Enterprise Information Systems,
Vol. 1, No. 1, February 2007, 25–48

Taylor & Francis
Taylor & Francis Group

ERP systems success: an empirical analysis of how two organizational stakeholder groups prioritize and evaluate relevant measures

P. IFINEDO* and N. NAHAR

Department of Computer Science and Information Systems, University of Jyväskylä, Mattilanniemi Building, PO Box 35, FIN-40351, Jyväskylä, Finland

(*Received September 2006*)

Organizations worldwide are adopting enterprise resource planning (ERP) systems. A number of studies discuss the implementation and success of such systems, but our study of the literature indicates that discussions about ERP systems success from the perspectives of key organizational stakeholders are not easy to come across. This study is designed to fill this gap in research. Using surveys in Finland and Estonia, we obtained empirical data from 66 respondents in 44 diverse, private, industrial organizations. Our objective was to determine whether differences exist between two organizational stakeholder groups, i.e. business managers and IT professionals, concerning how each group believe ERP success measures and dimensions are prioritized and evaluated in their respective organizations. Prior literature suggests that differences exist between the two groups with regard to how each perceives organizational information technology (IT) issues. Our study indicates that no significant statistical differences exist between the two groups with the exception of one dimension of ERP success, i.e. vendor/consultant quality. The implications of our findings for both practice and research are discussed.

Keywords: Enterprise resource planning (ERP); Enterprise management; Enterprise systems organizational issues; Human resource management; Strategic information systems; Success; Measurement, IT professionals/managers; Business managers; Organizational stakeholder groups

1. Introduction

More often than not, the adoption or implementation of information technology (IT) systems in organizations leads to situations in which organizational members, due to differences in cultures and perceptions of value (Schein 1992, Saunders and Jones 1992, Ward and Peppard 1999, Tai and Phelps 2000, Lee and Myers, 2004), may have diverging views of the importance of such systems. Sometimes these dissenting viewpoints among organizational members may become more pronounced at the latter stages in the systems' lifecycle when the success evaluations of the adopted IT systems are to be assessed (e.g. Senn 2003, Sedera *et al.* 2003, Gable *et al.* 2003). In such less-than-perfect organizational climates, modern

*Corresponding author. Email: premifin@cc.jyu.fi

Enterprise Information Systems
ISSN 1751–7575 print/ISSN 1751–7583 online © 2007 Taylor & Francis
http://www.tandf.co.uk/journals
DOI: 10.1080/17517570601088539

organizations continue to adopt IT because of the crucial advantages that IT systems offer, i.e. IT provides competitive advantages, among others (Porter and Millar 1985, Stephens *et al*. 1992, Ward and Peppard 1999, Davenport 2000). Among the popular IT systems being adopted by organizations (public and private) are enterprise resource planning (ERP) systems (Davenport 1998, 2000, AMR Research 2005). Essentially, ERP systems are business IT suites designed to integrate business processes and functions; they present a holistic view of a business by permitting the sharing of common data and practices in a real-time environment (Markus and Tanis 2000, Wang *et al*. 2006). Organizations adopt ERP systems for a variety of reasons, including replacement of legacy systems and cost reductions (Davenport 1998, 2000, Mabert *et al*. 2003). Current reports by AMR Research (2005) indicate that the ERP market worldwide is to grow from US$47.8 billion in 2004 to US$64.8 billion by 2009, which gives an indication of the rate of penetration of the software in organizations. Much has been written about the adoption and implementation of ERP (see Esteves and Pastor 2001), but few researchers have discussed the impact and success of such systems for adopting firms especially at the post-implementation stages (e.g. Sedera *et al*. 2002, Gable *et al*. 2003, Sedera *et al*. 2004). According to Sedera *et al*. (2002), 'Even the meager literature available on ERP impacts has a range of limitations. Most existing studies (e.g. Shang and Seddon 2002) report only on the ''positive impacts'' (benefits) of ERP systems . . .' (*ibid*, p. 586). This is not to suggest that negative accounts of ERP implementation are not readily available in the literature (please see e.g. Markus and Tanis 2000, Li *et al*. 2006).

This study is motivated, in part, by the lack of research and literature in the information systems (IS) field dealing with ERP systems success at the latter stages in the software lifecycle in adopting organizations. Clearly, many ERP studies have been reported in several disciplines because ERP implementation cuts across different functional areas (see, for example, Davenport 1998, Abdinnour-Helm *et al*. 2003, Ifinedo 2006, Li *et al*. 2006, Zhang *et al*. 2006); however, for familiarity and illustration purposes, this study presents perspectives from the IS area. Specifically, we are interested in discussing ERP success from the perspectives of two key organizational stakeholder groups, namely, business managers and information technology managers/professionals. Our notion of ERP success refers to the utilization of such systems to enhance organizational effectiveness (Myers *et al*. 1997, Gable *et al*. 2003), which is different from the technical implementation success of such systems wherein measurement indicators such as cost overruns, project management metrics, and time estimates are the main concerns (Martin 1998). In discussing ERP success, we drew from the relevant literature—mainly the work of DeLone and McLean (1992)—that categorized IS success measurement into six interdependent dimensions. Further, Gable *et al*. (2003) argued for and proposed a four-dimension success measurement for ERP systems, which Ifinedo (2006a) extended to six by taking into account other relevant dimensions of success not addressed in the Gable *et al*.'s (2003) model. The six dimensions of ERP success in Ifinedo (2006a) are as follows:

1. Information quality
2. System quality
3. Individual impact
4. Organizational impact

5. Vendor/consultant quality
6. Workgroup impact

More of this later. Our study of the literature shows that the preceding four dimensions of ERP success have been used by Sedera *et al*. (2002, 2004) who investigated a theme comparable to this present study.

That said, over the past three decades, several researchers (see Hamilton and Chervany 1981, Cameron 1986, Myers *et al*. 1997, Tallon *et al*. 2000, Shang and Seddon 2002) in the IS field and related disciplines have noted the importance of examining the effectiveness or success of IT at multiple levels within organizations. Hamilton and Chervany (1981) and Myers *et al*. (1997) recommend that for deeper understanding to emerge, researchers should endeavour to present discussions of IT systems success in organizations from several perspectives, including the evaluator's perspective. According to Sedera *et al*. (2004, p. 2), 'However, there is no universal agreement on what employment cohorts (organizational stakeholder groups) should be canvassed' in such studies. Here, business managers are chosen because these executives are ideally suitable to act as key informants in the assessment of IT (and ERP) success or impacts on their organizations (Tallon *et al*. 2000, Sedera *et al*. 2004). This group of executives, according to Tallon *et al*. (2000) is more involved with IT investment decisions than other organizational players, and often more aware of the views of peers and subordinates regarding the performance of previous IT investments. On the other hand, IT professionals are important actors in modern organizations because the use of IT systems is growing for organizations that are gradually realizing the strategic importance of IT systems in their operations (Stephens *et al*. 1992, Ward and Peppard 1996, 1999). Moreover, during the acquisitions of complex IT systems such as ERP, IT professionals' technical backgrounds may come handy for the adopting organization (Willcocks and Sykes 2000, Al-Mudimigh *et al*. 2001).

