 21.8%	 – –	 – –	 – –	 – –
IEM used	1. ROI 2. NPV 3. PP*	1. PP* 2. PW** 3. ROI	1. NPV 2. ROI	1. CBA*** 2. ROI	CBA***
% of respondents mentioned formally recognised IS/IT evaluation methods/ techniques	51.0%	–	54.0%	<50%	–
Linkage between IS/IT projects and business objectives	54.8%	–	87.7%	–	–
Intangible benefits included in the project appraisal process	48.8%	–	–	73%	–

Overstated the benefits in order to get approval	48.2%	–	26.2%	47%	
Prepared a benefits delivery plan	52.4%	45%	43.0%	27%	–
Conducted post-implementation reviews	48.8%	–	77.3%	72%	–
Had a formal process to ensure that lessons were learned	41.7%	–	52.3%	29%	44.0%
Had a formal process to identify and realize any further benefits after implementation	52.4%	–	18.2%	19%	–

* Packback period
** Present worth
*** Cost/benefit analysis

IS/IT investment evaluation and benefits realization

Respondents were asked about adoption, usage and success with formal IS/IT investment evaluation (IEM) and benefits realization (BRM) methodologies or approaches for various IS/IT activities. Compared to other studies, the survey results revealed a low usage of IS/IT investment evaluation methodology (41.6%) and a relatively high adoption of IS/IT benefits realization approach (42.6%).

The result is interesting when compared with other studies carried out in Australia and the UK (see Table 2). It indicates that while the usage of IEM by Taiwanese organizations is lower than organizations in Australia and the UK, the usage of BRM is quite high among the responding organizations in Taiwan.

However, respondents indicated that investment evaluation methodology was widely used (selected 4 or 5 out of a five-point scale ranging from “not at all” to “extensively”) in only 18.8% of cases. The percentage is significantly lower than the surveys conducted in large Australian organizations (54.5%) and in large UK organizations (36%). According to Hudson et al. (2001), the evaluation process is simply too resources intensive and too strategic oriented for SMEs to handle. SMEs generally resorted to ad hoc approaches to evaluate their proposed IS/IT investments (Marshall and McKay, 2002).

Similarly, respondents indicated that benefits realization approach was widely used in only 20.8% of cases. This result is consistent with findings by Lin and Pervan (2003) in their large Australian organizations where only 22.7% of respondents had widely used, and two Australian SMEs studies by Jensen (2003) and Marshall and McKay (2002) where the approach was not

widely used by virtually all respondents.

In terms of effectiveness of those methodologies or approaches in ensuring successful information systems, respondents who had methodologies or approaches indicated that investment evaluation and benefits realization were effective (4 or 5 out of a five-point scale) in only 22.7%, and 21.8% of cases, respectively. This is not really surprising given that SMEs normally do not carry out post-implementation reviews to determine whether or not the methodologies or approaches were used effectively (Marshall and McKay, 2002).

Overall, the IEM and BRM were neither effective in ensuring successful information systems nor they were widely used. The correlation test revealed that the employee size did not determine the usage of both IEM and BRM but had a great influence on the wide and effective use of these two methodologies.

The correlation test also revealed that larger organizations were more likely to use IEM and BRM than their smaller counterparts. Moreover, these methodologies or approaches were more likely to be used widely and effectively by larger organizations than the smaller organizations.

In addition, the level of usage of IS/IT investment evaluation methodology and IS/IT benefits realization approach by respondents were significantly correlated ($p=0.817$). Of those who had a BRM, 90.5% also practiced a formal IS/IT investment evaluation methodology. This is consistent with the survey by Lin and Pervan (2003) in which 81.8% of organizations which had a benefits realization approach also used a IS/IT investment evaluation methodology.

Finally, the traditional financially oriented evaluation techniques such as net present value (NPV) and return on investments (ROI) were still the most commonly mentioned appraisal techniques by the respondents of this survey for deciding upon IS/IT investments. Payback period (PP) was another popular technique. Many responding organizations employed more than one technique or method (51%) and less than half of the respondents (40%) mentioned formally recognized techniques such as ROI, NPV, payback period, internal rate of return (IRR), or discounted cash flow. These results are generally consistent with findings by Ballantine and Stray (1998) and Ward et al. (1996). In addition, most respondents failed to indicate what IS/IT benefits realization approaches were used. Again, cost/benefit analysis tools such as NPV and ROI were the most mentioned BRM used by the respondents.

