DO BUSINESS MANAGERS AND IT PROFESSIONALS VIEW ENTERPRISE RESOURCE PLANNING (ERP) SYSTEMS SUCCESS MEASURES DIFFERENTLY?

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ABSTRACT

Enterprise Resource Planning (ERP) systems are diffusing globally. While studies discussing the adoption of ERP abound, there is a paucity of research investigating the success of such systems. This study investigates ERP success from the perspectives of business managers and IT professionals. Using a postal survey, we obtained empirical data from 44 private organizations in two Northern European countries - Finland and Estonia. Our objective was to determine whether differences exist between two organizational stakeholder groups concerning their *prioritization* and *evaluation* of ERP success measures and dimensions. Our analyses did not indicate significant statistical differences between the two groups on all the dimensions but one. We discuss the implications of our findings for both practice and research.

INTRODUCTION

An Enterprise Resource Planning (ERP) system is packaged business software designed to integrate business processes and functions. ERP systems present a holistic view of a business by permitting the sharing of common data and practices in a real-time environment (Davenport, 1998; Klaus et al., 2000). Organizations adopt them for a variety of reasons, including the replacement of legacy systems and cost reductions (Davenport, 1998; Mabert et al., 2003; Hallikainen et al., 2004). A recent press release by AMR Research reported the global ERP market increased 14% in 2004 to US $25 billion for the vendors of such software (Reilly, 2005), and the top ERP vendors include SAP and Oracle. ERP adoption continues to grow globally (Allnoch, 1997; Everdingen et al., 2000; Mabert et al., 2003) despite the difficulties and risk encountered by organizations when adopting and implementing these systems (Martin, 1998; Markus et al., 2000; Nahar and Savolainen; 2000). Studies have also shown that firms adopting ERP record higher financial performance and higher market valuation than firms that do not adopt ERP (e.g., Poston and Grabski, 2001).

Not surprisingly most studies in the trade press and information systems (IS) domain tend to discuss the implementation and adoption of ERP (see Esteves and Pastor, 2001) with only a handful focusing attention on the success of such systems (Nelson and Somers, 2001; Tan and Pan, 2002; Gable et al., 2003; Sedera et al., 2003a; 2004). We define “ERP systems success” as the utilization of such

systems to enhance organizational efficiency and effectiveness (Myers et al., 1997; Gable et al., 2003). This definition differs in scope from the technical implementation success of such systems (Martin, 1998; Markus et al., 2000; Tan and Pan, 2002). The paucity of research on ERP success is the primary motivation for this study, and secondarily we aimed at responding to the calls made by researchers (e.g., Somers et al., 2000; Al-Mashari, 2003) for more studies to investigate other aspects of ERP. We will investigate the perceptions of two key organizational stakeholder groups, namely, business managers and information technology (IT) managers or professionals with regard to ERP success assessment. 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; Shang and Seddon, 2002; 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 are more aware of the views of peers and subordinates regarding the performance of previous IT investments. On the other hand, IT professionals or managers are important actors in organizations during ERP adoption processes because of their technical backgrounds (Al-Mudimigh et al., 2001). In this study, we ask the following questions:

Q1: Would business managers and IT professionals *prioritize* the dimensions and measures of ERP systems success differently?

Q2: Would business managers and IT professionals *evaluate* the dimensions and measures of ERP systems success differently?

These foregoing questions are critical in the context of ERP adoption because researchers over the years have suggested that business managers and IT professionals may in fact hold differing views on many issues due to cultural differences (Schein, 1992; Grindley, 1992; Shah et al., 1994; Ward and Peppard, 1996, 1999; Galliers et al., 1994; Khandelwal, 2001). A study by Schein (1992) found that top management (business managers) and the IT community belong to two separate subcultures. Similarly, Ward and Peppard (1996; 1999) observed that there is often a cultural gap between the IT departments and business departments in organizations, and van der Heijden (2000) added “This gap 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”. Likewise, Shah et al. (1994) discussed the culture gap between Users of IS systems (e.g. end-users and managers) and IS developers (IT professionals). To this end, we intend to shed light on the views held by the two organizational actors regarding ERP success in their organizations. Studies investigating the viewpoints of organizational stakeholders regarding ERP systems success measurement are scarce. Given the huge financial investments made by organizations as they acquire ERP and the political nature of organizations (Sumner, 1999; Esteves and Pastor, 2001; Markus and Tanis, 2000; Lee and Myers, 2004), one may argue that corporate managers could benefit from an understanding of the perceptions of the chosen two organizational players in this study. Our conclusions would enable management to identify and effectively manage any differences between the two groups.