As indicated above, perhaps the study closest to this one is that of Sedera *et al*. (2002, 2004). These authors examined ERP success across different employment cohorts in Australian public organizations using organizational stakeholder groups, which included Users (strategic and management) and IT staff. This roughly coincides with our delineation of business managers and IT professionals. In brief, they found that different 'employment cohorts possess different views on ES success' (Sedera *et al*. 2004, p. 12). They did not offer reasons as to why such noticeable differences surfaced in their study. However, the literature suggests that differences in perceptions of value and occupational cultures could be some of the main reasons (see Grindley 1992, Schein 1992, Saunders and Jones 1992, Shah *et al*. 1994, Ward and Peppard 1996, 1999). Further, the results from Sedera *et al*. (2002) showed that IT staff evaluated and prioritized 'system quality' more than Users did [in this paper, *evaluate* is used interchangeably with *rate*; we also accept Hornby's (2000) definition of 'evaluate', to mean the assessment of something after thinking carefully about it. From the same source, 'prioritize' is defined as putting 'tasks, problems, etc. in order of importance' (*ibid*, 1047)]. Both studies (Sedera *et al*. 2002, 2004) showed that Users—mainly the strategic sub-sample—evaluated and prioritized measures and the dimensions of 'organizational impact' more than the IT staff did. However, these authors also noted that the two organizational stakeholder groups did not show any significant differences in 'information quality'. Clearly, our study is similar to and yet

somewhat different from the work of Sedera *et al.* (2002, 2004). First, the conceptualization of ERP success in this study is broader in scope than in the prior studies. Second, in contrast to the public sector organizations that Sedera and colleagues studied in Australia, we will focus on private sector organizations in another region of the world, i.e. the Baltic–Nordic region of Europe. In fact, the region is noted as having a high penetration rate of ERP systems adoption (van Everdingen *et al.* 2000, Clouther 2004). Moreover, the operational environments of public and private sector organizations have been known to differ considerably (e.g. Mansour and Watson 1980, Khandelwal 2001). A recent study (Ifinedo 2006b) in one of the countries in the region showed that organizations across both sectors showed significant differences in key IS management issues evaluated. We contend that obtaining empirical evidence from private organizations (firms) from a region of the world that has not been researched as regards how organizational actors assess ERP systems success is pertinent for practitioners in the region and for researchers with interests in ERP success evaluations. Importantly, the 'stakeholder theory' (Freeman, 1984) provides us with a lens through which we could discuss the findings of our study. In short, the theory posits that sustainable success rests, to a great extent, with a systematic consideration of the needs and goals of all key stakeholders in the organization (Lyytinen *et al.* 1998, Fraser and Zarkada-Fraser 2003).

The remainder of the paper is structured as follows: section 2 provides a review of the relevant literature as well as the research hypotheses. Section 3 describes the research methodology and results. Section 4 presents the data analysis. The discussions and conclusion are presented in section 5.

2. Literature review

2.1 *ERP systems success measurement framework*

Gable *et al.* (2003) are among a few that have researched ERP systems success measurement. ERP systems are different from other IT systems implementations (Davenport 2000). This is because ERP implementation includes technological, operational, managerial, strategic, and organizational constructed components (Markus and Tanis 2000, Yu 2005) and as a consequence, success measurement models used for other typical IT systems' evaluation may not be adequate for ERP systems (Yu 2005, Ifinedo 2006a). According to Yu (2005, p. 117) 'the system assessment after ERP implementation is not an end'; these researchers also argue that such an exercise should focus on relevant issues beyond those encountered during implementation. Thus, it is illuminating when attention is paid to ERP systems particularly, rather than just lumping them together with other IT systems. Indeed, DeLone and McLean (1992) stress that researchers should take into account the specific characteristics of the IT system under investigation when evaluating its success for organizations. That said, Gable *et al.* drew from the IS success evaluation literature (e.g. DeLone and McLean 1992). The DeLone and McLean (D&M) IS success model is popular in the IS field for its comprehensiveness and insight (Iivari 2005). In short, Gable and colleagues developed an additive model that redefines the dimensions in the original D&M IS success model. Gable and colleagues eliminated

(through multi-stage data collection and statistical analysis) the Use and User satisfaction dimensions. Arguments against dropping them are also available in the literature (Seddon 1997). The retained ERP success dimensions in Gable and colleagues' model are system quality (SQ), information quality (IQ), individual impact (II) and organizational impact (OI). Ifinedo (2006a) proposed an extended ERP systems success measurement model. Through literature reviews and case interviews, two relevant dimensions not included in the Gable *et al.* model were incorporated, i.e. workgroup impact (WI) and vendor/consultant quality (VQ). In brief, Ifinedo (2006a) argues that any ERP success measurement model should include dimension related to WI because ERP systems are often adopted to overcome the shortcomings of other IT systems, including material resource planning (MRP) systems that ended up isolating the enterprise into islands of information (Davenport 2000, Abdinnour-Helm *et al.* 2003). ERP systems harmonize processes from the different departments within the organization and thus it is to be expected that their impacts would be palpable across the various sub-units, workgroups, and departments in the organization. Therefore, organizations should assess the success of such systems at functional levels as well. In fact, other researchers including Myers *et al.* (1996) have made similar calls in the past and Barua *et al.* (1995, p. 20) found 'that the most important significant contributions of IT investments occur at low organizational levels where they are implemented'.

With regard to the inclusion of VQ as a dimension of ERP success, Ifinedo (2006a) argues that the engagement of poor quality ERP systems providers 'can become a negative influence or even a curse which [drags] the entire company into a spiral of ineffectiveness' (Yu 2005, p. 117). Markus and Tanis (2000) noted that when the quality of the providers (vendors and consultants) have not been perceived to be high for the adopting organization, dire consequences have resulted (in severe cases, the firm may have suffered serious operational performance leading to loss of business and bankruptcy). Other ERP researchers, including Wu and Wang (2005) have actually incorporated a similar dimension, i.e. 'customer/supplier service provider' as an ERP success measure. This extended ERP success measurement model is illustrated in figure 1. Full discussion on the framework is available elsewhere in Ifinedo (2006a). We describe each of the dimensions in appendix 1. More importantly, we grouped both vendors and consultants together because Sedera *et al.* (2003) found that items that they used to represent consultant and

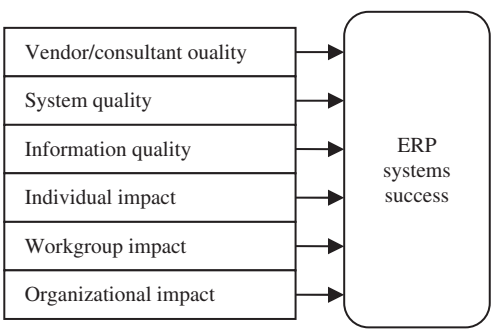

Figure 1. Our conceptualized model of ERP systems success.

vendor loaded together, and other IS studies (e.g. Bajwa *et al.* 1998) have similarly grouped both vendors and consultants.

2.2 *IT professionals/managers and business managers as organizational stakeholders*

The stakeholder theory is applicable to this discourse. Freeman (1984, p. 25), provides the following classical definition: 'A stakeholder in any organization is (by definition) any group or individual who can affect or is affected by the achievement of the organization's objectives'. Essentially, the stakeholder theory is primarily a management instrument that contains methods for identifying and managing stakeholders' objectives. Fraser and Zarkada-Fraser (2003) state: 'The stakeholder theory posits that sustainable success rests, to a great extent, with a systematic consideration of the needs and goals of all key stakeholders'. The stakeholder theory has techniques for identifying stakeholders, describing the relationships among them, and providing guidelines for handling conflicting interests (Pouloudi and Whitley 1997). This theory considers two perspectives: inside-in (employees, managers) and inside-out (others: shareholders, partners, etc.). We narrow our scope in this study to the former. In the extant IS literature, stakeholders have been identified based on a particular research purpose. Lyytinen *et al.* (1998) describe stakeholders as actors that can set forward claims or benefit from IT systems development issues. In their study, Singletary *et al.* (2003) identified stakeholders as managers, IT professionals, and end users. Wilkes and Dickson (1987) delineate the elements in their study as top management, IS managers and internal auditors. In their study of ERP success assessment in 27 public organizations in Australia, Sedera *et al.* (2004) identified their stakeholders using employment cohorts, including technical staff and end users. We have discussed above the reasons why the groups of stakeholders considered would seem appropriate for this study.