Identifying and structuring benefits

Alignment with stated organizational objectives has a key bearing on how IS/IT investments are organized and conducted, and the priorities that are assigned to different IS/IT investment proposals. However, only 54.8% of respondents' IS/IT projects were linked to the business objectives (87.7% in Lin and Pervan (2003)). Of those who had linked the IS/IT projects to the business objectives, nearly one third of them (28.3%) failed to adopt either

an IEM or a BRM. This should be a real concern for senior management as these IS/IT projects would not assist the organizations in achieving their strategic objectives. They would simply be a waste of organizational resources.

Intangible benefits are often critical to an organization's operation and efficiency (Norris 1996). However, they are usually omitted from evaluation studies, because they cannot be quantified or justified by traditional financial evaluation techniques (Apostolopoulos and Pramataris 1997). Not surprisingly, less than half of the respondents (48.8%) indicated that they had included intangible benefits in their IS/IT project appraisal process. Of those who had included intangible benefits, a significant portion (24.4%) did not use either an IEM or a BRM. It would be interesting to know how they included intangible benefits in their appraisal process without using these methodologies.

Interestingly, in 48.2% of cases, the respondents openly admitted that their current process actually overstated the benefits in order to get approval. This seemed to imply that while benefits claimed were likely to be quantified and realized in practice, the process itself placed significant emphasis on getting project approval than on delivering on proposed benefits. The result also appeared to indicate that the use of either an IEM or a BRM made it more difficult to overstate the benefits.

Planning, delivering, and evaluating benefits

Over half of respondents (52.4%) claimed that their organization prepared a benefits delivery plan. Surprisingly, of those who claimed to prepare a benefits delivery plan 29.5% did so without using a BRM. Without such a plan, it was difficult to envisage how an organization might effectively realize business benefits.

Moreover, almost half of respondents (48.8%) held formal reviews of activities associated with delivering IS/IT benefits. Furthermore, of those who held formal reviews of benefits delivery, 65% of them felt that their benefits were overstated. This result is not inconsistent with a survey carried out by Sohal and Ng (1998) where 59% of the respondents did not determine whether expected benefits were being achieved during post-implementation reviews. The implication of these findings is that the objectives of post-implementation reviews are by no means clear, and that the objective in many cases is not the review of actual benefits delivery. A possible explanation is provided by Kumar (1990), who found that in the majority of cases the primary objective of a post-implementation review is not project improvement but to formally close out the IS/IT project.

A significant number of respondents (41.7%) did not have a formal process to learn from their past mistakes and this is consistent with findings from Willcocks (1992) in which 44% of their respondents admitted not to have learned from their mistakes. It was unclear whether or not those that did not learn from past implementations could ever improve their

implementation processes. This is explained by Kumar (1990) who concludes that current practices may not provide the more important long term feedback improvement benefits of the evaluation process.

Potential for further benefits

Taking the sample as a whole, 52.4% of the respondents claimed to have a process for identifying further benefits after implementation. This is not consistent with findings by Lin and Pervan (2003) and Ward et al. (1996) in which 18.2% and 19% of the respondents claimed to have a formal process to identify any further benefits after implementation and took action to realize them, respectively. The higher level could be due to the relatively high usage of BRM (42.6%) among the Taiwanese SMEs.

Critical success factors and degree of satisfaction with the IS/IT investments in B2B-EC

Most respondents indicated that internal factors such as lack of staff resistance (64.3%), organizational readiness (59.6%), integrating internet with marketing strategy (51.1%), and top management support (60.3%) were critical success factors for successful adoption of IS/IT investments in B2B-EC. However, the other internal factor, IS/IT investment evaluation and benefits realization, was seen by respondents as critical to the adoption of B2B-EC in only 29.1% of cases. The result was consistent with the above finding that IEM and BRM were not widely and effectively used by the respondents. The only external factor that was included in this study, governmental support (19.0%), was not seen as important factors for the adoption of IS/IT investments in B2B-EC by Taiwanese SMEs. The results may reflect the difficulties faced by SMEs in their IS/IT investment evaluation (Love et al., 2005) as well as in seeking assistance from the government (Chen, 2003).

