A Critical Evaluation of Enterprise Systems Success Measurement Models

Darshana Sedera, Satish Rangaswami and Pavana Mallavaram

Queensland University of Technology, 2 George St., Brisbane, Australia, {d.sedera, s.rangaswami, p.mallavaram@qut.edu.au}

ABSTRACT

Measuring Enterprise Systems Success is a complex endeavour. Accurately gauging the impacts of Enterprise System requires a detailed understanding of the benefits of Enterprise Systems, appreciation of the multidimensionality, and the development of a correspondent, standardized, validated and robust measurement instrument. Despite the popularity and potential of Enterprise Systems in modern organizations, no acceptably valid and reliable Enterprise System success assessment scale has heretofore been developed. The impacts resulting from ES are arguably difficult to measure. An Enterprise System entails many users ranging from top executives to data entry operators; many applications that span the organization; and a diversity of capabilities and functionality. These contemporary IS characteristics (along with other issues discussed in the literature review section) suggest that existing models of ES/IS success should be used with causion knowing the advantages, disadvatages and the issues with them. This paper attempts to provide three criteria to comprehensively evaluate ES success models. Examples are illustrated with four alternative ES/IS success models

INTRODUCTION

An Enterprise System (ES1) is an off-the-shelf package that provides an integrated suite of applications which provide transaction processing and management information systems for the common core of business processes. Enterprise Systems (ES) provide comprehensive administrative systems and help to automate and streamline business processes. ES have been widely implemented worldwide, particularly in larger organizations. ES spending is expected to reach USD$78 billion in 2004 (Management and Distribution Report, 2000) and should continue to be one of the largest, fastest-growing approaches in the application software industry for the next decade (Yen, Chou and Chang, 2002). Despite the substantial investments made by organizations around the world, evidence of ES success has been mixed, with some studies showing positive impacts of ES in organizations (e.g. O' Leary, 2000; White, Clerk and Ascarely, 1997), while others have shown nil or detrimental impacts (e.g. Kalakota and Robinson, 1999; Caldas and Wood, 2000). Researchers have emphasized the importance of systematically measuring ES success to guide Enterprise Systems investments. Markus and Tanis (2000) state, 'the key questions about Enterprise Systems from the perspective of an adopting organization's executive leadership are questions about the success'. The impacts resulting from ES are arguably difficult to measure (e.g. Baer, 1999; Davis, 1989; Deloitte Consulting, 2000; Knowles, Fotos, Henry, 2000; Shang and Seddon, 2000). The importance of assessing the value of ES (and large Information Systems generally), underpins key issues reported by organizational executives around the world (Ball and Harris, 1982; Brancheau and Wetherbe, 1987; Dickson, Leitheiser, Nechis and Wetherbe, 1984).

This paper seeks to address aforementioned question of evaluating ES success through a critical analysis of four alternative frameworks developed to measure IT success: 1) The Balanced Scorecard (Kaplan and Norton, 1992), 2) MIT 90'S IT impacts framework (Scott Morton, 1990), 3) Shang and Seddon ERP benefits Framework (Shang and Seddon 2000: 2003) and 4) The Enterprise System Success Measurement Model (Gable, Sedera, Chan 2003). The paper proceeds with an overview f the

enterprise systems followed by the four frameworks of evaluation. Next, the importance of evaluating ES success is discussed and the three criteria for evaluating frameworks are discussed. Each of the models is then critically evaluated using the three criteria and the paper concludes with a summary findings.