At a general level, researchers have suggested that business managers and IT professionals as organizational stakeholders may hold differing views on many issues due to cultural differences amongst them (Grindley 1992, Schein 1992, Shah *et al.* 1994, Ward and Peppard 1996, 1999, Senn 2003). A study by Schein (1992) found that top management (business managers) and the IT community belong to two separate subcultures. Similarly, researchers, including Ward and Peppard (1996, 1999), and Shah *et al.* (1994) note the existence of cultural gaps between the IT departments and business departments in organizations. Van der Heijden (2000) notes that: 'This gap [differences between IT and business professionals] is often fostered by ''hard'' elements (power and control structures), but also by rituals, routines, stories, myths, and symbols that set the IT department apart from the other departments.' Differing viewpoints between the two organizational stakeholder groups could also be attributable to the presence of differing agendas or goals for the organization regarding IT issues (e.g. Schein 1992, Ward and Peppard 1996), organizational politicking (Pfeffer 1992, Lee and Myers 2004) and to different perceptions of value (Saunders and Jones 1992). These last authors comment that value in the eye of the beholder is a relative concept. That both IT professionals and business managers have differing views of organizational-IT issues has been widely reported in the literature. For example, Wilkes and Dickson's (1987) study of the perceptions of their three organizational stakeholders regarding the assessments of

the IS organization indicated that the perceptions of the three groups differed markedly with the top management executives stressing the importance of managerial data for the IS organization more than the IS managers did. It is suggested that business managers including chief executive officers (CEOs) and chief financial officers (CFOs) tend to focus more on organization-wide business issues whereas IT managers (e.g. chief information officers; CIOs) place more emphasis on technology and IT management issues (Brancheau and Wetherbe 1987, Moynihan 1995, Khandelwal 2001, Sedera *et al*. 2004). Further, Khandelwal (2001) found that CEOs tend to place more emphasis on organization-wide business issues while 'IT managers appear to be concentrating more on IT management and technology issues' (p. 24) (see also Brancheau and Wetherbe 1987, Moynihan 1995, Sedera *et al*. 2004). Senn (2003) examined the perceptions of 146 executives/managers and 61 IT managers regarding the returns from IT investments and found significant differences between the two; however, he notes that there are more similarities than differences in the way both groups evaluate IT issues.

With specific references to ERP systems, Singletary *et al*.'s (2003) study of managers, IT professionals and end-users, regarding the characteristics, benefits and downsides of ERP applications integration, found significant differences among the three stakeholders. A survey of 159 respondents comprising CFOs and CIOs of some American colleges that had recently implemented ERP found differences between the two groups in some areas including executive management support, project team composition, and training (Frantz *et al*. 2002). The CIOs evaluated these higher than did their CFO counterparts. Bradley and Lee (2004), researching the information needs in a university that implemented PeopleSoft (ERP), found that there were differences between technical and management personnel on issues related to the understanding of ERP features and the level of training required. The study implied that the less technically savvy group, i.e. CFOs have less understanding of ERP features and required more training. Additionally, there is evidence suggesting that ERP acquisitions in organizations often result in some organizational members coming out as 'losers' and others, as 'winners' (see e.g. Willcocks and Sykes 2000, Kumar and van Hillegersberg 2000). For example, Willcocks and Sykes (2000) observe that during ERP adoption, the IT department (and its staff) tends to have less important roles compared to other departments (and their functionaries). Kumar and van Hillegersberg (2000, p. 24) comment: 'Typically, ERP initiatives in organizations are motivated by senior executives other than the CIO (Chief Information Officer)'. This might be interpreted to mean that those calling the shots during the system acquisition will invariably be the most influential actors in such initiatives.

2.3 *Hypotheses formulation*

Differences or similarities between stakeholder groups, including the ones chosen for this study can be investigated using a variety of approaches; however, for illustration purposes, our approach which involves the examination of how each group prioritize and evaluate (rate) selected items and the test of variance on items across the groups would seem adequate for knowledge enhancement. Importantly, other studies (e.g. Brancheau and Wetherbe 1987, Khandelwal 2001, Senn 2003) have used similar approaches to compare and contrast the viewpoints of business managers and

IT professionals on organizational IT issues. As indicated above, Sedera *et al*. (2002, 2004) reported that the two stakeholder groups in this study have different views on ERP success. The review of the literature above suggests that business managers and their IT counterparts have traditionally been inclined to warm up to some issues in certain ways. Clearly, IT people seem to place more emphasis on technology issues whereas business managers tend to emphasize management issues. The results in Sedera *et al*. (2002, 2004) indicate this pattern as well. These researchers show that IT staff evaluate and prioritize SQ more than Users do. Sedera *et al*. (2002, 2004) showed that Users—mainly the strategic sub-sample—evaluated and prioritized measures and the dimensions of OI more than IT staff, and that the two organizational stakeholder groups did not indicate any significant differences for IQ. They did not offer reasons as to why such noticeable differences became evident in their study. However, the preceding literature review suggests that differences in cultures, perceptions of value, and the location of organizational influence and power could be some of the main reasons. Our objective was not to uncover which factors are responsible for the differences between the groups. Rather, we subscribe to the view that the two organizational stakeholder groups have historically assessed organizational-IT issues differently. In this light, evidence suggests that business managers will assess (i.e. prioritize and evaluate) measures and dimensions related to II, WI, and OI and issues related to the engagement of the software suppliers (i.e. VQ) more than IT professionals do, and for obvious reasons. Business managers tend to use such systems in their daily operations more than IT staff, and the former are also in a better position to understand the impacts of such systems (e.g. Abdinnour-Helm *et al*. 2003). Recall we also noted that business managers are more likely to initiate ERP acquisitions and directly engage with the systems' providers. On the other hand, IT professionals due to technical backgrounds (see Markus and Tanis 2000) may have higher opinions of ERP's SQ just as Sedera *et al*. (2002, 2004) revealed. Following the preceding discussion, we formulate the following two hypotheses with the view to shed light on how both groups would prioritize and evaluate relevant items.

*H*1: As members of different organizational stakeholder groups, do business managers and IT professionals/managers *prioritize* the measures and dimensions of ERP systems success differently?

*H*2: As members of different organizational stakeholder groups, do business managers and IT professionals/managers *evaluate* the measures and dimensions of ERP systems success differently?

3. Research methodology

The main research method used for this study is a survey which we carried out from July to September 2005. We sampled firms generated from local contacts and companies directories, e.g. an online database of Finnish companies (http://www.yritysopas.com/) and the Estonian Chamber of Commerce and Industry Directory 2004 (http://mail.koda.ee/ektk/koda_eng). Firms were chosen by the ease that we could obtain contact addresses for key organizational personnel (mainly those in mid- and top-level positions, e.g. Chief Information Officer, Chief Financial Officer) in the selected firms. Adjusting to the relative sizes of both countries,

we identified 350 firms in Finland and 120 in Estonia from the aforementioned sources. According to Zikmund (2000), a researcher may select his sample size based on his knowledge about the sample size used in comparable studies. In their study of ERP systems in Sweden, a country in the region of this study, Olhager and Selldin (2003) sent out questionnaires to 511 different firms. Thus, we believe a population of about 500 firms might suffice for my study. In fact, the population of firms adopting ERP in Finland and Estonia is unknown to us, and the resources to determine the number were unavailable to us during this study. We concentrated on private organizations in the two countries because we believe the adoption of ERP systems might be higher there than in public sector organizations. The research was designed to obtain views at the firm level. Accordingly, only key organizational informants (see examples of their job titles below) received a packet consisting of a cover letter, questionnaire, and a self-addressed, stamped envelope. These groups of respondents are among the most knowledgeable informants regarding ERP success in organizations (Gable *et al.* 2003). About 60% of the mailings to the participants included only one questionnaire; the rest (40%) of the mailings had two questionnaires. It was decided that multiple respondents from one organization would enhance the validity of the study as a common source bias would be minimized. In addition, low response rates seen with IS research in the two countries as discussed by Nissinen (2002) prompted us to use this approach. In instances where we sent out two questionnaires, the recipients were instructed to give one of the questionnaires to an appropriate person within their organization. We encouraged the subjects to present views representative of their organization.

3.1 *Instrument development, validity and reliability*

We developed the research instrument from measures and constructs validated in the literature. Respondents in our survey indicated their degree of agreement with statements using a 7-point, Likert-type scale, where 1 = strongly disagree and 7 = strongly agree (see table 1(a) and appendix 2). To ensure each organizational stakeholder group is presenting a view representative of organization-wide perspectives, we posed the questions in the questionnaire appropriately (see appendix 2). To ensure data validity and reliability of the survey instrument, four knowledgeable individuals (i.e. two IS faculty, one ERP consultant and one ERP managerial level user) completed the questionnaire before our mailing it out, and their comments helped us improve its quality. Our case studies in both countries on ERP success issues in adopting firms (see Ifinedo and Nahar 2006a, b) and the pilot test also enhanced the face and content validity of this particular study. Of note, the opinions expressed by both the IT professionals and business managers that we interviewed in the case studies were consistent with the results in this study; i.e. each group gave views similar to what is provided herein. We also noticed that for firms with more than one respondent, the responses on key issues were comparable; this enhances the validity of the responses from such firms as well as our data in general.