In addition, Table 3 summarizes the results regarding the degree of satisfaction and benefits with the adoption of B2B-EC.

Table 3: Degree of Satisfaction and Benefits with the Adoption of B2B-EC

Questions	**% agreement**
Your company is satisfied with the use of B2B-EC in the business	25%
B2B-EC has enhanced the corporate image of your company	43%
B2B-EC has helped established stronger link with your sellers/buyers	40%
B2B-EC has helped your company to develop new business opportunities	40%
B2B-EC has helped to reduce costs	41%
B2B-EC has helped increase sales in your company	34%
B2B-EC has enlarged market share of your company	29%

The ANOVA indicated that significant differences were found between the degree of satisfaction with the adoption of B2B-EC and the spending on IS/IT-related investments ($p < 0.03$). This suggested that the B2B-EC satisfaction was influenced by the amount of spending on IS/IT-related investments. Furthermore, the ANOVA revealed that the degree of satisfaction with the adoption of B2B-EC and all six benefits of using B2B-EC (eg. increased sales) did significantly vary with the use of IEM, but not with the use of BRM. This indicated that the use of IEM (not BRM) had a positive impact on the B2B-EC satisfaction and perceived benefits of using B2B-EC by Taiwanese SMEs.

A correlation analysis showed that the degree of satisfaction with the usage of B2B-EC were significantly correlated with all six benefits of using B2B-EC (eg. the development of new business opportunities and the establishment of stronger link with seller/buyer). The results here are consistent with the finding by Chen (2003) that Taiwan's B2B-EC has been driven largely by the competitive pressure and the need to respond to the new market opportunities in order to protect their position in global trade. In addition, the results are also consistent with a government survey in Taiwan that showed more than 54% of responding organizations were mainly interested in using B2B-EC to explore new marketing opportunities as well as to broaden their customer base (Chen, 2003).

Conclusions and implications

This paper has examined the IS/IT investment evaluation and benefits realization practices of Taiwanese SMEs. To date, there has not been much research undertaken in this particular area in Taiwan, so the findings presented should provide the impetus for organizations to re-consider their approaches to IS/IT investment evaluation and benefits realization. The inherent difficulties in identifying and assessing IS/IT investments are often a cause for uncertainty about the expected impact the investments might have on the business. As a result, it is all too easy for businesses and management to ignore the evaluation of their IS/IT investments. Comparing with other similar studies, the results from this survey on Taiwanese SMEs show relatively low usage of IS/IT investment evaluation methodology and relatively high adoption of benefits realization methodology or approach. In addition, these methodologies or approaches were generally not used widely and effectively within the responding organizations. Moreover, most respondents were not satisfied with their adoption of IS/IT investments in B2B-EC applications. The results of this study also demonstrate that for the SME sector in Taiwan the key elements of success in adopting IS/IT-related projects such as B2B-EC are the internal factors. The potential benefits of IS/IT investments in B2B-EC vary according to how companies define success. Some can leverage B2B-EC to reduce operating costs, to increase transactions, or to develop new markets. Others are more intent on aligning its use with their marketing strategy objectives. However, B2B-EC is not just

a technological aid, but also a tool for fulfilling marketing strategy. For those with a decision to make over IS/IT investment justification and B2B-EC adoption, the evaluation of IS/IT investments and benefits realization processes alone are not sufficient guarantees of success. Rather, the key is integration of B2B-EC with critical success factors and marketing strategies in line with company values and beliefs.

The IS/IT investment in B2B-EC is not just technological gimmickry; it is in fact a whole new way of doing business that replaces traditional models. It not only brings increases operational efficiency and effectiveness, but also a chance to re-engineer the business process. However, its benefits cannot be delivered without taking into account the internal factors and the processes of IS/IT investment evaluation and benefits realization. To obtain the most from the exercise, companies must undergo a process of benchmarking (i.e., benefits, costs and risks) to re-examine their underlying internal business practices. This will ensure that they are aligned to deliver customer value. A strategy that elevates the importance of IS/IT in supporting mission-critical business processes is required of all companies if they are to improve their performance as well as that of the overall industry. Based on our findings we recommend that SMEs should focus on making IS/IT, and the use of other technologies such B2B-EC applications, an integral part of their business strategy. In addition, SMEs should conduct an assessment of the IS/IT available to the organization so that features and costs can be readily identified. Moreover, SMEs should also develop an expected IS/IT benefits and costs management plan as well as determine if sufficient IS/IT benefits exist and if organizational culture is supportive of adopting IS/IT and other technologies.

