Do top- and mid-level managers view Enterprise Resource Planning (ERP) systems success measures differently?

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Abstract: We investigated ERP systems success measurement from the perspectives of top- and mid-level managers. Using surveys in two small Northern European countries, we aimed to determine whether differences exist between the two groups. Our results showed that there are no significant statistical differences between the two groups. The implications of the findings for both practice and research are outlined.

Keywords: ERP success; top management; mid-level managers; organisational stakeholder groups; Finland; Estonia.

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1 Introduction

Enterprise Resource Planning (ERP) systems are complex and comprehensive software packages. Often, authors describe them by their functionality, for example, Ho *et al*. (2004) state "ERP systems work essentially at integrating all business information, allowing organisations to manage effectively their resources of people, materials and finance" (p.235). ERP systems are being adopted worldwide for a variety of reasons, including legacy systems replacement, cost reductions and faster information transactions (Davenport, 1998; Everdingen *et al*., 2000; Esteves and Pastor, 2001). Not surprisingly, most studies in the trade press and Information Systems (IS) domain tend to discuss the implementation and adoption of ERP (Esteves and Pastor, 2001) with only a handful focusing attention on the success of such systems (*e.g.*, Nelson and Somers, 2001; Tan and Pan, 2002; Gable *et al*., 2003; Sedera *et al*., 2003; 2004). We define 'ERP systems success' as the utilisation of such systems to enhance organisational efficiency and effectiveness (Myers *et al*., 1997; Gable *et al*., 2003). It differs in scope from the technical implementation success (and failure) of such systems (*e.g.*, Martin, 1998; Markus *et al*., 2000; Tan and Pan, 2002; Tsai *et al*., 2005). 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.

Organisations consist of various actors or stakeholders whose interests might converge (or diverge) depending on roles, values, or situations (Rousseau, 1978; Cameron, 1986; Pfeffer, 1992; Sedera *et al*., 2004). With respect to Information Systems (IS) success evaluations, studies have shown that different management levels might value issues differently (Brancheau and Wetherbe, 1987; Moynihan, 1990; Saunders and Jones, 1992; Schein, 1992). Concerning ERP success assessment, Sedera *et al*. (2004) found that such evaluations differed according to employment cohorts. It is worth noting that Igbaria (1990) found that no significant differences exist between top- and lower-level management regarding IS success in the context of end-user computing.

In this paper, we will investigate the perceptions of two key organisational stakeholder groups, namely, top-level and mid-level (functional) management with regard to ERP success evaluations. We excluded from our study lower-level workers who perform clerical duties, which was a third management level identified by Anthony (1965). Top management support and involvement are vitally important for the success of IT projects in organisations because of their influence and role in providing financial resources and relevant guidelines (Doll, 1985; Teo and Ang, 1999; Pijpers *et al*., 2001). On the other hand, mid-level managers reportedly have a better understanding of how IT systems affect the business than do top-level managers, and may use IT more than do top managers (Moynihan, 1990; Schein, 1992; Teo and Ang, 1999; Shang and Seddon, 2002; Pijpers *et al*., 2001; Seeley and Targett, 1999). Huge investments are required to adopt an ERP system (Davenport, 1998; Somers *et al*., 2000), and corporate managers could benefit from an understanding of how key organisational players view its success. Similarly, insights from this study could facilitate theory development with regard to ERP systems success assessment and organisational stakeholders. Thus, we seek answers to the following questions:

Q1: Do top management and mid-level managers prioritise the dimensions and measures of ERP systems success differently?

Q2: Do top management and mid-level managers evaluate the dimensions and measures of ERP systems success differently?

Research context

We conducted our research in Finland and Estonia, two small technologically advanced Northern European countries with a combined population of approximately seven million people (WEF, 2003; Ifinedo and Davidrajuh, 2005). Finnish companies began adopting ERP systems in the late 1990s (Everdingen *et al*., 2000; Laukkanen *et al*., 2005), but the software is just beginning to spread to Estonia (Clouther, 2005). Further, Finland and Estonia are neighbouring countries with similar cultural values (Hofstede, 2001; Mockaitis, 2002). Hofstede's (2001) cross-national typology includes the following: Power Distance (PD), Individualism-Collectivism (IC), Uncertainty Avoidance (UA), and Masculinity-Femininity (MF). We will not focus on these issues, but will centre our study on organisational stakeholders. However, because PD is a cultural dimension relevant to our discussion, we will explore it further. PD refers to the degree of equality (or inequality) in a society and measures how subordinates respond to power and authority. A low PD ranking indicates that a society de-emphasises the differences between citizens' powers. Hofstede (2001) gave Finland and Estonia low PD rankings indicating that superiors and their subordinates in those countries have similar views and do not treat each other differently.

The remainder of this paper is 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. The discussions of the research findings and their implications are presented in Section 5. Finally, the concluding remarks are made in Section 6.

2 Background

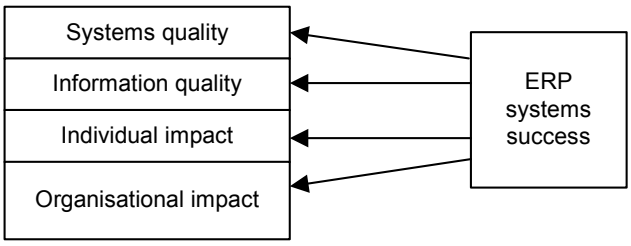
We will first review IS and ERP success assessment literature (*e.g.*, DeLone and McLean, 1992; Gable *et al*., 2003; Sedera *et al*., 2003), then briefly discuss The Stakeholder Theory (Freeman, 1984) and the differing perspectives held by actors on organisational issues (Rousseau, 1978; Cameron, 1986; Pfeffer, 1992; Schein, 1992).