Table 1 shows a few of the measures, their sources, and the reliability of the research variables. Clearly, the Cronbach Alpha for each dimension is above the 0.70 limit recommended by Nunnally (1978), indicating a reasonably high reliability of the research measures and constructs. Similarly, the item-to-total correlation coefficients of the measures on their respective constructs (omitted due to

Table 1. ERP systems success dimensions.

Dimension	No. of measures	Cronbach Alpha	Sources	Examples of statements in the instrument
Vendor/consultant quality	5	0.876	Thong *et al.* 1994, Ko *et al.* 2005	'Our ERP vendor/consultant is credible and trustworthy'. 'Our ERP vendor/consultant is experienced and provides quality training and services'.
Information quality	8	0.822	Gable *et al.* 2003, Sedera *et al.* 2003, DeLone and McLean 1992	The information on our ERP is understandable'. 'The information on our ERP is relevant'.
System quality	11	0.852	Gable *et al.* 2003, Sedera *et al.* 2003, DeLone and McLean 1992	'Our ERP has accurate data'. 'Our ERP is easy to use'. 'Our ERP is easy to learn'.
Individual impact	6	0.769	Myers *et al.* 1997, Gable *et al.* 2003, Sedera *et al.* 2003, DeLone and McLean 1992	Our ERP improves individual productivity'. 'Our ERP saves time for individual tasks and duties'.
Workgroup impact	7	0.810	Myers *et al.* 1996, 1997	'Our ERP helps to improve workers' participation in the organisation'.
Organisational impact	8	0.867	(Myers *et al.* 1997, Gable *et al.* 2003, Sedera *et al.* 2003, DeLone and McLean 1992)	'Our ERP reduces organisational costs'. 'Our ERP increases customer service/satisfaction'.

space limitations) are high. In summary, the item-to-total correlation coefficients for each dimension ranged as follows:

- System quality (0.55 to 0.79);
- Information quality (0.50 to 0.76);
- Vendor/consultant quality (0.70 to 0.89);
- Individual impact (0.53 to 0.71);
- Workgroup impact (0.62 to 0.76);
- Organizational impact (0.59 to 0.81); and
- ERP success (0.94 to 0.95).

Further, the correlations among the dimensions of success ranged from 0.44 to 0.81. We also examined the construct validity of our instrument using the principal component analysis. The results of a factor analysis of the 45 measures using Varimax with Kaiser Normalization identified the six constructs as used in the study, and this explained 64.29% of the variance in the model (figure 1).

3.2 *Survey results*

SPSS 13.0 was used to analyse the data. Our respective response rate, excluding the received questionnaires that were unusable, was 29 firms (8.5%) for Finland, 15 firms (12.5%) for Estonia, and 44 (9.5%) combined for the two countries. We received 62 individual responses: 39 from Finland and 23 from Estonia. It is worth mentioning that our data collection effort reflects the typically low responses that are commonly seen for IS studies in the region and for surveys targeting mid-level and senior employees in organizations (Nissinen 2002, Kearns and Lederer 2003). Our data classified by occupation comprised 20 (32.3%) IT professionals/managers and 42 (67.7%) business managers. Their job titles included chief executive officer, chief information officer, chief accountant, IT manager and finance manager. There were 35 (56.5%) men and 27 (43.5%) women in our sample. Of the respondents, 40% had college degrees, 20% had technical and other vocational education, and 43 (69.3%) were between 31 and 50 years old. On average, they had 9 years of work experience in their respective organizations. Of the 62 respondents, 33.9% had SAP in their organizations, 14.5% had Movex, 9.6% had Scala, 8.1% had Hansa, and the remaining 33.9% had other mid-market ERP products, including Concorde, Nova, etc. The annual turnover of the firms in the sample ranged from €1 million to a little over €2 billion, with €19 million as the median. The workforce ranged from 10 to 13 000 employees, with a median of 120 employees. We received responses from a wide range of industries, including manufacturing, financial services, IT firms, pharmaceuticals, food processing, retail, and warehouse businesses. Our sample classified by the size of workforce following guidelines provided by EC (2003) and Laukkanen *et al*. (2005) included 15 (24%) small, 25 (40%) medium-sized, and 22 (36%) large firms. We used recommendations suggested by Armstrong and Overton (1977) to assess the non-response bias in our survey by comparing early and late respondents on key organizational characteristics such as size, industry type, year of ERP adoption, and ERP type, among others. The results of the chi-square tests (significant at <0.05) showed there were no significant differences along these key characteristics.

4. Data analysis

We tested the normality of our data variables using the Kolmogorov-Smirnov statistic. The results indicate that our data do not conform to a normal distribution, hence the use of non-parametric tests for our data analysis. Importantly, our data analysis indicates that both the parametric test (*t*-test) and non-parametric test (Mann–Whitney U test) that were used for our data yielded analogous interpretations, but we will only show the results from the latter for brevity's sake. Additionally, we performed a strict test on our data by randomly selecting an equal number, i.e. 20 from each group, and the mean scores obtained for each measure and dimension compare with the ones retained for the original data set used for our data analysis. (This study uses mean scores for the non-parametric tests). The first hypothesis was formulated to determine whether there are differences in how business managers and IT professionals prioritize the measures and dimensions of ERP systems success. We computed the mean of each variable or measure for the two groups and ranked the variables in order of priority according to their mean scores (i.e. the mean score obtained from the survey was ordered by the researchers). We then used the Kendall Tau-b coefficient (T^b), significant at $p < 0.05$ to compare the ranking orders of the 45 measures for both groups. The results were $T^b = 7.34$, Value $= 0.562$, Sig. (p) $= 0.000$ for comparisons with the 45 measures. This indicates that there is a strong relationship between the two groups, suggesting no differences between them in how they prioritize the measures of ERP systems success.

Upon inspection of the ranking orders for both groups, our attention was drawn to a few salient parts. The top five most important measures in order of importance for both groups are comparable with measures such as: importance, relevance, accuracy, reliability, and information timeliness of ERP being featured. Similarly, the least important measures include the following statements: 'Our ERP provides us with competitive advantage,' 'Our ERP is easy to use,' and 'Our ERP is flexible'. These measures received lower ratings from both groups and resulted in these measures being placed at the bottom of the ranking order (see table 2). Both groups rated measures such as ERP's capability to enhance individual productivity among the least important measures. However, the main noticeable differences relate to a few of the measures pertaining to the VQ dimension; the IT professionals in our sample seem to indicate less satisfaction with this dimension compared to their business counterparts. In contrast, the business managers' top ten ranking measures included items related to the VQ dimension, for example, 'Our ERP vendor/consultant is trustworthy' ranks among the top-ten for business managers whereas the same measure ranked lowly for IT managers. Measures relating to the ease of learning and using ERP were rated lowly by both groups. Further, two organizational stakeholder groups appear to indicate that their ERP software lack flexibility and may not provide competitive advantage to their various organizations. Feedback from an IT Director in a Finnish car dealership states, 'X (an ERP system) does not give us any competitive advantage in the market'. In brief, we can conclude that the top and bottom measures for the two groups compare reasonably well, with the exception of the measure relating to VQ dimension.

As part of the first hypothesis, we compared both groups on the six dimensions of ERP success through their composite mean scores. We computed a composite measure representing each dimension of ERP success from the averages of the

Table 2. Relative ordering of ERP systems success measures.

The top-10 ERP success measures for the groups						The bottom-10 ERP success measures for the groups				
Measure	Business managers		IT professionals			Measure	Business managers		IT professionals	
Our ERP has (is)...	Mean	Rank	Measure	Mean	Rank	Our ERP has (is)...	Mean	Rank	Mean	Rank
Relevant	5.81	1	Important	5.90	1	Enables e-business/ e-commerce	4.38	36		
Important	5.81	2	Accurate data	5.70	2	Improves organisational-wide communication	4.38*	37		
Usable (information)	5.55	3	Up-to-date (information)	5.65	3	Easy to use	4.31	38	3.80*	43
Up-to-date (information)	5.38	4	Relevant	5.55*	4	Improves worker's participation	4.26	39		
Reliable	5.33	5	Reliable	5.55*	5	Facilitates business process change	4.24	40	4.10	36
Available	5.31	6	Efficient	5.35	6	Enhances organisational learning	4.21	41*	3.80*	42
Accurate data	5.24	7	Usable (information)	5.30*	7	Easy to learn	4.14	42	3.85*	41
Timely information	5.10	8	Timely information	5.30*	8	Flexible	4.12*	43	3.90	39
Integrates with other IS systems	5.10	9	Understandable	5.25	9	Enhances individual creativity	4.12*	44	3.70	45
Our ERP vendor/ consultant is trustworthy	5.05	10	Has good features	5.10	10	Provides competitive advantage	3.90	45	3.85*	40
						ERP increases customer service/satisfaction		3.80*	44	
						Our ERP vendor/consultant provides quality training and services		3.95	38	
						Our ERP vendor/consultant communicates well with my organisation		4.05	37	

*Tie.