Research Context

We conducted our study in Finland and Estonia - two small neighboring technologically advanced Northern European countries with a combined population of approximately seven (7) million people (WEF, 2004; Ifinedo and Davidrajuh, 2005). Finnish companies began adopting ERP systems in the late 1990s (Everdingen et al., 2000; Laukkanen et al., 2005; Ifinedo, 2005), but the software is just beginning to spread to Eastern Europe, including Estonia (Clouther, 2004; Ifinedo, 2005). SAP is among the most popular ERP software in Finland, whereas Estonian firms tend to procure mid-market products like Scala and Navision (Ifinedo, 2005). Further, Finland and Estonia share similar cultural values (Hofstede, 2001; Mockaitis, 2001). It is important to point out this fact because researchers (e.g. Soh et al., 2000) suggested national culture might have a bearing on ERP implementation. Thus, although our data comes from two different countries, we are assured of the homogenous nature of the sample on a major differentiator, namely, cross-national cultural differences. The remainder of this paper is organized as follows: Section 2 provides a review of the relevant literature. Section 3 describes the research methodology and results. Section 4 presents the data analysis, and in Section 5, we discuss and conclude the findings of the study.

BACKGROUND

Our literature review draws from the IS and ERP success evaluation literature. This is followed by brief discussions on The Stakeholder Theory (Freeman, 1984) and the differing perspectives held by the two organizational actors on IT issues.

The Development of the ERP Systems Success Measurement

The evaluation of IT/IS systems success for organizations has been a recurring issue over the past three decades (Myers et al., 1997; Ballantine et al., 1997), and various assessment approaches have surfaced. One stream of research focuses on the use of attitudinal and subjective measures (see, Doll and Torkzadeh, 1988) while another utilizes financial and objective parameters (Barua et al., 1995; Brynjolfsson and Hitt, 1996). In both instances, understanding the success or effectiveness of the IT systems could be limited when the dimensions and measures of success are restrictive. There is no consensus among IS researchers regarding the conceptualization and operationalization of IS success evaluations (DeLone and McLean, 1992; Seddon, 1997; Ballantine et al., 1997), and some researchers (e.g., Grover et al., 1996; Myers et al., 1997) have argued for more comprehensive measures to be used for IS success studies. Perhaps it was the plethora of IS success assessment approaches that led Keen (1980) to seek clarification of the "dependent variable." In response, DeLone and McLean (1992) developed an integrated, multi-dimensional, and inter-related IS success model that is now the dominant model for IS evaluation research. However, their model is not without criticism (Seddon, 1997; Ballantine et al., 1997; Gable et al., 2003). DeLone and McLean (1992) themselves noted that it is unlikely that any single, overarching IS success evaluation measure will emerge and advised that a combination of measures are necessary for evaluating IS success. They stated "Researchers should systematically combine individual measures from the IS success categories to create a comprehensive measurement instrument" (p. 88). With regard to ERP system

success evaluations, perhaps Gable and colleagues (Gabel et al., 2003; Sedera et al., 2003a) were stimulated by DeLone and McLean effort as they developed an additive model that redefines the dimensions in the original DeLone and McLean IS success model. Specifically, Gable and colleagues noted that Seddon and Kiew (1994) tested paths in DeLone and McLean model finding support for some and not for the others. More recently, Iivari (2005) reported a similar finding in his study, which corroborates the findings made by Seddon and Kiew (1994). In brief, Gabel 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 (e.g., Seddon, 1997; Ballantine et al., 1997). The retained dimensions of ERP system success in Gable et al. (2003) model are *System Quality* (SQ), *Information Quality* (IQ), *Individual Impact* (II), and *Organizational Impact* (OI). Please see Figure 1. The directions of the arrows are artifacts of statistical analysis beyond the scope of this paper; please consult Ifinedo (2006) in the *Proceedings* of the SE DSI 2006 for additional information.