Over the past three decades, evaluating the value and success of IT systems for organisations has been a recurring issue (Myers *et al*., 1997; Seddon *et al*., 2002; Zviran *et al*., 2005), 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 utilises financial and objective parameters (*e.g.*, 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 (see DeLone and McLean, 1992; Gable *et al*., 2003; Ballantine *et al*., 1997). There is no consensus among IS researchers regarding the conceptualisation and operationalisation 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; Gable *et al*.,

2003) have argued for more comprehensive measures to be used for IS success studies. However, this study will use subjective and perceptual measures because objective measures are difficult to quantify and obtain from organisations.

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 interrelated IS success model that is now the dominant model for IS evaluation research (Myers *et al*., 1997; Gable *et al*., 2003). 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 is necessary for evaluating IS success. They stated that "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 *et al*. (2003; Sedera *et al*., 2003) were stimulated by the foregoing request made by DeLone and McLean (1992) as they developed an *additive* model that redefines the dimensions in the original DeLone and McLean (1992) IS model. Gable *et al*. (2003) eliminated (through statistical analysis) the Use and User satisfaction dimensions. Arguments against those dropped dimensions 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.*'s model are Systems Quality (SQ), Information Quality (IQ), Individual Impact (II), and Organisational Impact (OI).

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

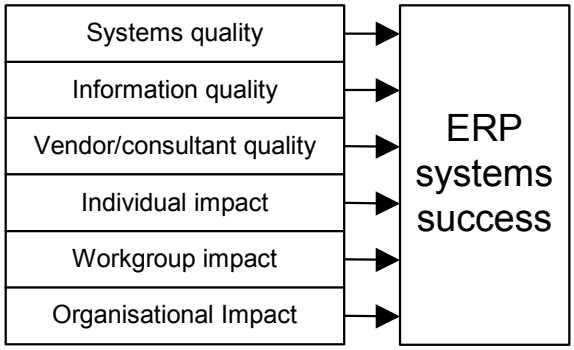


Further, Myers *et al*. (1996) argued that any IS success model should incorporate Workgroup Impact (WI) because of the contributions made by work teams and groups toward organisational productivity. Our notion of 'workgroup' encompasses sub-units of an organisation. Essentially, the underlying philosophy of ERP (see Davenport, 1998; Markus and Tanis, 2000; Ho *et al*., 2004) underscores the arguments of Myers *et al*. (1996). Finally, a dimension named Vendor/Consultant Quality (VQ) is incorporated into the Gable *et al.*'s 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; Somers *et al*., 2000; Markus and Tanis, 2000; Ko *et al*., 2005). Thus, our ERP systems success model comprises six dimensions (see Figure 2). Following the guidelines in Gable *et al*. (2003), we assessed the *additive* nature of our model. (Please see Ifinedo (2006) 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 modelling techniques, the psychometric properties of the measures and constructs in our model are sound (see Ifinedo, 2006). In summary, it is our conclusion that ERP systems success is a *second-order* factor, best represented by the conceptualisation shown in Figure 2.

Figure 2 Our conceptualised model of ERP systems success



Furthermore, we believe that the conceptualisation of success evaluations for IT-based projects recently proposed by Nilsson (2004) might provide insight 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:

$$\text{Degree of success in ISD [IS]} = f(\text{Quality} \times \text{Acceptance} \times \text{Value})$$

Furthermore, he stated:

> "…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 that 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 formula is relevant to this discourse because it recognises that differing stakeholders might perceive the constructs of success differently.

That said, 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 organisation 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).

In extant IS literature, stakeholders have been identified based on a particular research purpose. Singletary *et al*. (2003) identified stakeholders as managers, IT professionals, and end users. Somers and Nelson (2004) listed 'top management' among key organisational players in ERP systems. Lyytinen *et al*. (1998) describe stakeholders as actors that can set forward claims or benefit from IT development issues. In their study of ERP success assessment in 27 public organisations in Australia, Sedera *et al*. (2004) identified their stakeholders using employment cohorts, to include the following: Strategic, Technical staff and End users. As previously stated, we identified two groups of stakeholders: the top- and mid-level managers according to the three levels of management described by Anthony (1965).