OVERVIEW OF ENTERPRISE SYSTEMS

Enterprise Systems can defined as a packaged business solution that is designed to automate and integrate business processes, share common data and business practices across the enterprise and provide access to information in a real time environment (Deloitte Consulting 1999). ES are currently the prevailing form of business computing for many large organizations in the public and private sector (Gable, 1998). Organizations invest on ES expecting positive outcomes in the areas of business processes improvements, reduction of IT expenditure, increment of customer responsiveness and in general, for strategic business improvements (Li, 1999; Ross and Vitale, 1999)2. Despite the optimistic motives, some ES projects have reported nil or detrimental impacts. The impacts resulting from ES are arguably difficult to measure (Baer 1999; Davis 1989; Deloitte Consulting 2000; Knowles et al. 2000). An enterprise system entails many users ranging from top executives to data entry operators; many applications that span the organization; and a diversity of capabilities and functionality. Furthermore, measuring Enterprise Systems success takes on a special importance since the costs and risks of these large technology investments rival their potential payoffs (Markus, Axline, Petrie and Tanis 2003).

These reasons have amplified the need to have a comprehensive understanding of the systems success measurement models and frameworks (e.g., Baer 1999; Davis 1989; Deloitte Consulting 2000; Knowles et al. 2000; Shang and Seddon 2000). The following section discusses the selected four models for evaluating ES/IS success.

ALTERNATIVE FRAMEWORKS OF ES SUCCESS

The four alternative models of ES success critiqued in this paper include: 1) The Balanced Scorecard (Kaplan and Norton, 1992), 2) MIT 90'S IT impacts framework (Scott Morton, 1990), 3) ERP Benefits Framework (Shang and Seddon, 2000) and 4) Enterprise System Success Measurement Model (Sedera, Gable and Chan, 2003). These frameworks provide a comprehensive view of impact of ES in an organization. Although Balanced Scorecard and MIT 90's frameworks are developed in relation to Information Systems success, we believe that they can be effectively used to measure contemporary IS such as ES. The following is a brief overview of each of these models and frameworks.

- **Shang and Seddon Framework (Shang and Seddon, 2000).** This framework provides a comprehensive list of business benefits of enterprise systems in five benefits dimensions namely operational, managerial, strategic, IT infrastructure and organizational benefits. These benefit dimensions are further divided into 21 sub dimensions. The consolidated list of benefits suggested in this framework have been reportedly acquired through ES implementation and this is based on the analysis of the features of ES, on the literature on information technology (IT) value, on data from 233

Table 1.

Enterprise Systems Benefits Classified against ES Life Cycle and Higher Order Benefits	Balanced Scorecard	ES Success Model	ERP Benefits F:Work	MIT90's IT Impacts Framework
STABALIZE (ES Lifecycle 1)				
OPERATIONAL BENEFITS				
1. Increased Flexibility		✓	✓	✓
2. Adequate Data Entry Controls		✓	✓	✓
3. Cycle Time Reduction	✓	✓	✓	✓
4. Faster and Accurate Transactions		✓	✓	✓
MANAGERIAL BENEFITS				
1. Stores Common Data Across the Entire Enterprise		✓	✓	✓
2. Increased Data Accessibility		✓	✓	✓
BUSINESS BENEFITS				
1. Automates Business Processes		✓	✓	
2. Integrates Business Processes		✓	✓	
3. Stores Common Data Across the Entire Enterprise		✓	✓	✓
4. Maintenance Reduction		✓	✓	✓
5. Head Count Reduction		✓		
6. Cycle Time Reduction	✓	✓	✓	✓
TECHNICAL / IT BENEFITS				
1. Stores Common Data Across the Entire Enterprise		✓	✓	✓
2. Maintenance Reduction	✓	✓	✓	✓
SYNTHESIZE (ES Lifecycle 2)				
OPERATIONAL BENEFITS				
1. Standardized Information System or Platform		✓	✓	
2. On-time Delivery Improvement	✓	✓	✓	✓
3. Higher Reliability		✓	✓	✓
4. Improved Inventory		✓	✓	✓
5. Fewer Physical Resources or Better Logistics		✓	✓	
6. Improved Customer Responsiveness	✓	✓	✓	
7. Improved Customer Service	✓	✓	✓	✓
8. Improved E-Commerce Support		✓	✓	
MANAGERIAL BENEFITS				
1. Improvement in Business Performance with new or Improved Processes	✓	✓	✓	✓
2. Information Visibility	✓	✓	✓	
3. Improved Management Decision Making	✓	✓	✓	✓
4. Improved Financial Management	✓	✓	✓	✓
BUSINESS BENEFITS				
1. Ease of Expansion or Growth			✓	
2. Incorporate Best Practices and Enable Continuous Business Growth	✓	✓	✓	
3. On-time Delivery Improvement	✓	✓	✓	✓
4. Revenue / Profit Increases	✓	✓	✓	✓
5. Improved Inventory		✓	✓	✓
6. Fewer Physical Resources or Better Logistics		✓	✓	
7. Technology Cost Reduction		✓	✓	
TECHNICAL / IT BENEFITS				
1. Higher Reliability		✓	✓	✓
2. Technology Cost Reduction		✓	✓	
SYNERGIZE (ES Lifecycle 3)				
MANAGERIAL BENEFITS				
1. Improved Overall Organizational Structure	✓	✓	✓	✓
2. Better Application of Management Style	✓	✓	✓	
BUSINESS BENEFITS				
1. Improved Overall Organizational Structure	✓	✓	✓	✓
2. Improved Innovation Capabilities	✓	✓	✓	
3. Improved Customer Retention	✓	✓		
4. Improved Supplier Interaction		✓	✓	✓
5. Able to Support Extended Enterprise System such as SCM and CRM		✓	✓	
6. Improved Overall Organizational Quality	✓	✓	✓	✓