Table 3. The ranking of ERP success dimensions.

	Business managers ($n=42$)			IT professionals ($n=20$)			Total ($n=62$)	
Dimension	Mean	SD	Rank	Mean	SD	Rank	Mean	Rank
System quality	4.7762	0.8430	3	4.7550	0.9305	2	4.78	2
Information quality	5.2381	0.7657	1	5.2778	0.7902	1	5.25	1
Vendor/consultant quality	4.9000	0.9890	2	4.2100	0.8979	6	4.68	3
Individual impact	4.6270	0.8262	4	4.2583	0.7482	5	4.51	5
Workgroup impact	4.5204	0.8129	5	4.6000	0.8402	3	4.55	4
Organizational impact	4.4851	0.9174	6	4.2813	1.0926	4	4.42	6
Overall ERP systems success	5.0873	0.9934		4.7833	1.3945		4.99	

Note: SD – standard deviation.

Table 4. The test results for the diverging measures.

Variable or measure	Mann–Whitney *U*-test statistic	Sig. (2-tailed)
Our ERP vendor/consultant is trustworthy	285.0	0.036
Our ERP vendor/consultant provides quality training and services	282.5	0.021
Our ERP vendor/consultant provides quality training and services	241.5	0.005

relevant measures (see Hair *et al*. 1998). For business managers, the order of importance for the dimension is information quality (IQ), vendor/consultant quality (VQ), system quality (SQ), individual impact (II), workgroup impact (WI), and organizational impact (OI). For IT professionals, the order of importance is information quality (IQ), system quality (SQ), workgroup impact (WI), organizational impact (OI), individual impact (II) and vendor/consultant quality (VQ) (see table 3). Concerning the relative ranking ordering, the results of the Kendall Tau-b coefficient test (significant at $p>0.05$) for the two groups on the six dimensions are $T^b=8.18$, Value $=0.333$, Sig. $=0.413$, which indicates a difference between them. The two groups seem not to agree on prioritization of the dimensions; i.e. the order of priority differs according to statistical analysis. Furthermore, table 3 shows that the bottom three dimensions included the same issues, but the same is true for the top three. Clearly, business managers appear to prioritize the VQ dimension higher than do their IT counterparts. Both groups ranked the IQ dimension highest.

For the second hypothesis, we wanted to determine if business managers and IT professionals evaluate (rate) the measures and dimensions of ERP systems success differently. Using the Mann–Whitney *U*-test, we compared the 'measures' across the two groups individually. Table 4 indicates the three measures on which there were dissenting views between the two groups. All the measures were related to one dimension of success, i.e. VQ.

Table 5. The test results for the dimensions of ERP success.

	SQ	IQ	VQ	II	WI	OI
Mann–Whitney *U*	394.500	400.500	263.000	306.000	384.500	383.000
Sig. (2-tailed)	0.701	0.769	0.018	0.085	0.592	0.577

Again, using the Mann–Whitney *U*-test, we compared the 'dimensions' across the two groups. Table 5 indicates that there are disagreements between the two groups on the VQ dimension, which is consistent with the preceding result.

5. Discussions and conclusions

In this paper, our objective was to find out whether two organizational stakeholder groups, namely business managers and IT professionals hold differing views regarding how each group assesses (i.e. prioritizes and evaluates) ERP systems success measures and dimensions in their respective organizations. Our effort complements those by Sedera *et al.* (2002, 2004). In those studies, both IT professionals and business managers were reported to have prioritized and evaluated ERP success differently with the exception of one dimension of ERP success, i.e. IQ. At a much wider level, the literature has shown that both would assess organizational-IT issues differently due to a variety of reasons including culture, influences stemming from organizational power and perhaps the perception of value. This study is predicated on the knowledge that differences may exist between IT professionals and business managers, and we did not aim at examining why it might be the case. Rather, our motive was, as noted above, to add more insights to the findings in comparable studies (Sedera *et al.* 2002, 2004) that had researched the assessment of ERP across employment cohorts; i.e. organizational stakeholder groups. However, this present study was carried out in a different context and region.

Our data analysis did not indicate any differences between the two groups regarding how each prioritized measures related to ERP success. It is easy to see that all the measures that made the top ten were the same across both groups. Similarly, both groups had seven measures in common in their bottom ten measures. With regard to how the dimensions of success were prioritized, we found some variations on how each group prioritized the dimension related to VQ in particular. Business managers rated this dimension significantly higher than did IT professionals. Regarding the evaluation (rating) of each of the 45 measures of ERP success individually, our statistical analysis shows that there are three measures on which the two groups hold diverging views; these three measures relate to the VQ. As was the case with the foregoing discussion about the prioritization of the ERP success dimensions, we noticed that our business managers' sub-sample rated these dimensions higher than their IT colleagues. Taking together, our approach that used two conceptualizations, i.e. prioritization and evaluation, in determining whether differences exist between the two selected organizational groups yielded similar results—both groups seem to have a similar view of ERP success in their respective organizations with the exception of measures and the dimension related to the quality of the software providers.

5.1 *Implications and future study*

This study has produced significant insights that will benefit both practitioners and IS academics. Since discussions of organizational actors or stakeholders often focus on how to better manage, measure, and evaluate organizational resources (Freeman 1984, Pouloudi and Whitley 1997, Fraser and Zarkada-Fraser 2003), the finding that business managers and their IT counterparts hold comparable views on all but one dimension is vital for practitioners. Regarding the stakeholders' perceptions of the assessment of ERP success in their organizations, the findings of this study indicate that both stakeholder groups hold a common view. This would enable both researchers and management to reconsider past information, i.e. that both groups have different cultures and will present different views of organizational IT issues. Consistent with the stakeholder theory, the common views between the two groups would mean that corporate managers are in a better position to effectively manage their similarities with respect to the effectiveness or success of acquired ERP systems. Similarly, any ensuing differences might be easily spotted.

Our study permits us to suggest that ERP adopting organizations can engender a harmonious organizational climate or environment when in-house IT experts' inputs are adequately considered during ERP implementation processes. We are of the view that perhaps the reason why both IT professionals and business managers in our study indicated differing opinions on the VQ dimension might be attributable to their contrasting the roles during the acquisitions of such systems (Kumar and van Hillegersberg 2000, Willcocks and Sykes 2000). It is safe to conjecture that the perceptions of IT professionals about the quality of the systems' provider *vis-à-vis* the success of the software for the organization might be different were they to have similar roles; the work by Pfeffer (1992) is illuminating in this area. Importantly, as we did not investigate the specific roles of the study's participants during their ERP acquisitions we cannot be certain about our conclusions in relation to the roles of organizational players during the adoption of such complex IT systems. ERP adopting organizations are better poised to reap the benefits of their investment in such complex and expensive IT systems when there is a positive organizational climate in which overall success with the software is achieved, and resistance or sabotage avoided. Vendors of such systems in the region of this study (and elsewhere) might benefit from this study as well. The lowly rated measures identified in this study such as the difficulty of using the systems could, among others, stimulate the providers of ERP systems to pay attention to developing robust ERP systems (see also DeSisto 1997, Strong *et al.* 2003, Sammon *et al.* 2004, Topi *et al.* 2005). It is reasonable to suggest that prospective customers would appreciate systems deemed easy to use, learn, and capable of meeting the needs that prompted the acquisition of the system in the first place.