Literature shows that the organisational rank and position of an individual is crucial in influencing the decisions of other organisational stakeholders (Rousseau, 1978; Raghunathan and Raghunathan, 1989). Because of the political nature of organisations (Rousseau, 1978; Cameron, 1986; Pfeffer, 1992; Parker *et al*., 1995), differing stakeholders have dissimilar values or opinions on certain organisational issues (Weiss *et al*., 1986; Wilkes and Dickson, 1987; Brancheau and Wetherbe, 1987; Lederer and Mendelow, 1988; Moynihan, 1990; Schein, 1992). For example, Brancheau and Wetherbe (1987) found top- and mid-level management have different views on key IS management issues. Mid-level managers reportedly have a better understanding of how IT systems affect the business than do top-level managers (Teo and Ang, 1999; Shang and Seddon, 2002; Moynihan, 1990; Schein, 1992). Because value is a relative concept that is in the eye of the beholder, the evaluation of IS issues in an organisation often depends upon the individual's position or rank (Weiss *et al*., 1986; Wilkes and Dickson, 1987; Raghunathan and Raghunathan, 1989). Wilkes and Dickson (1987) studied the perceptions of three organisation stakeholders (top-level management, IS managers, and internal auditors) regarding the assessment of an IS organisation. They found that the perceptions of the three groups differed markedly. With regard to ERP success evaluations, Sedera *et al*. (2004) found top-level managers (Strategic level) placed greater emphasis on Organisational Impacts, whereas a group of mid-level managers, *i.e.*, Technical staff rated Systems Quality higher than did others. The differences between top- and mid-level managers are not surprising. Pijpers *et al*. (2001, p.960) state, "Their [top-level management] position and role in the organisation and the nature of their duties and social/organisational relationship differ from the other members of the company". Doll (1985, p.17) states, "Collectively, top management is responsible for providing general guidance for the IS activity", whereas mid-level managers oversee the operational aspects of the business that might involve more extensive use of IS than is required for top-level management (Seeley and Targett, 1999). Since prior studies suggest that the two stakeholder groups have diverging views and opinions on IS and related issues, it is reasonable to expect diverging views in the context of ERP success evaluations.

3 Methodology

3.1 Research method

Participating firms in the study were chosen by our ability to obtain contact addresses of key organisational personnel, as the population of ERP adopting firms in the two countries is unknown. In brief, our sampled firms were generated from the following

sources: ERP User Groups, ERP Vendors customers' lists, published lists of Top Enterprises for 2004 for both countries, and local contacts. We chose only the private sector because we believed that the adoption of ERP systems might be higher there than in public firms. We identified 350 firms in Finland and 120 firms in Estonia. Four knowledgeable individuals completed the questionnaire prior to our mailing it, and their comments helped us improve its quality. Respondents in our survey indicated agreement with the statements using a 7-point, Likert-type scale, where 1 = strongly disagree and 7 = strongly agree. A few of the statements[1] are shown in Table 1. The questionnaire also had sections for other information such as company turnover, workforce, ERP type, and demographic profiles.

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.*, 2003; 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.*, 2003; 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.*, 2003; DeLone and McLean, 1992)	'Our ERP improves individual productivity.' 'Our ERP is beneficial for individual's tasks.' '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 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.' 'Our ERP supports decision making.'
(Overall) ERP systems success measures	3	0.942	(Gable *et al.*, 2003; Sedera *et al.*, 2003)	Overall, the impact of our ERP on: i) me, ii) my workgroup (department), and iii) my organisation has been positive

Since the unit of analysis of this study was at the functional and organisational levels, only key organisational informants including chief executive officers, chief finance officers and unit 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 organisation.

Low response rates seen with IS studies in the region (Nissinen, 2002) prompted us to use this method. Also, it was felt that that multiple respondents from one organisation would enhance the validity of the study. The other 60% of the mailings included only one questionnaire.

3.2 Results

We used SPSS 13.0 to analyse 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 26 (42%) top-level management and 36 (58%) mid-level 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. On average, they had nine years of work experience in their respective organisations. 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 organisations, 14.5% had Movex, 9.6% had Scala, 8.1% had Hansa, and the remaining 33.9% had other mid-market ERP (including Concorde, Nova, *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. The two largest groups in our sample are manufacturing with nine firms (20%) and the retail/warehouse business with 12 firms (27%). Our sample classified by workforce using guidelines provided by Laukkanen *et al.* (2005) included 15 (24%) small companies, 22 (36%) large firms, and 25 (40%) medium-sized.

3.3 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), Organisational 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 analysing the 45 measures using Varimax with Kaiser Normalisation for the six constructs explained 64.29% of the variance in the model (Figure 2).

4 Data analysis

We tested the normality of our data variables using the Kolmogorov-Smirnov statistic. The results indicated that our data do not conform to a normal distribution, hence the use of non-parametric tests for our data analysis. The first objective was to determine whether there are differences in how top- and mid-level managers *prioritise* the dimensions and measures 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. 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 $T^b = 9.55$, Value = 0.648, Sig. (p) = 0.000. This indicates that there is a strong relationship between the two variables, suggesting that there are no differences between the two groups in prioritising the measures of ERP systems success. Upon inspection of the ranking orders for both groups, we highlighted a few salient parts as follows. The five most important variables in order of importance for top-level managers are as follows: importance, relevance, accuracy, reliability, and timeliness of ERP. This is almost the same for the mid-level managers, with the exception of 'usability of ERP', which was included in their top-five measures but was 8th in importance for top-level managers. Of the top-ten issues or measures, 90% are common to both groups, which is similar to the 80% seen for the measures on which both groups attach less priority or importance. Examples of those 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.