enterprise system vendor reported stories published on the web and on interviews with managers of 34 organizations using ES. The framework has been applied to the identification of benefits in a longitudinal case study of four organizations over a period of three years. The framework focuses on benefits of the view point of management (business managers).

- **MIT 90's IT Framework (Scott Morton, 1990).** The management in the 1990's research program was created in 1984 to understand the impact of IT in organizations of all kinds. The main aim was to explore whether the organizations will be able to survive and prosper in the competitive environment of the 1990's and beyond and to help managers throughout the world understand the kinds of impact IT will have on business missions, organizational structures and operating practices. The research methodology adopted was extensive and demonstrates the breadth of enquiry which included the following steps: prototypes, experiments, instruments, surveys, theory, empirical data collection and theory testing. The framework proposes that the organization's strategy, structure, management processes, individual roles and skills and IT should be consistent with each other. Optimal performance will only be possible if there is a fit between them. The implications of the study are regrouped and focussed to represent the five forces in an organization that can be influenced. The impacts of these forces are explained using 1) Technology, 2) Individual and Roles, 3) Structure, 4) Management Processes, 5) Strategy.

- **Balanced Scorecard (Kaplan and Norton, 1992).** Developed by Robert S. Kaplan and David P. Norton after a year long research project with 12 companies at the leading edge of performance measurement to evaluate business performance and health, Balanced Scorecard (BSC) aids balanced attention to and measurement of all drivers of company value. BSC is a popular approach to strategic management that imbeds long term strategy into management system through measurements. The balanced scorecard links the organization focus on future success by setting objectives and measuring performance from 4 perspectives, namely: 1) Customer Perspective, 2) Internal Business Perspective, 3) Innovation and Learning Perspective, 4) Financial Perspective.

- **Enterprise Systems Success Measurement Model (Gable, Sedera, and Chan 2003).** This model attempts to measure ES success from multiple stakeholder perspective, namely, Strategic Personal, Business Managers, Operations staff and technical personal. The final validated study model employed 27 measures of ES success arranged under four dimensions: information quality, system quality, individual impact and organizational impact (Gable at al. 2003). The model was derived employing a three-round survey using data gathered from six-hundred responses in 27 sector organizations that implemented SAP R/3 in the late 90's. The ES success model made the following important findings to the ES context: 1) validates the model constructs and measures in a contemporary ES context, 2) 1st comprehensive empirical, quantitative assessment of ES success reported in the academic press and 3) illustrates the relative importance of non-financial measures of ES success.