In addition, the practical and general implications that can be drawn from this study offer some other useful insights for research. Our data, which we noted were obtained from private sector organizations, seemed to be at variance with those in Sedera *et al.* (2002, 2004). On the whole, the results from this study appear not support our hypotheses that business managers and their IT counterparts being members of different organizational stakeholder groups would espouse differing views of ERP success. We offer the following explanations as possible reasons why our analysis might have differed. First, the issues (measures) used in this study were

not generated by the participants, unlike in Sedera *et al.* (2002, 2004) where these researchers used a Delphi method to enlist the measures from the participants (IT staff and business managers) who participated in subsequent surveys to evaluate the generated measures. We also noted that Sedera *et al.* (2002, 2004) enlisted a wider range of participants in their study than we did (i.e. they included the views of both top-level management and lower level IT staff). Prior studies (e.g. Saunders and Jones 1992) have suggested that when organizational actors (top managers and IT professionals) produce their lists of success factors, the ones generated by each group tend to be highly rated or accorded higher priority than those developed by others. Thus, it is likely that the pattern reported in Sedera *et al.* (2002, 2004) is a reflection of this reality. Second, it is possible that rank and position of this study's participants (recall that they were mid- and top-level organizational members) might have influenced our results in some ways. This we infer from an earlier publication (Ifinedo and Nahar 2006a) where we examined how the same participants classified by organizational hierarchy prioritized and evaluated ERP success, and where we found no significant differences in that respect. Thus, it is likely the closeness in the rank and position of the study's participants might have made it harder for any major differences to rise to the surface. If lower level IT professionals' perception of ERP success were to be compared and contrasted with those of top level business managers' and vice versa, it is likely that major differences might become noticeable. A recent study by Abdinnour-Helm *et al.* (2003) seems to point in this direction. Third, the results obtained in this study were based on small sample sizes, and this might have negatively influenced our data analysis.

Further, our study offers the following information. Although our results did not indicate any great statistical difference between the two groups regarding how each group prioritized the individual measures, we noticed, nonetheless, that the mean rankings of the measures for the business managers were consistently higher than those of their IT counterparts. This in some respect provides support to the finding in Abdinnour-Helm *et al.* (2003) noting that 'managers . . . may have a broader knowledge base with which to evaluate the potential value of . . . ERP systems and the value that ERP offers may be more directly related to the contributions they make to the firm' (p. 270). Likewize, the findings in Sedera *et al.* (2004) also support this viewpoint. Our result concurs with other studies suggesting that business managers tend to have a broader view of organizational issues (Weiss *et al.* 1986, Brancheau and Wetherbe 1987, Wilkes and Dickson 1987, Schein 1992) and would tend to indicate higher evaluations of such issues than do others. We noticed that both groups regard the informational quality of ERP systems as the important dimension of the six that we operated. This finding mirrors the results in the work of Sedera *et al.* (2004) which, taken together with ours, may imply that perhaps this dimension could serve as the best indicator of ERP success to monitor when assessing the views of differing stakeholder groups. Items (measures) that were lowly ranked include the ease of use, learning of ERP, and the flexibility of such systems, which both business and IT managers in this study rated lowly. Paradoxically, these are some of the reasons organizations adopt ERP in the first place. The relatively low placement of some of these measures in our ranking of the total 45 measures support observations and arguments (DeSisto 1997, Strong *et al.* 2003, Sammon *et al.* 2004, Topi *et al.* 2005) that both the providers and adopters of such systems should be aware of the limits of ERP systems.

Once again, even though our study did not support Sedera *et al*. (2002, 2004) and widely held views that both groups would evaluate organizational-IT issues and ERP success differently, it does, to some extent, confirm observations in some studies (e.g. Tai and Phelps 2000, Senn 2003) indicating that views between the groups may in fact not be static (i.e. they may converge or diverge, depending on the issue). In this regard, we lend support to the conclusions made by Senn (2003) where he suggests that there may be more similarities in the way IT professionals and business managers assess or evaluate IT issues than there are differences. He asserts 'The results show that there is a high degree of similarity in beliefs of managers and IT professionals . . . These are important findings. They suggest that perhaps the traditional 'two worlds' view, from the past, needs to be reconsidered' (*ibid*, p. 10). Along a similar line of reasoning, Frantz *et al*. (2002, p. 43) investigating how CIOs and CFOs evaluate issues related to ERP implementations, conclude: '[Their] study results showed consensus for the most part among chief financial and information officers.' In general, this research effort might stimulate further inquiry and theory development regarding the success evaluations of enterprise systems in adopting firms *vis-à-vis* organizational stakeholder groups. The challenge for other researchers is to produce a deeper understanding of our research theme by replicating the study in other settings and regions as well as making an attempt to find out what factors could be causes of the differences (if any). Moreover, it is impossible to establish the validity of findings on the basis of a single study in one region of the world. When other replications become available, the cumulative knowledge in the IS field will be enhanced (Keen 1980). Other research methods, including case studies might be considered in order to enhance our understanding of the theme. Studies involving other organizational stakeholder groups might produce useful insights for practitioners and researchers alike. For example, future studies could investigate the viewpoints of the two organizational stakeholder groups on other IT systems, including systems developed internally in lieu of those procured from external sources such as ERP. Investigations could aim at finding out whether IT professionals are satisfied with their roles during ERP implementation against the backdrop of others assuming process ownership roles, and how do contrasting roles impact the success evaluations of such systems. Other relevant questions to address may include the following: Are ERP adopting organizations satisfied with their systems' features? Does ERP engender competitive advantages for adopting organizations? What views do in-house IT professionals have on their ERP vendors/consultants?

5.2 *Limitations of the study*

There are limitations to this study, some of which we briefly discuss here. The study uses a convenient sample of 62 respondents, which may be adequate for these two small countries but insufficient for a conclusive understanding of the issue. Future studies should endeavour to use a larger sample of respondents in which equal number from the differing stakeholder groups are represented. Nonetheless, our sample size compares favourably with sample sizes used in IS research elsewhere, including ERP studies originating from the region (see e.g. Laukkanen *et al*. 2005).

Our sample is not random, and we cannot rule out personal bias, not even in cases where the respondents claim to present an average view for their respective organizations on selected issues. Further, we used subjective and perceptual measures in this study, but it may be that both stakeholders groups might rate objective measures (i.e. profit or financial measures) differently if used to assess ERP success. Additionally, our sample comprises mixed ERP software, including top-brand names (e.g. SAP and Oracle) and mid-market products (e.g. Hansa, Scala and Nova). It is possible that the heterogeneous nature of the ERP systems used for our study is limiting. Finally, our sample consists of small, medium, and large companies. The diversity in the sample is good, but it may affect our findings. A homogenous sample of only large or small firms might yield results different from the ones discussed herein. The opinions in the public sector may differ as would the viewpoints of junior employees (e.g. Abdinnour-Helm *et al*. 2003, Khandelwal 2001, Sedera *et al*. 2004). Thus, we caution against generalising the findings of this study to all contexts.

Appendix 1. The dimensions of ERP success

Vendor/consultant quality (*VQ*)

This refers to the quality of expertise, relationships, training, and communication, among others that the providers of the software offer the adopting organization.

System quality (*SQ*)

This refers to the performance characteristics of the ERP systems. SQ is concerned with issues relating to the ease of using and learning the systems, its data accuracy, reliability, efficiency, and so forth.

Information quality (*IQ*)

This dimension focuses on the quality of the information system output. IQ deals with the timeliness, relevance, availability, understandability, and usability of the information output of the system, among others.

Individual impact (*II*)

This dimension is concerned with the effect of the IS (in this instance, ERP) on the individual. II assesses how the use of the adopted ERP system has increased the individual's productivity, improved his or her decision making capability, and so forth.

Workgroup impact (*WI*)

This dimension refers to the impact of ERP acquisitions on the workgroups, sub-units and/or departments within organizations. WI encompasses issues relating to the use of ERP to improve inter-departmental coordination, communication, and productivity.

Organizational impact (*OI*)

This refers to the value or benefits accruing to the organization for adopting a particular ERP system. Such impacts might be related to the extent to which the ERP has enabled the adopting firm to improve its customer service, enhance its decision making, reduce its organizational costs, and so forth.

Appendix 2

Table 1a. The measures in the questionnaire.