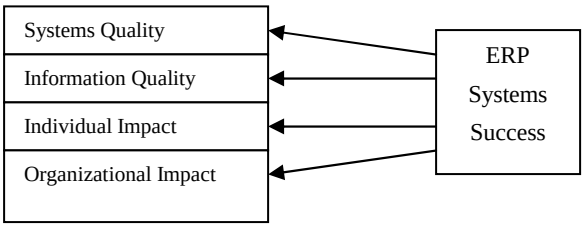

Figure 1. Gable et al. (2003) ERP systems success model

Further, Myers et al. (1996) argued that any IS success model should incorporate *Workgroup Impact* (WI) because of the contributions made by work teams and groups towards organizational productivity, and these authors incorporated the dimension into the DeLone and McLean model. Importantly, our notion of "workgroup" encompasses sub-units and/or functional departments of an organization. Essentially, the underlying philosophy of ERP (see, Davenport, 1998; Klaus et al., 2000; Markus and Tanis, 2000) underscores the arguments of Myers et al. (1996). Moreover, "interdepartmental co-operation" and "interdepartmental communication" ranked 3rd. and 6th. respectively in a study of 22 critical success factors (CSFs) of ERP implementation by Akkermans and van Helden (2002). We also incorporated a dimension named *Vendor/Consultant Quality* (VQ) into the Gable and colleagues ERP success model because of the crucial role played by the vendors and consultants of such systems throughout the life span of any ERP adoption (Davenport, 1998). Markus and Tanis (2002) highlighted "dependence on vendors" as a key issue in ERP systems implementation that differentiates these systems from other IT implementations. Recently, Ko et al. (2005) highlighted the role of vendors/consultants in transferring knowledge to organizations during ERP implementation, and vendor/consultant support is among the notable CSFs in Akkermans and van Helden's (2002) study. Of note, we grouped both vendors and consultants together because they represent an external source of expertise to the organization regarding ERP implementation, and in some instances an organization may deal with one entity representing both (see Poston and Grabski, 2001). Also, when the implementation of such systems go awry both the vendor and consultant face a similar penalty (see Markus and Tanis, 2002), and Sedera et al. (2003b) found that "consultant and vendor items loaded together yielding a new factor named External knowledge player" (p. 1411).

Our ERP systems success model comprises six main dimensions (see Figure 2) and consists of subjective and perceptual measures because objective measures are difficult to quantify and obtain from organizations (Mabert et al., 2003). Following the guidelines in Gable et al. (2003), we assessed the *additive* nature of our model. Please see Ifinedo (2006) in the SE DSI 2006 *Proceedings* for the full discussion; in summary, the largest correlation (0.74) significant at the 0.01 level is between the criterion average and the dimension average. Gable et al. (2003) note, "That the dimension average yields the largest correlation with all the criteria further supports the view that the dimensions are additive, and thus when combined yield a stronger overall measure of success than possible from any single dimension" (p.585). Further, using structural equation modeling techniques, the psychometric properties of the measures and constructs in our model are sound (Ifinedo, 2006). In summary, it is our conclusion that ERP systems success is a *second-order* factor, best represented by the conceptualization shown in Figure 2.

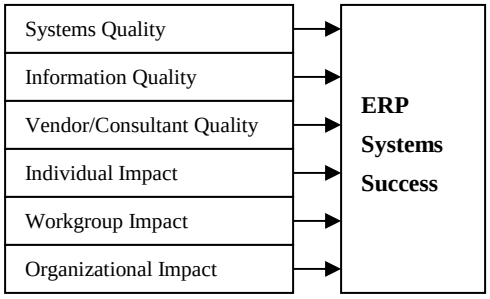

Figure 2. Our Conceptualized model of ERP systems success

Furthermore, we believe that the conceptualization of success evaluations for IT-based projects recently proposed by Nilsson (2004) might provide insights regarding our second research question. He adapted a well-known formula for calculating success in business proposed by Likert (1961). Nilsson (2004, p.39) stated the formula as follows: Degree of success in ISD [IS] = f (Quality x Acceptance x Value). This author states, "…to attain a successful result, we must have both sufficient quality in the designed solutions (i.e. IT-systems) and a good acceptance *among the actors* (i.e. users) to give them a motivation for using the solution as well as the designed solutions should create a business value to the ultimate beneficiaries (i.e. the customers to the company). A low figure in [any of the three] quality, acceptance or value will lead to an unsuccessful result – hence the multiplication signs in the formula" (p. 39). This formulation is relevant in this discourse, as it appears to recognize the importance of effectiveness and efficiency evaluations of IT systems in addition to attempting to account for the views of stakeholders.