IMPORTANCE OF EVALUATING ES SUCCESS

Research assessing the success of information systems has been ongoing for nearly three decades (e.g., King and Rodriguez 1978; Matlin 1979; Myers et al. 1997; Rolefson 1978). However, the scope and approach of these IS success evaluation studies has varied greatly, with little consensus on measures of IS success, thus complicating comparison of results across studies and confounding the establishment of a cumulative research tradition. Gable Sedera and Chan (2003) identified seven weaknesses in IS success measurement studies: 1) Mutual exclusivity and additivity of success measures, 2) Model completeness, 3) Choice of IS success dimensions, 4) Theoretical basis for causal/process paths, 5) Excessive emphasis on quantitative (financial) measures, 6) The nature of the contemporary IS environment, 7) Multiple stakeholder perspectives.

Criteria for Evaluating ES success frameworks

Based on the seven weakness of IS evaluation frameworks (Gable, Sedera, Chan 2003), we propose three criteria to evaluate the four alternative frameworks of IS/ES success. First, the alternative frameworks are 'tested' against a **universal list of ES benefits** to assess the model completeness, Excessive emphasis on financial measures and the nature of the contemporary IS environment. The second criterion, **ES success facets** aim to assess choice of success dimensions and the multiple stakeholder perspective. Finally, the **model characteristics** are assessed to understand the mutual exclusivity and additivity of success measures. The three criteria are discussed below.

Table 2.

Cameron and Whetten's Questions to Measure Organizational Performance	Options Available	Balanced Scorecard	ES Success Model	ERP Benefits F:Work	MIT90's IT Impacts Framework
1.From whose perspective is effectiveness being judged?	Strategic Management	✓	✓		
	Business Managers	✓	✓	✓	✓
	Operational / Data Entry Operators		✓		
	Technical Personal		✓		
2. What is the domain of activity?	Tasks Emphasised in Organization / Organization as a whole	✓			
	Enterprise Systems		✓	✓	
	Information Technology in the Organization				✓
3. What is the level of analysis?	Individual		✓	✓	
	Sub-unit		✓		
	Organization	✓	✓	✓	✓
	Population				
	Societal				
4. What is the purpose of evaluation?	Strategy Management	✓		✓	✓
	Business Performance Improvement	✓		✓	
	Future Planning	✓		✓	
	Impact of IT on Business Organization				✓
	Employment Group Views		✓		
	Importance of Perceptions of ES on multiple employment groups		✓		
5. What time frame is employed?	Short Term				
	Long Term	✓	✓	✓	✓
6. What types of data are to be used?	Objective	✓	✓	✓	
	Perceptual	✓	✓	✓	✓
	Empirical				✓
7. Against which referent is effectiveness being judged?	Against some other organization				
	Against some ideal level of performance			✓	
	Against stated goals of the organization	✓		✓	
	Against past performance of the organization	✓	✓	✓	
	Against certain desirable characteristics	✓	✓		✓

The **ES success facets** are based on the study of Seddon, Staples and Patnayunki (1999). The authors recommend that anyone seeking to evaluate an IT application should have a clear answer to each of Cameron and Whetten's (1983) seven questions on organizational effectiveness measurement. We have used these questions to gain a deeper understanding of each of the models and the answers to these questions are only based on the explanations of how each of the frameworks was developed. Table 2 compares the four frameworks against the Cameron and Whetten's seven questions of organizational performance.

The first question of Cameron and Whetten (1983) refers to the stakeholder point-of-view. An Enterprise System, unlike a traditional Information System (IS), entails many stakeholders ranging from top executives to data entry operators. These stakeholders (a.k.a employment cohorts) typically have multiple and often conflicting objectives and priorities and rarely agree on a set of common aims. The importance of gathering perceptions of success at multiple levels in organizations has been discussed among academics for several decades. It is quite evident, in relation to the first question on stakeholder perspective, that the Enterprise Systems Success Measure model is far superior to all other models. As discussed by Seddon et al (1999) the 'domain of activity' remains with a single focus for all four models. In question 3 – the level of analysis – the ES success measurement model illustrates its ability to assess ES success at various levels (individual, subunit and organizational). In all other questions (4, 5, 6 and 7), each model has its own advantages and disadvantages, thus will not be discussed here.