With regard to the priority accorded the dimensions of ERP success, we assessed the six dimensions 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 top-level managers, the order of importance for the dimension is as follows: IQ, VQ, SQ, WI, OI and II. For mid-level managers, the order of importance is IQ, SQ, VQ, WI, II, and OI. (Please see Table 2 for the details). In this regard, the results of the Kendall Tau-b coefficient test for the two groups on the six dimensions are $T^b = 7.33$, Value = 0.476, Sig. = 0.000, which indicates no difference between them. The two groups seem to agree on prioritisation of the dimensions (as they did with the individual measures), which is evident by their respective ordering. 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 their subjects – differing stakeholder groups – were in perfect agreement about the importance of the Information Quality dimension; the same was not true for the other dimensions of ERP success on which comparisons were made. In this study, it is important to point out that top managers clearly rated all the measures (and dimensions) higher than did their mid-level counterparts.

Table 2 The ranking of ERP success dimensions

Dimension	*Top management (n=26)*			*Mid-level management (n=36)*			*Both (n=62)*	
	Mean	*Std. dev.*	*Rank*	*Mean*	*Std. dev.*	*Rank*	*Mean*	*Rank*
Systems quality	4.8500	0.9815	3	4.7132	0.7851	2	4.77	2
Information quality	5.3632	0.7960	1	5.1795	0.7550	1	5.25	1
Vendor/consultant quality	4.8846	1.0736	2	4.5308	1.0039	3	4.68	3
Individual impact	4.5641	0.8394	6	4.4744	0.8611	5	4.51	5
Workgroup impact	4.6758	0.9420	4	4.5165	0.7195	4	4.55	4
Organisational impact	4.6538	1.1431	5	4.2788	0.8286	6	4.42	6
(Overall) ERP success	5.2564	1.2730		4.8462	1.0759		4.99	

Our secondary objective was to determine if top- and mid-level managers *evaluate* the dimensions and measures of ERP systems success differently. Using the Mann-Whitney U-test, we compared the measures individually across the two groups. Table 3 indicates the three measures on which there are disagreements between the two groups.

Table 3 The test results for the diverging measures

Variable or measure	*Mann-Whitney U-Test statistic*	*Sig. (2-tailed)*
Our ERP has accurate data	337.5	0.049
Our ERP is reliable	324.5	0.028
Our ERP improves overall productivity	313.5	0.023

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

$$\text{Degree of ERP systems success} = f(\text{Quality} \times \text{Acceptance} \times \text{Value}) \quad \text{(i)}$$

$$\text{Degree of ERP systems success} = f[(SQ + IQ + VQ) \times (\text{Overall, ERP success measures}) \times (II + WI + OI)] \quad \text{(ii)}$$

Table 4 indicates that top managers have a higher perception of ERP success than do mid-level managers. The values of the 'degree of ERP systems success' for top management executives and mid-level managers are 3305.4 and 2795.2, respectively. Although there is an apparent difference between the two groups with respect to their 'degree of ERP systems success', this is relatively low at 15%. Overall, this finding, like others discussed, support other studies (*e.g.*, Abdinnour-Helm *et al*., 2003) suggesting that "managers (higher levels)… may have a broader knowledge base with which to evaluate the potential value of …ERP systems and value that ERP offers may be more directly related to the contributions they make to the firm" (p.270).

Table 4 The results for the degree of ERP systems success for both groups

	Top management (N= 26) (Mean)	*Mid-level managers (N = 36) (Mean)*
Quality	System quality = 4.85	System quality = 4.71
	Information quality = 5.36	Information quality = 5.17
	Vendor/consultant quality = 4.88	Vendor/consultant quality = 4.53
	Sub-total = 15.09	Sub-total = 14.41
Value	Individual impact = 4.56	Individual impact = 4.51
	Workgroup impact = 4.68	Workgroup impact = 4.55
	Organisational impact = 4.65	Organisational impact = 4.42
	Sub-total = 13.89	Sub-total = 13.48
Overall, ERP success indicators	Overall impact of ERP on the individual = 5.31	Overall impact of ERP on the individual = 4.89
	Overall impact of ERP on the workgroup = 5.23	Overall impact of ERP on the workgroup = 4.69
	Overall impact of ERP on the organisation = 5.23	Overall impact of ERP on the organisation = 4.81
	Sub-total = 15.77	Sub-total = 14.39
Degree of ERP systems success	3305.4	2795.2

5 Discussions

The primary objective of this study was to determine whether two groups of organisational stakeholders, namely, top- and mid-level (functional) managers, hold differing views regarding their assessment and prioritisation of ERP systems success measures and dimensions. The extant IS literature suggests that dissimilar views do exist because of the differing organisational roles and positions of the two groups. Given this reasoning, we believed that this research would corroborate prior studies of this view. However, our statistical analyses did not indicate any differences between the two groups, but we did find some variations on how each group evaluates certain measures. Overall, both groups hold comparable views on the measures of ERP success. We can tentatively say that both groups *prioritised* and *evaluated* ERP measures in a similar fashion, and the values they attached to the 'degree of ERP success' may be similar; even when top management consistently assessed the *success* of their ERP in their various organisations higher than did mid-level managers (please see Tables 2 and 4). A possible explanation to this observed pattern is provided by Abdinnour-Helm *et al.* (2003) where they comment, "perhaps managers [higher levels] saw the new ERP system as both inevitable and likely to enhance their control over operations" (p.270). Our finding is consistent with other studies suggesting that top-level managers tend to have a broader view of organisational issues (Weiss *et al*., 1986; Brancheau and Wetherbe, 1987; Wilkes and Dickson, 1987; Schein, 1992; Abdinnour-Helm *et al*., 2003) and would tend to indicate higher evaluations than do others. Further, we observed that both groups value the informational quality of ERP systems as the important dimension of the six that we operationalised. 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 across differing stakeholder groups. On the other hand, the Organisational Impact dimension was the least important dimension, and was rated higher by top managers in this study than did mid-level managers to support the results in Sedera *et al.*'s (2004) work, where strategic users (higher level management) seemed to place more emphasis on the dimension than did others.