Business Managers and IT Professional as Stakeholders

Our discussion of the Stakeholder Theory draws from the work of Freeman (1984, p 25), who 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 (Gupta, 1995; Pouloudi and Whitley, 1997). The Stakeholder Theory considers two perspectives: inside-in (employees, managers) and inside-out (others: shareholders, partners). We narrowed our scope in this study to the former. In 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. Somers and Nelson (2004) listed "top management" among key organizational players in ERP systems. Wilkes and Dickson (1987) delineated the elements in their study as follows: 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 the following: Strategic employees, Technical staff, and End users. In this paper, the two groups of stakeholders of concern to us are business managers and IT professionals. Our choice of the two groups for this study is informed by their knowledge of organizational IT investment and ERP success issues, as previously discussed (Tallon et al., 2000; Shang and Seddon, 2002). Moreover, the changing roles of IT professionals in modern organizations enable them to have access to vital information especially those pertaining to IT (Stephen et al. 1992; Ward and Peppard, 1996, 1999). Also, IT professionals are no longer just "technicians" as they used to be in the past and could provide useful insight regarding the success of ERP within their organizations (Sedera et al., 2003b, 2004). Furthermore, given the espoused cultural differences between the two groups, we believed a study including both groups might provide useful insights regarding ERP systems success evaluations.

With respect to the views held by the two organizational actors on IT issues, several studies (e.g., Galliers et al., 1994; Schein, 1992; Senn, 2003; Sedera et al., 2004) suggested that business managers and IT professionals might have diverging views on IT evaluations because of cultural gaps (Ward and Peppard, 1996, 1999). 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; Wilkes and Dickson, 1987; Moynihan, 1995; Khandelwal, 2001, Sedera et al., 2004). Particularly, some researchers (e.g., Pfeffer, 1992; Schein, 1992) found evidence in support of claims of cultural gaps between the two groups. Additionally, differing viewpoints between the two organizational stakeholder groups could also be attributable to the existence of differing agendas or goals for the organization regarding IT issues (e.g., Schein, 1992; Ward and Peppard, 1996; Lee and Myers, 2004). The political nature of organizations might result in issues being valued or viewed differently because value is a relative concept that is in the eye of the beholder (Saunders and Jones, 1992). 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 import of managerial data for the IS organization more than do IS managers. Likewise, 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; Galliers et al., 1994; 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. He found significant differences between the two groups on issues including "IT demands change constantly" and "IT managers are not business managers"; however, he noted that there were more similarities in the way both groups evaluated IT issues than there were differences. With regard 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 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. Also, Sedera et al. (2004) found that top-level managers (Strategic level) placed greater emphasis on "*Organizational Impact*" (OI) of ERP success than did others; a similar pattern was observed in relation to the impact of "*Systems Quality*" (SQ) on ERP success which the Technical staff rated higher than did others. Given the vast amount of research in extant IS literature suggesting the existence of differing views and values for the two stakeholder groups on IT related issues, it may be a reasonable to predict that a diverging view may exist for our two stakeholders in the context of ERP systems success evaluations.

METHODOLOGY

The survey was carried out from July to September 2005. Admittedly, it was impossible for us to determine the number of firms adopting ERP in Finland and Estonia, as limited funds did not permit us to determine such information. We decided to sample firms generated from local contacts, ERP User Groups and vendors lists, as well as published lists of Top Enterprises for 2004 for both countries. Firms were chosen by our ability to obtain contact addresses for key organizational personnel. We identified 350 firms in Finland and 120 firms in Estonia. In order to ensure data validity and reliability, four knowledgeable individuals completed the questionnaire prior to our mailing it, and their comments helped us improve the quality. Respondents in our survey indicated agreement with statements using a 7-point, Likert-type scale, where 1 = strongly disagree and 7 = strongly agree. A few of the statements are shown in Table 1 (omitted due to space limitations). The questionnaire also had sections for other information such as company turnover, workforce, ERP type, and demographic profiles. Since the unit of analysis of this study was at the functional and organizational levels only key organizational informants including chief executive officers, chief finance officers, unit managers, and IT managers received a packet consisting of a cover letter, questionnaire, and a self-addressed, stamped envelope. Forty percent (40%) of the mailings were matched pairs (two questionnaires in the packet), and the recipients were encouraged to give one of the questionnaires to an appropriate person within their organization. Low response rates seen with IS studies in the region Nissinen (2002) prompted us to use this method. Also, it was felt that multiple respondents from one organization would enhance the validity of the study. The other 60%

of the mailings included only one questionnaire. We encouraged the subjects to present views representative of their organization.