A recent article entitled “IT Doesn’t Matter” has argued that IT has become a commodity because it has become widespread, as happened to other innovations such as engines and telephones (Carr, 2003). According to Carr (2003), IT has become an infrastructure technology and therefore is often subject to over-investments and may cause economic troubles such as the “Internet Bubble”. However, Carr’s (2003) views on IT are not shared by most IT practitioners and academics who argue that IT still has a lot to offer in the future and can deliver competitive advantages to organizations (Strassmann, 2003; Vandenbosch and Lyytinen, 2004). The authors predict that more successful Taiwanese SMEs would analyze their economics and assess their benefits and costs of IS/IT investments carefully, and spend on only those IS/IT applications that would deliver productivity gains.

Finally, the authors acknowledge that this study has certain limitations. With regard to the questionnaire, the views expressed may be confined to the individual in the organization who happened to be the respondent, and it is more than likely that only respondents interested in the research topic took the trouble to reply. Those replying may be more likely to carry out evaluation and be satisfied with their evaluation processes than the average non-respondent. Furthermore, our study took place at a particular point in time. Most enterprises are grappling with a range of issues covering a lack

of management commitment or direction, IS/IT benefits realization, security, costs, and technology. Further research could be conducted to capture opinions of benefits realization and investment evaluation at various phases of an IS/IT project life cycle and also in terms of their IT maturity. Alternatively, future research can be also conducted to look at the long-term effectiveness of IS/IT and the wide scope of IS/IT impact as well as to investigate the required input parameters for evaluation of the benefits of IS/IT investments. As mentioned earlier, it will also be interesting to find out how SMEs included intangible benefits in their IS/IT investment evaluation process without using any of the formal evaluation methodologies or benefits realization plans. Finally, future research can also be conducted to look at the reasons many Taiwanese SMES did not evaluate IS/IT investments.

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Appendix 1: IS/IT evaluation studies in SMEs

Articles	Country	No. of participants	Research method	Key findings
Ballantine, Levy and Powell (1998)	UK	4 SMEs	Case study	Factors for evaluation practices: • A lack of business & IS/IT strategy • Limited access to capital resources • An emphasis on automating (improving efficiency) • The influence of major customers • Limited information skills
Dans (2001)	Spain	441 SMEs	Telephone interviews	• There is a positive relationship between IT investments and productivity • The output contribution of IT investments is significant and positive
Hillam & Edwards (2001)	UK	1SME	Case study	• There is a strong linkage between the identified company strategy & the attitude of the company to IS/IT investments & the type of investments undertaken • Company strategy typology will influence the type of IS/IT implemented & the justification for this investments
Hudson, Smart & Bourne (2001)	UK	8 SMEs	Case study	Barriers to evaluation process: • The development process being too resources intensive & too strategic oriented

Latinen (2002)	Finland	93 SMEs	Survey	Important measurement of performance: • Employee motivation • Customer satisfaction • Product profitability • Company profitability • Capital structure
Marshall and McKay (2002)	Australia	18 SMEs	Telephone interviews	• Generally ad hoc approaches to evaluation of the proposed investments • Almost non-existent post-implementation reviews • Few measures of success • Virtually no evidence of proactive management of the realisation of benefits of the investments
Jensen (2003)	Australia	75 SMEs	Focused interviews & Telephone interviews	• SMEs did not consider the evaluation approach when adopting IT • They were prepared to bear the costs involved without any expectation of a particular return • Virtually no evaluation of potential benefits of the IT investments by SMEs
Enterprise Ireland (2004)	Ireland	96 SMEs	Day-long discussion	• Risk: 47% of SMEs had security issues • 38% had opportunities to get significant benefits with moderate to high IT investments • 55% had opportunities to get significant benefits with relatively little IT investments

Love et al. (2005) (Australia)	Australia	130 SMEs	Survey	• IT investments levels among SMEs were not influenced by organizational size • 'improved organizational and process flexibility' is the highest ranked strategic benefit for almost all industry sectors • 'hardware costs' is the highest ranked direct cost for almost all industry sectors • security is the number one risk factor associated with IT investments for Australian SMEs

Appendix 2: Questionnaire

Corporate Background Information

1) Which industry is your organisation primarily in (i.e. manufacturing, mining, retailing)?	
2) What is the size of your organisation in terms of net revenue?	
3) What is the size of your organisation in terms of total spending on IS/IT-related investments?	
4) What is the size of your organisation in terms of total employees?	