	Measures
1	Our ERP has accurate data
2	Our ERP is flexible
3	Our ERP is easy to use
4	Our ERP is easy to learn
5	Our ERP is reliable
6	Our ERP allows data integration
7	Our ERP is efficient
8	Our ERP allows for customization
9	Our ERP has good features
10	Our ERP allows for integration with other IT systems
11	Our ERP meets users' requirements
12	Our ERP database contents is up-to-date
13	Our ERP has timely information
14	The information on our ERP is understandable
15	The information on our ERP is important
16	The information on our ERP is brief
17	The information on our ERP is relevant
18	The information on our ERP is usable
19	The information on our ERP is available
20	Our ERP vendor/consultant provides adequate technical support
21	Our ERP vendor/consultant is credible and trustworthy
22	Our ERP vendor/consultant has good relationships with my organization
23	Our ERP vendor/consultant is experienced and provides quality training and services
24	Our ERP vendor/consultant communicates well with my organization
25	Our ERP enhances individual creativity
26	Our ERP enhances organizational learning and recall for individual worker
27	Our ERP improves individual productivity
28	Our ERP is beneficial for individual's tasks
29	Our ERP enhances higher-quality of decision making
30	Our ERP saves time for individual tasks and duties
31	Our ERP helps to improve workers' participation in the organization
32	Our ERP improves organizational-wide communication
33	Our ERP improves inter-departmental co-ordination
34	Our ERP creates a sense of responsibility
35	Our ERP improves the efficiency of sub-units in the organization
36	Our ERP improves work-groups productivity
37	Our ERP enhances solution effectiveness
38	Our ERP reduces organizational costs
39	Our ERP improves overall productivity
40	Our ERP enables e-business/e-commerce
41	Our ERP provides us with competitive advantage
42	Our ERP increases customer service/satisfaction
43	Our ERP facilitates business process change
44	Our ERP supports decision making
45	Our ERP allows for better use of organizational data resource

Notes: Assessed on a Likert scale where 1 = strongly disagree, 2 = disagree, 3 = somewhat disagree, 4 = neutral, 5 = somewhat agree, 6 = agree and 7 = strongly agree.

References

Abdinnour-Helm, S., Lengnick-Hall, M.L. and Lengnick-Hall, C.A., Pre-implementation attitudes and organizational readiness for implementing an Enterprise Resource Planning system. *Euro. J. Oper. Res.*, 2003, **146**(2), 258–273.

Al-Mudimigh, A., Zairi, M. and Al-Mashari, A., ERP software implementation and integrative framework. *Euro. J. Inform. Syst.*, 2001, **10**(4), 21–226.

AMR Research, $17 Billion expected future growth in enterprise applications market, 2005. Available onlineat: http://www.amrresearch.com/Content/View.asp?pmillid=18789 (accessed on 13 March 2006).

Armstrong, J.S. and Overton, T.S., Estimating non-response bias in mail surveys. *J. Market. Res.*, 1977, **14**(3), 396–402.

Bajwa, D.S., Rai, A. and Brennan, I., Key antecedents of executive information system success: a path analytic approach. *Decision Support Syst.*, 1998, **22**(11), 31–43.

Barua, A., Kriebel, C. and Mukhopadhyay, T., Information technologies and business value: an analytic and empirical investigation. *Inform. Syst. Res.*, 1995, **6**(1), 3–23.

Bradley, J. and Lee, C.C., ERP training and user satisfaction, in *Proceedings of the 10th Americas Conference on Information Systems*, 2004, pp. 128–133 (New York, NY).

Brancheau, J. and Wetherbe, J., Key issues in information systems management. *MIS Quart.*, 1987, **11**(1), 23–45.

Cameron, K.S., Effectiveness as paradox: consensus and conflict in conceptions of organizational effectiveness. *Manage. Sci.*, 1986, **32**(5), 539–553.

Clouther, S., Industrial ERP market turns positive after years of declining revenues, ARC Advisory Group, 2004. Available online at: http://www.arcwire.com/Newsmag/ent/erp081204.asp (accessed on 9 August 2005).

Davenport, T., Putting the enterprise into the enterprise system. *Harvard Business Rev.*, 1998, **76**(4), 121–131.

Davenport, T., *Mission Critical*, 2000 (Harvard Business School Press: Boston, MA).

DeLone, W.H. and McLean, E.R., Information systems success: the quest for the dependable variable. *Inform. Syst. Res.*, 1992, **3**(1), 60–95.

DeSisto, R., ERP integration strategies for TES systems, Gartner Research Note: tU-724-344, 1997 (Gartner Research Press: Stamford, CT).

(EC) European Commission, SME definition: commission recommendation. Available online at: http://europa.eu.int/comm/enterprize/enterprize_policy/sme_definition/index_en.htm (accessed on 5 May 2005).

Esteves, J. and Pastor, J., Enterprise resource planning systems research: an annotated bibliography. *Comm. AIS*, 2001, **7**(8), 1–52.

Frantz, P.S., Southland, A.R. and Johnson, J.T., ERP software: implementations best practices. *EDCAUSE Quart.*, 2002, **25**(4), 38–45.

Fraser, C. and Zarkada-Fraser, A., Investigating the effectiveness of managers through an analysis of stakeholder perceptions. *J. Manage. Develop.*, 2003, **22**(9), 762–783.

Freeman, R.E., *Strategic Management: A Stakeholder Approach*, 1984 (Pitman: Boston, MA).

Gable G, and Sedera, D. and Chan T., Enterprise systems success: a measurement model, in *Proceedings of the 24th ICIS*, 2003, pp. 576–591 (Seattle, Washington).

Grindley, K., Information systems issues facing senior executives: the culture gap. *J. Strat. Inform. Syst.*, 1992, **1**(2), 57–62.

Hair Jr, J.F., Anderson, R.E., Thatham, R.L. and Black, W.C., *Multivariate Data Analysis*, 1998 (Prentice-Hall International, Inc: Upper Saddle River, NJ).

Hamilton, S. and Chervany, N.L., Evaluating information system effectiveness. Part I: comparing evaluation approaches. *MIS Quart.*, 1981, **5**(3), 55–69.

Hornby, A.S., In *Oxford Advanced Learner's Dictionary of Current English*, edited by S. Wehmeier, 2000 (Oxford University Press: Oxford, UK).

Ifinedo, P., Extending the Gable *et al.* enterprise systems success measurement model: a preliminary study. *J. Inform. Tech. Manage.*, 2006a, **17**(1), 14–33.

Ifinedo, P., Key information systems management issues in Estonia for the 2000s and a comparative analysis. *J. Global Inform. Tech. Manage.*, 2006b, **9**(2), 22–44.

Ifinedo, P. and Nahar, N., Quality, impact and success of ERP systems: a study involving some firms in the Nordic-Baltic region. *J. Inform. Tech. Impact*, 2006a, **6**(1), 19–46.

Ifinedo, P. and Nahar, N., Do top and mid-level managers view enterprise resource planning (ERP) systems success measures differently? *Int. J. Manage. Enterprise Develop.*, 2006b, **3**(6), 618–635.

Iivari, J., An empirical test of the DeLone-McLean Model of information system success. *DATA BASE for Adv. Inform. Syst.*, 2005, **36**(2), 8–27.

Khandelwal, V.K., An empirical study of misalignment between Australian CEOs and IT managers. *J. Strat. Inform. Manage.*, 2001, **10**(1), 15–28.

Keen, P., MIS Research: reference disciplines and a cumulative tradition, in *Proceedings of the 1st International Conference on Information Systems* (*ICIS*), 1980, pp. 9–18 (Philadelphia, PA).

Kearns, G.S. and Lederer, A.L., The impact of industry contextual factors on IT focus and the use of IT for competitive advantage. *Inform. Manage.*, 2004, **41**(7), 899–919.

Ko, D., Kirsch, J.L. and King, W.R., Antecedents of knowledge transfer from consultants to clients in enterprise system implementations. *MIS Quart.*, 2005, **29**(1), 59–85.

Kumar, K. and van Hillegersberg, J., ERP experiences and evolution. *Comm. ACM*, 2000, **43**(4), 22–26.

Laukkanen, S., Sarpola, S. and Hallikainen, P., ERP system adoption—does the size matter? in *Proceedings of the 38th Hawaii International Conference on System Sciences* (*HICSS38*), 2005, pp. 1–9, (Hawaii).