Results

We used SPSS 13.0 to analyze the data. Our respective response rate, excluding the unusable received questionnaires 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. Our data comprised of 20 (32.3%) IT professionals/managers and 42 (67.7%) business managers. Their job titles included chief executive officer, chief information officer, chief accountant, and IT manager. There were 35 (56.5%) men and 27 (43.5%) women in our sample. On average, they had 9 years of work experience in their respective organizations. 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. 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 (including Concorde, Scala, etc.). The majority of firms implemented their ERP between 1998 and 2002. 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 included 15 (34%) large firms, 18 (41%) medium-sized firms, and 11 (25%) small companies (Laukkanen et al., 2005).

Instrument Development, Validity and Reliability

We developed the research instrument from measures and constructs validated in the literature. Table 1 shows the sources of the measures 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 space limitations) are high. In summary, the item-to-total correlation coefficients for each dimension ranged as follows: Systems 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 through principal component analysis. The results of factor analyzing the 45 measures using Varimax with Kaiser Normalization for the six constructs explained 64.29% of the variance in the model (Figure 2). Our case studies in both countries (Ifinedo, 2005) and the pilot test also enhanced the face and content validity of this study.

Table 1. ERP Systems Success Dimensions

Dimension	No. of measures	Cronbach Alpha	Sources	Examples of questions in the instrument
Systems Quality	11	0.852	(Gable et al., 2003; Sedera et al., 2003a; DeLone and McLean, 1992)	"Our ERP has accurate data." "Our ERP is easy to use." "Our ERP is easy to learn." "Our ERP is reliable."
Information Quality	8	0.822	(Gable et al., 2003; Sedera et al., 2003a; DeLone and McLean, 1992)	"The information on our ERP is understandable." "The information on our ERP is relevant."
Vendor/Consultant Quality	5	0.876	(Thong et al., 1994; Ko et al., 2005).	"Our ERP vendor/consultant is credible and trustworthy."
Individual Impact	6	0.769	(Myers et al., 1997; Gable et al., 2003; Sedera et al., 2003a; 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; Ifinedo, 2005)	"Our ERP helps to improve workers' participation in the organization."
Organizational Impact	8	0.867	(Myers et al., 1997; Gable et al., 2003; Sedera et al., 2003a; DeLone and McLean, 1992)	"Our ERP reduces organizational costs." "Our ERP increases customer service/ satisfaction."
(Overall) ERP Systems Success measures	3	0.942	(Gable et al., 2003; Sedera et al., 2003a)	Overall, the impact of our ERP on **i)** me, **ii)** my workgroup (department), and **iii)** my organization has been positive"

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. However, our data analysis indicated that both the parametric test (t-test) and non-parametric test (Mann-Whitney U test) yielded analogous interpretations, but we will only show the results from the latter. Importantly, we performed a strict test on our data by randomly selecting an equal number from each group, and the means were comparable with the ones retained for the original data set. The first objective was 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. We then used the Kendall Tau-b coefficient (T^b),

significant at 0.05 to compare the ranking orders of the 45 measures for both groups, and the results were $T^b = 7.34$, Value = 0.562, Sig. (p) = 0.000. This indicates 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, we highlighted a few salient parts as follows: The top five most important measures in order of importance for both groups are comparable with variables 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 (Please see Table 2). Both groups also rated ERP's capability to enhance individual productivity among the least important measures. However, the main differences that can be seen relate to a few of the measures pertaining to the *Vendor/Consultant Quality* dimension; IT professionals seemed to indicate less satisfaction with this dimension compared to their business counterparts. In contrast, the business managers' top ten ranking measures included this statement: "*Our ERP vendor / consultant is trustworthy*."