Evaluation of **Generic model characteristics** is the next criterion of evaluation (See Table 3). This looks at the generic characteristics of a comprehensive research model. These characteristics are evaluated upon the statistical analysis performed, rather than evaluating models on its conceptual structures and design. The model characteristics that are being evaluated across the 4 models include: 1) the additivity of success dimensions4, 2) Mutual exclusivity5 of the success dimensions and measures and the 3) representativeness1 of success dimensions. The additivity allows researchers and practitioners1 to add the dimensions of success (i.e. the quadrant of the in Balanced Scorecard) to derive a single overarching score of the ES success. This can be demonstrated with tests such as regression with R^2 increments for all the dimensions of success. The mutual exclusivity of the dimensions of success is another aspect that is related to the additivity of the measures and dimensions. If only the dimensions and the measures are mutually exclusive that we could usefully add them for various purposes. Thirdly, the representativeness refers to the selection of success dimensions and measures. Delone and McLean (1992) suggest that in order to develop a comprehensive measurement model/instrument for a particular context, the dimensions and measures should be systematically selected considering contingency variables, such as: the organizational structure, size, or technology, and the individual characteristics of the system. Yet, most studies in this arena do not elaborate on the rationale for their choice of success dimensions and success measures employed.

It should be noted that out of the four models of success, only the ES success measurement model has statistically demonstrated the additivity of the dimensions and measures (See Sedera and Gable 2004 for further details). The ES success model followed a unique exercise (known as the *identification survey*) to exclude overlapping measures and dimensions of ES success. A thorough content analysis of the measures of the ERP benefits framework revealed strong overlaps between measures and dimensions. The representativeness refers to the extent to which the measures and dimensions are representative of the universal benefits and the possible stakeholders. Based on our prior analysis (see Table 1 and Table 2), we conclude that none, except the ES Success model demonstrate the representativeness of the model.

- **Universal list of ES benefits.** The universal list of ES benefits is constructed after completing a thorough literature review on key IS journals, conferences and web resources3 (See Table 1) and arranged according to the post-implementation stages of the ES lifecycle: Stabilize, Synthesize, and Synergize. In Table 1, the four frameworks are critically evaluated using the potential benefits of ES.

The analysis of Table 1 (The universal list of ES benefits) illustrates the issues and problems associated with the model completeness, excessive emphasis on financial measures and the nature of the contemporary IS environment. It is quite evident that the Balanced Scorecard is poorly populated in relation to the early stages of the ES lifecycle. Furthermore, due to its strategic focus the Balanced Scorecard is less suitable for the operational benefits. The same phenomenon can be seen with the MIT 90s IT impacts framework. However, the two ES specific frameworks (Shang and Seddon 2000, Gable, Sedera, Chan 2003) have instantiates a majority of the ES benefits. The findings indicate completeness of the two ES specific models and the fact that they accommodate the contemporary measures.

CONCLUSION

This paper illustrated a critical analysis of four alternative ES success measurement instruments. The four frameworks are: 1) The Balanced Scorecard (Kaplan and Norton, 1992), 2) MIT 90'S IT impacts framework (Scott Morton, 1990), 3) Shang and Seddon ERP benefits Frame-

Table 3.