Further, this study identified three measures on which the two groups held differing views, namely, 'accuracy', 'reliability', and 'the improvement of overall productivity by ERP'. As with the other measures, top-level management has a more positive view of these issues than do their mid-level counterparts. These differences could be attributable to the organisational influence and position held by top-level managers. For example, while some departments in an organisation might have to wait for their ERP systems to be updated and made 'accurate' and 'reliable' before proceeding with certain aspects of their tasks (see Strong *et al.*, 2003), it is possible that top-level managers can obtain such data and information from differing sources, including non-IT-based systems (Davenport, 1994). Another plausible explanation could be that these three measures may highlight the paradoxical effect of ERP systems on organisational control. Strong *et al.* (2003, p.503) described this phenomenon as the 'unequal outcome' resulting from the use of data held on the ERP system, and suggested that in the process of increasing the visibility of data, lower-level workers may gain 'greater access to information with which to make decisions and meet customer demands'. They added that due to the integrated nature of ERP systems, 'together with the flawed assumption that the *same data* will serve many purposes' (p.505), it is likely that a paradox of control becomes noticeable in ERP-adopting organisations. They identified three dimensions of data (definition, accuracy and timeliness) as being critical for the monitoring of the paradoxes of control arising from ERP systems. These authors noted that it is important to address data definition issues in ERP systems across the various functions in an organisation so as not to compromise the organisation's overall productivity. Apparently, the three issues on which the two groups in our study had differences relate to the three issues discussed by Strong *et al.* (2003). More importantly, other studies have raised concerns about the accuracy and reliability attributes (informational qualities) of ERP systems (*e.g.*, Sammon *et al.*, 2003), suggesting that a wider problem may exist with ERP systems that could lead to an imbalance in organisational functioning.

5.1 Implications for practice and research

This study has produced significant insights that will benefit both practitioners and IS academics. Since discussions of organisational actors or stakeholders often focus on how to better manage, measure, and evaluate organisational resources (Freeman, 1984; Gupta, 1995; Pouloudi and Whitley, 1997; Fraser and Zarkada-Fraser, 2003), the findings that top- and mid-level managers have comparable views are vital for practitioners. The common views of the two players suggest that they 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. Under these scenarios, the organisation is better poised to reap the benefits of its investment in such complex and expensive IT systems. Specifically, the empirical findings of this study concerning the

two selected stakeholders could stimulate corporate managers in Finland and Estonia (and elsewhere) to investigate the perceptions of the other organisational stakeholder group (lower-level workers) using Anthony's (1965) typology.

Additional investigation is needed on the three measures of ERP systems success where diverging views were observed. Well-conceived initiatives aimed at minimising the negative impacts that could arise from these differences are necessary, especially if further investigations could link these measures to any paradoxes in organisational control; *i.e.*, some sections of the organisation gaining more power than necessary. Management of organisations in comparable nations in the region (and elsewhere) could use the ERP system success model proposed in this paper to assess the success of their ERP software. In our case studies, a majority of organisational actors indicated that they have no formal means of evaluating the success of their ERP software (Ifinedo, 2005). Perspectives of differing organisational stakeholder groups and functions, such as IT versus business managers, ERP process owners versus end-users, and Production versus Accounts departments on ERP success could be investigated as well. Also, management could periodically benchmark these differing stakeholders' views regarding their perceptions of the success of their ERP software. Additionally, the three identified measures on which the two groups differed will be useful for vendors as they develop or promote their ERP systems. It is reasonable to suggest that prospective customers would appreciate robust systems capable of handling data accuracy and reliability, as well as improving the operational efficiency (see Strong *et al*., 2003; Sammon *et al*., 2003).

The IS discipline is also enriched by this research. Drawing from the ERP systems success measurement proposed by Gable and colleagues, we demonstrated that ERP systems success could incorporate other relevant measures. Our research is among the first to operationalise the Workgroup Impact for IS success evaluations proposed by Myers *et al*. (1996; 1997). This study is an initial attempt at examining ERP success from the perspective of differing organisational stakeholders groups. Moreover, this endeavour investigates ERP success from the perspective of private firms in contrast to other comparable studies (*e.g.*, Gable *et al*., 2003; Sedera *et al*., 2003) that studied the same theme by using public-sector organisations. Importantly, this study has been done to respond 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).

Specifically, although our results (that suggest converging views for the assessment of ERP systems success between top- and mid-level managers) depart from several other studies, they support the other research (*e.g.*, Igbaria, 1990) suggesting that the views between the two may be comparable. Additionally, the results of this study seem to indicate that top management might have a broader view on ERP success issues than do mid-level managers. This finding supports other studies (*e.g.*, Abdinnour-Helm *et al*., 2003; Sedera *et al*., 2004). This research adds credence to the observation in the work of Strong *et al*. (2003) indicating that measures including 'accuracy' of ERP data are vital when monitoring the effects of ERP systems *vis-à-vis* organisational control. In particular, the findings of this research may stimulate further inquiry and theory development regarding the success or effectiveness of enterprise systems in adopting firms in relation to organisational stakeholders. To that end, 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). Second, there is a need to validate the proposed

ERP system success model and the research instrument. Third, studies involving other stakeholder groups, such as IT versus business managers might produce useful insights for both practitioners and researchers.