Lee, J.C. and Myers, M., Dominant actors, political agenda, and strategic shifts over time: a critical ethnography of an enterprise systems implementation. *J. Strat. Inform. Manage.*, 2004, **13**(4), 355–74.

Li, L., Markowski, E.P., Markowski, C., & Xu, L., Assessing the effects of manufacturing infrastructure preparation prior to enterprise information-systems implementation. *Int. J. Prod. Res.*, 2006 (in press).

Lyytinen, K., Mathiassen, L. and Ropponen, J., Attention shaping and software risk—a categorical analysis of four classical approaches. *Inform. Syst. Res.*, 1998, **9**(3), 233–255.

Mabert, V.A., Soni, A. and Venkatraman, M.A., The impact of organizational size on enterprise resource planning (ERP) implementation in the US manufacturing sector. *Omega*, 2003, **31**(3), 235–246.

Mansour, A. and Watson, H., The determinants of computer-based information systems performance. *Acad. Manage. Rev.*, 1980, **3**(3), 521–533.

Markus, L. and Tanis, C., The enterprise systems experience—from adoption to success. In *Framing the Domains of IT Research: Glimpsing the Future Through the Past*, edited by R.W. Zmud, pp. 173–207, 2000 (Pinnaflex Educational Resources, Inc.: Cincinnati, OH).

Martin, M., Enterprise resource planning. *Fortune*, 1998, **137**(2), 149–151.

Moynihan, T., What chief executives and senior managers want from their IT departments. *MIS Quart.*, 1995, **14**(1), 15–25.

Myers, B.L., Kappelman, L.A. and Prybutok, V.R., A case for including work group productivity measures in a comprehensive IS assessment model, in *Proceedings of the 27th Annual Meeting of the Decizaon Sciences Institute*, 1996, pp. 756–758 (Orlando, FL).

Myers, B.L., Kappelman, L.A. and Prybutok, V.R., A comprehensive model for assessing the quality and productivity of the information systems function: toward a theory for information systems assessment. *Inform. Res. Manage. J.*, 1997, **10**(1), 6–25.

Nissinen, M., The Baltics as a business location for information technology and electronics industries, VTT Research Notes 2166, 2002. Available online at: http://www.vtt.fi/inf/pdf/tiedotteet/2002/T2169.pdf (accessed on 12 December 2005).

Nunnally, J.C., *Psychometric Theory*, 1978 (McGraw-Hill: New York, NY).

Olhager, J. and Selldin, E., Enterprise resource planning survey of Swedish manufacturing firms. *Euro. J. Oper. Res.*, 2003, **146**(2), 365–373.

Pfeffer, J., *Managing with Power: Politics and Influence in Organizations*, 1992 (Harvard Business School Press: Boston, MA).

Porter, M.E. and Millar, V.E., How information gives you a competitive advantage. *Harvard Business Rev*., 1985, **63**(2), 149–160.

Pouloudi, A. and Whitley, E.A., Stakeholder identification in the inter-organizational systems: gaining insights for the drug use management systems. *Euro. J. Inform. Syst*., 1997, **6**(1), 1–14.

Sammon, D., Adam, F. and Carton, F., Benefit realization through ERP: the re-emergence of data warehousing. *Electron. J. Inform. Syst. Eval*., 2003, **6**(2), 155–164.

Saunders, C.S. and Jones, J.W., Measuring performance of the information systems function. *J. Manage. Inform. Syst. (JMIS)*, 1992, **8**(4), 63–82.

Schein, E.H., *The Role Of The CEO in the Management of Change: the Case of Information Technology*, 1992 (Sloan School of Management: MIT Press, Cambridge, MA).

Sedera, D., Gable, G. and Palmer, A., Enterprise resource planning systems impacts: a Delphi study of Australian public sector organizations, in *Proceedings o the Pacific Asia Conference on Information Systems* (*PACIS*), 2002, pp. 584–600 (Tokyo, Japan).

Sedera, D., Gable, G. and Chan, T., Measuring enterprise systems success: a preliminary model, *in Proceedings of the 9th AMCIS*, 2003, pp. 476–485 (Tampa, Florida, USA).

Sedera, D., Gable, G. and Chan, T., Measuring enterprise systems success: the importance of a multiple stakeholder perspective, in *Proceedings of the 12th European Conference on Information Systems*, 2004, pp. 1–13 (Turku, Finland).

Seddon, P.B., A re-specification and extension of the DeLone and McLean model of IS success. *Inform. Syst. Res*., 1997, **18**(3), 240–253.

Senn, J.A., Do managers and IT professionals view the business value of information technology different? in *Proceedings of the 36th Hawaii International Conference on Systems Sciences*, 2003, pp. 1–10 (Hawaii, USA).

Shah, H.U., Dingley, S. and Golder, P.A., Bridging the culture gap between users and developers. *J. Syst. Manage*., 1994, **45**(7), 18–21.

Shang, S. and Seddon, P.B., Assessing and managing the benefits of enterprise systems: the business manager's perspective. *Inform. Syst. J*., 2002, **12**(4), 271–299.

Singletary, L., Pawlowski, S. and Watson, E., What is applications integration? Understanding the perspectives of managers, IT professionals, and end users, in *Proceedings of the 9th Americas Conference on Information Systems* (*AMCIS*), 2003, pp. 486–493 (Tampa, Florida).

Stephens, C.C., Ledbetter, W.N., Mitra, A. and Ford, F.N., Executive or functional manager? The nature of the CIO's job. *MIS Quart*., 1992, **16**(4), 449–467.

Strong, D.M., Volkoff, O. and Elmes, M.B., ERP systems and the paradox of control, in *Proceedings of the 9th Americas Conference on Information Systems*, 2003, pp. 500–507 (Tampa, FL, USA).

Tai, L.A. and Phelps, R., CEO and CIO perceptions of information systems strategy: evidence from Hong Kong. *Euro. J. Inform. Syst*., 2000, **9**(4), 163–172.

Tallon, P.P., Kraemer, K.L. and Gurbaxani, V., Executives' perceptions of the business value of information technology: A process-oriented approach. *J. Manage. Inform. Syst*., 2000, **16**(4), 145–173.

Topi, H., Lucas, W.T. and Babaian, T., Identifying usability issues with an ERP implementation, in *Proceedings of International Conference on Enterprise Information Systems*, 2005, pp. 128–133 (Miami, USA).

van der Heijden, H., Measuring IT core capabilities for electronic commerce: results from a confirmatory factor analysis, in *Proceedings of the International Conference on Information Systems*, 2000, pp. 152–163 (Brisbane, Australia).

van Everdingen, Y., Hillegersberg, J. and Waarts, E., ERP adoption by European midsize companies. *Comm. ACM*, 2000, **43**(4), 27–31.

Wang, Y., Li, H., Warfield, J. and Xu, L., Knowledge management in the ERP era. *Syst. Res. Behav. Sci*., 2006, **23**(2), 125–128.

Ward, J. and Peppard, J., Reconciling the IT/business relationship: a troubled marriage in need of guidance. *J. Strat. Inform. Syst*., 1996, **5**(1), 37–65.

Ward, J. and Peppard, J., Mind the gap: diagnosing the relationship between the IT organization and the rest of the business. *J. Strat. Inform. Syst*., 1999, **8**(1), 29–60.

Willcocks, L.P. and Sykes, R., The role of the CIO and IT function in ERP. *Comm. ACM*, 2000, **43**(4), 32–38.

Wilkes, R., and Dickson, G., Assessment of the information systems organizations: an empirical investigation of assessor perspectives, in *Proceedings of the 8th International Conference on Information Systems*, 1987, pp. 428–441 (Pittsburgh, PA).

Wu, J.-H. and Wang, Y.-M., Measuring ERP success: The key-users' viewpoint of the ERP to produce a viable IS in the organization. *Computer in Human Behavior*, 2005 (in press).

Yu, C.-S., Causes influencing the effectiveness of the post-implementation ERP system. *Indust. Manage. & Data Syst.*, 2005, **105**(1), 115–132.

Zhang, L. and Chuan Li, Y.-C., Theory and practice of systems methodology in ERP implementation. *Syst. Res. Behav. Sci.*, 2006, **23**(2), 219–235.

Zikmund, W.G., *Business Research Methods*, 2000 (Dryden Press: Fort Worth, TX).