General Questions

5) Does your organisation have: a) a formal IS/IT investment evaluation methodology? b) a IS/IT benefits realization methodology?	 a) Yes ☐ No ☐ a) Yes ☐ No ☐
6) What IS/IT investment evaluation methodology do you use?	
7) What IS/IT benefits realization methodology do you use?	
6) How widely are they used? a) formal IS/IT investment evaluation methodology? b) IS/IT benefits realization methodology?	(Not at all) (Extensively) a) 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ b) 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐
7) How effective are they in ensuring successful information systems? a) formal IS/IT investment evaluation methodology? b) IS/IT benefits realization methodology?	(Not at all) (Extensively) a) 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ b) 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐

Identifying and Structuring Benefits

8) Do you have a process that ensures that IS/IT projects are linked to business objectives?	Yes ☐ No ☐
9) Do you include intangible benefits in your IS/IT project appraisal process?	Yes ☐ No ☐
10) Do you believe that your current process: a) identifies all available benefits for a project? b) adequately quantifies the relevant benefits? c) overstates the benefits in order to get approval?	 a) Yes ☐ No ☐ b) Yes ☐ No ☐ c) Yes ☐ No ☐

Planning and Delivering Benefits & Evaluating and Reviewing Results

11) Do you prepare a benefits delivery plan?	Yes ☐ No ☐
12) During the implementation process, do you hold formal reviews of activities associated with delivering benefits?	Yes ☐ No ☐
13) Do you have a formal process to ensure that the lessons learned from successful (or unsuccessful) implementations are transferred to future projects?	Yes ☐ No ☐

Potential for Further Benefits

14) Do you have a formal process to identify any further benefits after implementation?	Yes ☐ No ☐
15) Do you normally take any action after implementation to realise these further benefits?	Yes ☐ No ☐
16) Given the increasing demand from senior managers for value for money from IS/IT, and taking your previous answers into consideration, what is the scope for improvement in your current approach to managing IS/IT benefits?	(No improvement needed) (Scope for significant 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐

Degree of Satisfaction with the Adoption of B2B-EC

17) Please state your opinions to the following statements:	Totally disagree				Totally agree
a) Your company is satisfied with the use of B2B-EC in the business	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
b) B2B-EC has enhanced the corporate image of your company	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
c) B2B-EC has helped established stronger link with your sellers/buyers	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
d) B2B-EC has helped your company to develop new business opportunities	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
e) B2B-EC has helped to reduce costs	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
f) B2B-EC has helped increase sales in your company	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
g) B2B-EC has enlarged market share of your company	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐

Critical Success Factors for the Adoption of B2B-EC

18) Please state your opinions to the following statements:	Totally disagree				Totally agree
Integrating Internet with marketing strategy					
a) It is critical that data can be easily shared among your internal B2B-EC systems	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
b) It is critical that your company can easily transmit, integrate and process data from suppliers and customers through the B2B-EC systems	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
Top management support					
c) It is critical that there is sufficient management support for the adoption of B2B-EC from your top management	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
d) It is critical that the resources that the management is willing to allocate on B2B-EC system are adequate.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐

Government support	
e) It is critical that B2B-EC is introduced with adequate education support by the Government	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐
f) It is critical that B2B-EC is introduced with adequate financial support by the Government	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐
IS/IT investment and benefits realization	
g) It is critical that B2B-EC is introduced with an adequate investment evaluation methodology	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐
h) It is critical that B2B-EC is introduced with an adequate benefits realization methodology	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐
Staff resistance	
i) It is critical that B2B-EC is introduced with no or only minimal resistance to change from your staff	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐
j) It is critical that B2B-EC is introduced with high employee motivation/interest	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐
Organizational readiness	
k) It is critical that the adoption of B2B-EC is consistent with the values, beliefs, and business needs of your company	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐
l) It is critical that your company has the required resources to adopt B2B-EC	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐
m) It is critical that there is good external B2B-EC vendor/consultant support	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