5.2 Limitations

Overall, there are limitations to this study. 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; as such, we do not stake out a claim for its representativeness for ERP adopting in the two countries. Nor can we rule out personal bias, even though the respondents claimed to present an average view for their respective organisations 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. We classified our subjects as top-and mid-level management; it is possible that such categorisations will obfuscate organisational hierarchy. 'Number of ranks below CEO' as used by Raghunathan and Raghunathan (1989) might yield better insights. 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 are 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 one discussed herein. Future research addressing some of the limitations of our study is expected.

6 Concluding remarks

We investigated the *prioritisation* and *evaluation* of ERP systems success assessment using two organisational stakeholder groups (top- and mid-level managers) from 44 private companies in two Northern European countries. The major finding is that there is no difference in how both groups prioritise measures of ERP success. Despite their differing organisational roles, it was not our objective to investigate *why* there are no differences on the theme. However, one plausible explanation could be the regional contextual influence. Northern European countries have a low PD ranking, which might result in superiors and their subordinates having comparable views on issues. That said, the findings of this study are crucial for management, as insights regarding the perceptions of these two key organisational players have emerged. Their converging views suggest that no conflict of interest could emerge between both groups, in contrast to an unfavourable scenario in which one group believes ERP benefits only the other group. However, this study identified only three measures from a total of 48 on which both groups seemed to indicate differences. We suggested that these three issues could

have wider implications arising from ERP systems' use in organisations. It is difficult to generalise the findings of this study to private firms in other regions; nevertheless, corporate managers in the region could benefit from the results of the research as they manage the interests of differing groups of organisational stakeholder *vis-à-vis* ERP systems adoption. The IS research community is also enriched by the perspective of ERP systems success evaluation presented in this paper as well as our findings. In the same vein, ERP vendors can view the three issues on which the two groups of organisational actors indicated diverging views as areas deserving of their attention.

References

Abdinnour-Helm, S., Lengnick-Hall, M.L. and Lengnick-Hall, C.A. (2003) 'Pre-implementation attitudes and organizational readiness for implementing an enterprise resource planning system', *European Journal of Operational Research*, Vol. 146, pp.258–273.

Al-Mashari, M. (2003) 'Enterprise Resource Planning (ERP) systems: a research agenda', *Industrial Management and Data Systems*, Vol. 103, No. 1, pp.22–27.

Anthony, R.N. (1965) 'Planning and control systems: a framework of analysis', *PhD Thesis*, Graduate School of Business Administration, Harvard University.

Ballantine, J., Bonner, M., Levy, M., Martin, A., Munro, I. and Powell, P.L. (1997) 'Developing a 3-D model of information systems success', in E. Garrity and G.L. Sanders (Eds.) *Information Systems Success*, Hershey, PA: Idea Group Publishing.

Brancheau, J. and Wetherbe, J. (1987) 'Key issues in information systems management', *Management Information Systems Quarterly*, Vol. 11, No. 1, pp.23–45.

Brynjolfsson, E. and Hitt, L. (1996) '"Paradox lost" firm level evidence on the return of information systems spending', *Management Science*, Vol. 42, No. 4, pp.541–558.

Cameron, K.S. (1986) 'Effectiveness as paradox: consensus and conflict in conceptions of organizational effectiveness', *Management Science*, Vol. 32, No. 5, pp.539–553.

Clouther, S. (2005) *Industrial ERP Market Turns Positive After Years of Declining Revenues*, ARC Advisory Group, http://www.arcwire.com/Newsmag/ent/erp081204.asp, 2004, (accessed 9 August 2005).

Davenport, T. (1998) 'Putting the enterprise into the enterprise system', *Harvard Business Review*, Vol. 76, No. 4, pp.121–131.

Davenport, T.H. (1994) 'Saving IT's soul: human-centered information management', *Harvard Business Review*, Vol. 2, pp.119–131.

DeLone, W.H. and McLean, E.R. (1992) 'Information systems success: the quest for the dependable variables', *Information Systems Research*, Vol. 3, No. 1, pp.60–95.

Doll, J.D. (1985) 'Avenues for top management involvement in successful MIS development', *Management Information Systems Quarterly*, Vol. 9, No. 1, pp.17–35.

Doll, W.J. and Torkzadeh, G. (1988) 'The measure of end-user computing satisfaction', *Management Information Systems Quarterly*, Vol. 12, No. 2, pp.259–274.

Esteves, J. and Pastor, J. (2001) 'Enterprise resource planning systems research: an annotated bibliography', *Communications of AIS*, Vol. 7, No. 8, pp.1–52.

Everdingen, Y., Hillegersberg, J. and Waarts, E. (2000) 'ERP adoption by European mid-size companies', *Communications of the ACM*, Vol. 43, No. 4, pp.27–31.

Fraser, C. and Zarkada-Fraser, A. (2003) 'Investigating the effectiveness of managers through an analysis of stakeholder perceptions', *Journal of Management Development*, Vol. 22, No. 9, pp.762–783.