	Balanced Scorecard	ES Success Model	ERP Benefits F:Work	MIT90's IT Impacts Framework
Additivity		✓		
Mutual Exclusivity		✓		
Representativeness		✓		

work (Shang and Seddon 2000: 2003) and 4) The Enterprise System Success Measurement Model (Gable, Sedera, Chan 2003). These four alternative frameworks were then evaluated using rigorous criteria. First, the models were tested to observe whether they could accomodate **total benefits of ES**. Furthermore, variety of measures and the ability of the models to accomodate the contemporary IS environment was also tested. The ES success measurement model and the ERP benefits framework illsutrated superior results compared to the Balanced Scorecard and the MIT 90s IT impacts framework. The second criterion, **ES success facets** was used employing the seven questions of Cameron and Whetten (1983). The ES success measurement model demonstrated better fit with this critrion than the other three. Finally, the **generic model characteristics** were assessed to understand the mutual exclusivity and additivity of success measures, in which the ES success model demonstrated all. Our analysis demonstrate three important crietria that one could be using to evaluate contemporary IS success models and frameworks. The evaluation of the four frameworks illustrated the superirority of the ES success measurement model.

REFERENCES

Austin, R. N. (1965). Planning and Control Systems: A Framework for analysis, Harvard University, Boston, Mas, USA.

Ball, L., Harris, R. (1982) "SMIS members: a membership analysis", MIS Quarterly, 6(1), 19-38

Bailey, J. (1999). "Trash haulers are taking fancy software to the dump." Wall Street Journal.

Bailey, J. E. and S. W. Pearson (1983). "Development of a Tool for Measuring and Analyzing Computer User Satisfaction." Management Science (29:5): 530-545.

Baer, T., (1999) "Finding Value in all the right places", Manufacturing Systems, November.

Barki, H. and J. Hartwick (1989). "Rethinking the Concept of User Involvement." MIS Quarterly (13:1): 53-63.

Bernroider, E. and S. Koch (1999). "Decision Making for ERP-Investments from the Perspective of Organizational Impact – Preliminary Results from an Empirical Study." AMCIS **5**: 773-775.

Bernroider, E. and S. Koch (2000). "Differences in Characteristics of the ERP System Selection Process between Small or Medium and Large Organizations." AMCIS **6**: 1022-1028.

Bingi, P., M. Sharma, et al. (1999). "Critical Factors affecting an ERP implementation." Information System Management (summer).

Brancheau, J., Whetherbe, J. (1987) "Key issues in Information Technology management", MIS Quarterly, 11, 23-45

Cameron, K. S., Whetton, D. A. (1983) "Organizational effectiveness: A comparison of multiple models", Academic press, New York, NY.

Caldas, M and Wood, T (2000) "How consultants can organizations survive the ERP frenzy", http://www.gv.br/prof_alunos/thomaz/ingles/paper5.htm, accessed December 2000

Carlino, J. (1999b). AMR Research Announces Evolution of ERP to Network Business Systems (NBS).

Chandler, J. (1982). "A Multiple Criteria Approach for Evaluating Information System Success." MIS Quarterly (6:1): 61-84.

Chung, S. and C. Snyder (1999). ERP initiation - A historical perspective. AMICS.

Davis, F. D. (1989) "Perceived usefulness, perceived ease of use, and user acceptance of Information Technology", MIS Quarterly, September, 319-340

Dickson, G., Leitheiser, R. L., Nechis, M., Wetherbe, J. (1984) "Key Information Systems issues for the 1980's" MIS Quarterly, 8(3), 135-159

Deloitte, C. (1999). "ERP's Second Wave: Maximizing the Value of ERP Enabled Process."

DeLone, W. H. and E. R. McLean (1992). "Information Systems Success: The Quest for the Dependant Variable." Information Systems Research (3:1): 60-95.

Doll, W. J. and G. Torkzadeh (1988). "The Measurement of End-User Computing Satisfaction." MIS Quarterly (12:2): 259-274.

Ein-Dor, P. and E. Segev (1978). "Organizational Context and the Success of Management Information Systems." Management Science (24:10): 1064-1077.

Escalle, C., M. Cotteleer, et al. (1999). Enterprise Resource Planning (ERP), Harvard Business School.