Table2. 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 organizational-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 organizational 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			3.95	**38**

	quality training and services			
	Our ERP vendor / consultant communicates well with my organization		4.05	**37**

Legend = * (tie)

Furthermore, both groups rated lowly measures relating to the ease of learning and using ERP, and the 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 dealerships states, "X (ERP) does not give us any competitive advantage in the market". We can conclude that the top and bottom measures for the two groups compare reasonably well. As part of Q1, 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 relevant measures (see Hair et al., 1998). For business managers, the order of importance for the dimension is as follows: IQ, VQ, SQ, II, WI, and OI. For IT professionals, the order of importance is IQ, SQ, WI, OI, II and VQ (Please see Table 3). Concerning the relative ranking ordering, the results of the Kendall Tau-b coefficient test (significant at $p>0.005$) for the two groups on the six dimensions are $T^b = 8.18$, Value = 0.333, Sig. = 0.413, which indicates difference between them. The two groups seem not to agree on prioritization of the dimensions. The top-three and the bottom-three dimensions include the same items, and both groups ranked the *Information Quality* dimension highest. Sedera et al. (2004) found that differing stakeholder groups were in perfect agreement about the importance of the *Information Quality* dimension. Clearly, business managers appear to prioritize the *Vendor/Consultant Quality* dimension higher than do their IT counterparts.

Table 3. The Ranking of ERP Success Dimensions

Dimension	Business managers (n=42)			IT professionals (n=20)			Total (n=62)	
	Mean	Std. Dev.	Rank	Mean	Std. Dev.	Rank	Mean	Rank
Systems Quality	4.7762	.8430	**3**	4.7550	.9305	**2**	4.78	**2**
Information Quality	5.2381	.7657	**1**	5.2778	.7902	**1**	5.25	**1**
Vendor/Consultant Quality	4.9000	.9890	**2**	4.2100	.8979	**6**	4.68	**3**
Individual Impact	4.6270	.8262	**4**	4.2583	.7482	**5**	4.51	**5**
Workgroup Impact	4.5204	.8129	**5**	4.6000	.8402	**3**	4.55	**4**
Organizational Impact	4.4851	.9174	**6**	4.2813	1.0926	**4**	4.42	**6**
Overall ERP systems success	5.0873	.9934		4.7833	1.3945		4.99	

We also wanted to determine if business managers and IT professionals *evaluate* the measures and dimensions of ERP systems success differently with our second question (Q2). 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.

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

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 *Vendor/Consultant Quality* dimension, which is consistent with foregoing observations.

Table 5. The Test Results for the Dimensions of ERP Success

	SQ	IQ	VQ	II	WI	OI	ERP success
Mann-Whitney U	394.500	400.500	263.000	306.000	384.500	383.000	406.500
Sig. (2-tailed)	.701	.769	.018	.085	.592	.577	.838

Further, the formula proposed by Nilsson (2004) was adapted to suit this present discourse. Equation (2) below was utilized to add insight to our inquiry regarding how each group evaluates ERP success.

***Degree of ERP success = f (Quality X Acceptance X Value*)** **(1)**

Degree of ERP success = f [(SQ + IQ + VQ) X (ERP success measures) X (II + WI + OI)] **(2)**

Table 6 indicates that business managers have a higher perception of ERP success than do IT professionals. The values of the "degree of ERP systems success" for business managers and IT professionals are 3105.5 and 2687.0, respectively. Although there is an apparent difference between the two groups, this is relatively low at 13%. Overall, this finding is consistent with other similar studies (e.g., Abdinnour-Helm et al., 2003) suggesting that managers might evaluate ERP value higher than do others.