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

Gable, G.G., Sedera, D. and Chan, T. (2003) 'Measuring enterprise systems success: a preliminary model', *Proceedings of the 9th Americas Conference on Information Systems (AMCIS)*, Tampa, Florida, pp.576–591.

Grover, V., Jeong, S.R. and Segars, A.H. (1996) 'Information systems effectiveness: the construct space and patterns of application', *Information and Management*, Vol. 31, pp.177–191.

Gupta, A. (1995) 'A stakeholder analysis approach for interorganizational systems', *Industrial Management and Data Systems*, Vol. 95, No. 6, pp.3–7.

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

Ho, C., Wu, W. and Tai, Y. (2004) 'Strategies for the adaptation of ERP systems', *Industrial Management and Data Systems*, Vol. 104, No. 3, pp.234–251.

Hofstede, G. (2001) *Culture's Consequences: Comparing Values, Behaviours, Institutions, and Organizations Across Nations*, New York: Sage Publications.

Ifinedo, P. (2005) 'Do organisational-technological contingency factors influence the perception of ERP systems success? An exploratory study in the Baltic-Nordic Region of Europe', *Proceedings of 4th International Business Information Management Association (IBIMA) Conference*, Lisbon, Portugal, pp.427–437.

Ifinedo, P. (2006) 'Enterprise Resource Planning (ERP) systems success measurement: an extended model', *Proceedings of the 8th International Conference on Enterprise Information Systems (ICEIS)*, 23–27 May, Paphos, Cyprus, forthcoming.

Ifinedo, P. and Davidrajuh, R. (2005) 'Digital divide in Europe: assessing and comparing the e-readiness of a developed and an emerging economy in the Nordic region', *Electronic Government: An International Journal*, Vol. 2, No. 2, pp.111–133.

Igbaria, M. (1990) 'End-user computing effectiveness: a structural equation model', *Omega – The International Journal of Management Science*, Vol. 18, No. 6, pp.637–652.

Keen, P. (1980) 'MIS research: reference disciplines and a cumulative tradition', *Proceedings of the 1st International Conference on Information Systems (ICIS)*, Philadelphia, PA.

Ko, D., Kirsch, J.L. and King, W.R. (2005) 'Antecedents of knowledge transfer from consultants to clients in enterprise system implementations', *Management Information Systems Quarterly*, Vol. 29, No. 1, pp.59–85.

Laukkanen, S., Sarpola, S. and Hallikainen, P. (2005) 'ERP system adoption does size matter?', *Proceeding of the 38th Hawaii International Conference on System Sciences (HICSS)*, Hawaii.

Lederer, A.L. and Mendelow, A.L. (1988) 'Convincing top management of the strategic potential of information systems', *Management Information Systems Quarterly*, Vol. 12, No. 4, pp.525–534.

Likert, R. (1961) *New Patterns of Management*, New York: McGraw Hill.

Lyytinen, K., Mathiassen, L. and Ropponen, J. (1998) 'Attention shaping and software risk – a categorical analysis of four classical approaches', *Information Systems Research*, Vol. 9, No. 3, pp.233–255.

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

Markus, M.L., Tanis, C. and Fenema, P.C. (2000) 'Multisite ERP implementation', *Communications of the ACM*, Vol. 43, No. 4, pp.42–46.

Martin, M. (1998) 'An ERP strategy', *Fortune*, Vol. 2, pp.95–97.

Mockaitis, A. (2002) 'The influence of national cultural values on management attitudes: a comparative study across three countries', *PhD Thesis*, Management and Administration, Vilnius University, Vilnius, Lithuania.

Moynihan, T. (1990) 'What chief executives and senior managers want from their IT departments', *Management Information Systems Quarterly*, Vol. 1, No. 14, pp.15–26.

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

Myers, B.L., Kappelman, L.A. and Prybutok, V.R. (1997) 'A comprehensive model for assessing the quality and productivity of the information systems function: toward a theory for information systems assessment', *Information Resources Management Journal*, Vol. 10, No. 1, pp.6–25.

Nelson, K.G. and Somers, T.M. (2001) 'Exploring ERP success from an end-user perspective', *Proceedings of the 7th Americas Conference on Information Systems (AMCIS)*, Florida.

Nilsson, A.G. (2004) 'Information Systems Development (ISD): past, present, future trends', *Proceedings of the 13th International Conference on ISD: Methods and Tools, Theory and Practice*, Vilnius, Lithuania, pp.29–40.

Nissinen, M. (2002) 'The Baltics as a business location for information technology and electronics industries', *VTT Research Notes 2166*, Helsinki: Edita Prima Oy.

Nunnally, J.C. (1978) *Psychometric Theory*, 2nd ed., New York: McGraw-Hill.

Parker, C.P., Dipboye, R.L. and Jackson, S.L. (1995) 'Perceptions of organizational politics: an investigation of antecedents and consequences', *Journal of Management*, Vol. 21, No. 5, pp.891–912.

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

Pijpers, G.G.M., Bemelmans, T.M.A., Heemstra, F.J. and van Montfort, K.A.G.M. (2001) 'Senior executives' use of information technology', *Information and Software Technology*, Vol. 43, pp.959–971.

Pouloudi, A. and Whitley, E.A. (1997) 'Stakeholder identification in the inter-organizational systems: gaining insights for the drug use management systems', *European Journal of Information Systems*, Vol. 6, pp.1–14.

Raghunathan, B. and Raghunathan, T.S. (1989) 'Relationship of the rank of information systems executive to the organizational role and planning dimensions of information systems', *Journal of Management Information Systems*, Vol. 6, No. 1, pp.111–126.

Rousseau, D.M. (1978) 'Characteristics of departments, positions, and individuals: contexts for attitudes and behavior', *Administrative Science Quarterly*, Vol. 21, No. 4, pp.598–616.

Sammon, D., Adam, F. and Carton, F. (2003) 'Benefit realisation through ERP: the re-emergence of data warehousing', *Electronic Journal of Information Systems Evaluation*, Vol. 2, No. 6, pp.155–164.

Saunders, C.S. and Jones, J.W. (1992) 'Measuring performance of the information systems function', *Journal of Management Information Systems*, Vol. 8, No. 4, pp.63–82.

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

Seddon, P.B. (1997) 'A re-specification and extension of the DeLone and McLean model of IS success', *Information Systems Research*, Vol. l8, No. 3, pp.240–253.

Seddon, P.B., Graeser, V. and Willcocks, L.P. (2002) 'Measuring organizational IS effectiveness: an overview and update of senior management perspectives', *The DATA BASE for Advances in IS*, Vol. 33, No. 2, pp.11–28.

Sedera, D., Gable, G. and Chan, T. (2003) 'Measuring enterprise systems success: a preliminary model', *Proceedings of the 9th Americas Conference on Information Systems*, Tampa, Florida.

Sedera, D., Gable, G. and Chan, T. (2004) 'Measuring enterprise systems success: the importance of a multiple stakeholder perspective', *Proceedings of the 12th European Conference on Information Systems*, Turku, Finland.

Seeley, M. and Targett, D. (1999) 'Patterns of senior executives' personal use of computers', *Information and Management*, Vol. 35, pp.315–330.

Shang, S. and Seddon, P.B. (2002) 'Assessing and managing the benefits of enterprise systems: the business manager's perspective', *Information Systems Journal*, Vol. 12, pp.271–299.

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

Somers, T.M. and Nelson, K.G. (2004) 'A taxonomy of players and activities across the ERP project life cycle', *Information and Management*, Vol. 41, pp.257–278.

Somers, T.M., Nelson, K. and Ragowsky, A. (2000) 'Enterprise Resource Planning (ERP) for the next millennium: development of an integrative framework and implications for researcher', *Proceedings of the 6th Americas Conference on Information Systems*, Long Beach, California.

Strong, D.M., Volkoff, O. and Elmes, M.B. (2003) 'ERP systems and the paradox of control', *Proceedings of 9th Americas Conference on Information Systems (AMCIS)*, Tampa, Florida.

Tan, C.W. and Pan, S.L. (2002) 'ERP success: the search for a comprehensive framework', *Proceedings of the 8th Americas Conference on Information Systems (AMCIS)*, Dallas, Texas.

Teo, T.S.H. and Ang, J.S.K. (1999) 'Critical success factors in the alignment of IS plans with business plans', *International Journal of Information Management*, Vol. 19, pp.173–185.

Thong, J.Y.L., Yap, C. and Raman, K.S. (1994) 'Engagement of external expertise in information systems implementation', *Journal of Management Information Systems*, Vol. 11, No. 2, pp.209–231.

Tsai, W., Chien, S., Hsu, P. and Leu, J. (2005) 'Identification of critical failure factors in the implementation of Enterprise Resource Planning (ERP) system in Taiwan's industries', *International Journal of Management and Enterprise Development*, Vol. 2, No. 2, pp.219–239.

Weiss, J.A., Gruber, J.E. and Carver, R.H. (1986) 'Reflections on value: policy makers evaluate federal information systems', *Public Administration Review*, Vol. 46, pp.497–505.

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

World Economic Forum (WEF) (2003) *The Networked Readiness Index Rankings 2003*, http://www.weforum.org/pdf/Gcr/GITR_2003_2004/Framework_Chapter.pdf (accessed 5 October 2004).

Zviran, M., Pliskin, N. and Levin, R. (2005) 'Measuring user satisfaction and perceived usefulness in the ERP context', *Journal of Computer Information Systems*, Vol. 45, No. 3, pp.43–52.

Bibliography

Clouther, S. (2005) *Industrial ERP Market Turns Positive after Years of Declining Revenues*, ARC Advisory Group, http://www.arcwire.com (accessed 6 July 2005).

Moynihan, T. (1995) 'What chief executives and senior managers want from their IT departments', *Management Information Systems Quarterly*, Vol. 14, No. 1, pp.15–26.

Reilly, K. (2005) *ERP Market Report Showing Overall Growth of 14% in 2004*, www.amrresearch .com/content/Display (accessed 15 October 2005).

Sammon, D., Adam, F. and Carton, F. (2003) 'Benefit realisation through ERP: the re-emergence of data warehousing', *The Electronic Journal of Information Systems Evaluation*, Vol. 6, No. 2, pp.155–164.

World Economic Forum (WEF) (2003) *The Networked Readiness Index Rankings 2003*, http://www.weforum.org/ (accessed 5 October 2004).

Note

1 The questionnaire is excluded due to space consideration, but available upon request.