Table 6. The Results for the Degree of ERP Systems Success

	Business managers (n= 20) (Mean)	IT managers (n= 42) (Mean)
Quality	System Quality = 4.78 Information Quality = 5.24 Vendor/ Consultant Quality = 4.90	System Quality = 4.76 Information Quality = 5.28 Vendor/ Consultant Quality = 4.21
	Sub-total = 14.92	**Sub-total = 14.25**
	Individual Impact = 4.63	Individual Impact = 4.26

Value	Workgroup Impact = 4.52 Organizational Impact = 4.49	Workgroup Impact = 4.60 Organizational Impact = 4.28
	Sub-total = 13.64	**Sub-total = 13.14**
Overall, ERP success indicators	Overall impact of ERP on the individual = 5.17 Overall impact of ERP on the workgroup = 5.02 Overall impact of ERP on the organization = 5.07	Overall impact of ERP on the individual = 4.85 Overall impact of ERP on the workgroup = 4.70 Overall impact of ERP on the organization = 4.80
	Sub-total = 15.26	**Sub-total = 14.35**
Degree of ERP systems success	**3105.5**	**2687.0**

DISCUSSIONS AND CONCLUSION

The objective of this study was to determine whether two organizational stakeholder groups, namely business managers and IT professionals, hold differing views regarding their assessment of ERP systems success measures and dimensions. In this regard, we developed a research instrument that builds from prior studies, and we gathered empirical data from private firms in two neighbouring Northern European countries (Finland and Estonia) using a postal questionnaire survey. Participation in the study was voluntary, and the response rate for the study is adequate for an exploratory study such as this one. The extant IS literature suggests dissimilar views do exist between the two groups because of the existence of cultural gaps. Given this information, we believed that this research would corroborate prior studies. Our statistical analysis did not indicate any differences between the two groups regarding how they *prioritize* the measures of ERP success, but we did find some variation on how each group prioritizes the dimension relating to *Vendor/Consultant Quality*. Business managers rated this dimension significantly higher than did IT professionals. According to Markus and Tanis (2000, 189-190), ERP systems "experiences may differ considerably, depending, for example, on whether the adoption of the enterprise system is initiated by IS specialists or by businesspeople. Anecdotal evidence suggests that senior business and other functional managers are often the process owners with the responsibility to initiate and directly deal with the ERP vendors/consultants during the implementation process (see for example, Davenport, 1998; Esteves and Pastor, 2001; Markus and Tanis, 2000; Al-Mudimigh et al., 2001; Lee and Myers, 2004). Consequently, the in-house IT departments may be relegated to the background with such an arrangement. Moreover, "enterprise package implementation obsoletes some of the IT skills commonly found in IT adopting organizations and requires the acquisition of new skills" (Markus and Tanis, 2000, 177). The limited role that in-house IT experts have during ERP adoption processes and the subsequent need for additional training may explain the difference between the two groups on this dimension.

With regard to the evaluation of each of the 45 measures of ERP success individually, our statistical analysis showed that there were three (3) measures on which the two groups hold diverging views. The three (3) measures relate to the *Vendor/Consultant Quality* dimension, which we discussed in the preceding paragraph. Further, their evaluations of the "degree of ERP success" are comparable,

though with some minor differences. It is easy to notice that business managers evaluated "degree of ERP success" in their various organizations higher than IT professionals did. This finding lends support to Abdinnour-Helm et al. (2003) where they suggested 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). Overall, this finding is consistent with other studies suggesting that 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 than do others. Further, we observed both groups value the informational quality of ERP systems as the important dimension of the six that we operationalized. 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. Our data also showed that firms adopting ERP might be having trouble with certain aspects of these systems. For example, both business and IT managers in this study rated measures relating to the ease of using and learning ERP as well as their flexibility lowly. Other items listed among the least regarded measures include the ability of ERP to provide adopting organizations with competitive advantage and improving business process change. Paradoxically, these are some of the reasons organizations adopt ERP in the first place. Our data suggests that the relatively low placement of these measures supports arguments made by some researchers (e.g., Strong et al., 2003; Sammon et al., 2004; Topi et al., 2005) for the providers and adopters of such systems to be aware of the limitations of ERP systems. In summary, there are implications for the findings of this study, which we will discuss after highlighting its limitations.

Limitations of the Study

We would like to note that generalizing the findings in this study to all contexts should be done with caution. There are limitations to this study, some of which we briefly discuss as follows. It is exploratory, and although a convenient sample of 62 respondents may be adequate in these two small countries, it is insufficient for a conclusive understanding of the issue. Our sample is not random. Nor can we rule out personal bias, even when the respondents claimed to present an average view for their respective organizations on selected issues. We used subjective and perceptual measures in this study; it is likely that both stakeholders groups might rate objective measures of ERP success differently. 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. We used variables that have been tested and validated for the questionnaire, but in one dimension - Workgroup Impact - we used a relatively new scale that might require validation. Further, the administered questionnaire was in English. Although managers in Finland and Estonia have a good command of the English language, there is a possibility that completing the questionnaire in a foreign language might have posed a problem and that some issues were misunderstood. 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.

Implications for Practice and Research

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; Gupta, 1995; 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. The common views of the two players suggest that they may accept their ERP software as belonging to everyone, and conflicts that might have arisen from having an IT system that one party believes benefits the other are avoided. Our study appears to suggest that ERP adopting organizations can engender a harmonious organizational environment by enlisting their in-house IT experts in the ERP implementation process. This could enhance a positive organizational climate in which overall success with the software is achieved, and resistance or sabotage avoided. Under such favorable scenarios, the organization is better poised to reap the benefits of its investment in such complex and expensive IT systems. Management could also gain further insight regarding this issue by assessing the viewpoints of other organizational actors using our procedures and ERP success model. Additionally, the lowly rated measures identified in this study could stimulate the providers of ERP systems to develop robust ERP systems. It is reasonable to suggest that prospective customers would appreciate systems deemed easy to use and learn and capable of meeting the needs that prompted the acquisition of the system.

The IS field is equally enriched by our effort. Drawing from the ERP systems success measurement proposed by Gable and colleagues, we incorporated two relevant dimensions as we developed a more comprehensive measurement model. Our research is among the first to operationalize the *Workgroup Impact* for IS success evaluations proposed by Myers et al. (1996; 1997). We can say that our framework provides the basis for the development of an appropriate scale to assess ERP success in organizations. This study is an initial attempt at examining ERP success from the perspective of differing organizational stakeholder groups, from which future studies could draw. We investigated ERP success using only private firms in contrast to other comparable studies (e.g., Gable et al., 2003; Sedera et al., 2003a, b; 2004) that studied the same theme in public-sector organizations. Our presentation of the views from the private sector adds to the body of knowledge. Importantly, this study responds to the ongoing calls by researchers (e.g., Somers et al., 2000; Al-Mashari, 2003) for ERP studies to be extended to wide-ranging areas other than the putative issues of adoption and implementations of such systems (see, e.g., Esteves and Pastor, 2001). In general, our results seem to suggest comparable views may exist between business managers and IT professionals regarding ERP systems success measurement. This confirms findings in other studies that views between the groups may in fact not be static, i.e., at times converging and otherwise. Apparently, our study lends support to the conclusions reached by Senn (2003) where he suggests that there may be more similarities in the way IT professionals and business managers evaluate IT issues than there are differences.

In this study, both groups seem to agree on all the dimensions but one, the *Vendor/Consultant Quality* dimension, perhaps because of the role being accorded IT professionals in the course of implementing ERP. More generally, our study supports the view expressed by other researchers (e.g., Abdinnour-Helm et al., 2003; Sedera et al., 2004) that managers might have a broader view on ERP

success issues than do others. Findings in this study corroborate Sedera et al. (2004) wherein *Information Quality* was the only dimension of ERP success on which all their stakeholder groups seemed to have perfect agreement. Here, this dimension rated and ranked highly for both groups. Future studies could benefit from this information. We add credence to the work of other researchers (Strong et al., 2003; Sammon et al., 2004; Topi et al., 2005) indicating the limitations of ERP systems. Additionally, this research may stimulate further inquiry and theory development regarding the success or effectiveness of enterprise systems in adopting firms in relation to organizational stakeholders. The challenge for other researchers is to produce a deeper understanding of our theme by replicating the study in other settings and regions. Such replications are useful for the development of cumulative knowledge in the IS field (Keen, 1980). Also, there is a need to validate the proposed ERP system success model and research instrument. Studies involving other organizational stakeholder groups might produce useful insights for practitioners and researchers alike. More importantly, our study opens up new areas for future studies. Investigations could be aimed at finding out whether IT professionals are satisfied with their roles during ERP implementation against the backdrop of others assuming process ownership roles. Also, answers to the following questions could be useful: Are ERP adopting organizations satisfied with their systems' features, and do these software enhance their competitive advantage? Would ERP systems success in organizations be impacted negatively in situations where IT professionals are given lesser roles during ERP implementations? What views do in-house IT professionals have of their ERP vendors/consultants?

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