Gable, G., Sedera, D., Chan, T. (2003) "Enterprise Systems Success: a measurement model", in proceedings of the 24th International Conference on Information Systems, S. T. March, A. Massey and J. I. DeGross (eds.) December 14-17, Seattle, WA

Hawking, P. and A. Stein (2004). "Revisiting ERP Systems: Benefit Realization." 37th Hawaii International Conference on System Sciences.

Ives, B. M., M. H. Olson, et al. (1983). "The Measurement of User Satisfaction." Communications of the ACM (26:10): 785-793.

Kalakota, R., and Robinson, M. (1999) "E-business – Road map to success", Addison-Wesley, Reading, MA

Kaplan, R. S. and D. P. Norton (1992). "The Balanced Scorecard: Measures that Drive Performance." Harvard Business Review: 70-79.

King, J. L. and J. I. Rodriguez (2000). "Cost Benefit Analysis in Information Systems Development and Operations." Computing Surveys (10:1): 19-34.

Klaus, H., Rosemann, M., Gable, G., (2000) "What is ERP?", Information Systems Frontiers, 2:2, pp 141-162.

Knowles, H., Fotos, S., Henry, N., (2000) "Q & A from the internet: Implementing SAP", The controllers update, September.

Li, C. (1999). "ERP Packages: what's next?" Information System Management **16**(3).

Management and Distribution Report (2000) "ERP software sales expected to plummet", Vol 39-7, pp 18-21

Markus L., Tanis C. and van Fenema, P. C. (2000) "The enterprise systems experience – from adoption to success" in Framing the domains of IT research: Glimpsing the future through the past" Zmud, R. W. (ed.). Pinnaflex Educational Resources, Cincinnati, OH, USA

Markus, L. M., Axline, S., Petrie, D., Tanis, C. (2003) Learning from adopters' experiences with ERP: problems encountered and success achieved" in Second-Wave Enterprise Resource Planning Systems, Graeme Shanks,

Peter B. Seddon and Leslie Willcocks (eds) Cambridge University Press, Cambridge, UK

Martin, G. (1979) "What is the value of investment in information systems?" MIS Quarterly, 3(3),5-34

Myers, B. L., L. A. Kappelman, et al. (1997). A Compressive Model for Assessing the Quality and Productivity of the Information Systems Function: Toward a Theory for Information Systems Assessment.

O' Leary, D. E (2000) "Enterprise Resource Planning Systems: Systems Life Cycle, Electronic commerce, and Risk", Cambridge University Press, Cambridge, UK

Rolefson, J. F. (1978) "The DP check-up" Journal of system management, 29(11), 38-48

Ross, J. W. and M. R. Vitale (1999). The ERP Revolution: Surviving versus Thriving, Massachusetts Institute of Technology.

Saarinen, T. (1996). "An Expanded Instrument for Evaluating Information System Success." Information & Management (31): 103-118.

Sedera, D., Gable, G. G. (2004) " A Factor and Structural Equation analysis of the Enterprise Systems Success Measurement Model" International Conference in Information Systems (ICIS 2004), Washington DC

Seddon, P. B., Staples, S., Patnayakuni, R., Bowtell, M. (1999) "Dimensions of Information Systems Success", Communications of AIS, 2, pp20

Scott Morton, M. S. (1990). The Corporations of the 1990's, Oxford University Press.

Yen, D. C., Chou, D. C. and Chang, T. (2002) "A synergic analysis for web-based enterprise resource planning systems", Computer Standards and Interfaces, Vol 24-4, pp337-34

White, B., Clark, D., Ascarely, S. (1997) "Program of pain" Wall Street Journal, 14 March, 6

ENDNOTES

1   In this paper, the terms ERP, Enterprise Resource Planning and the more contemporary, Enterprise Systems (ES), are used interchangeably. See (Klaus, Rosemann, Gable, 2000) for in depth discussion on 'What is ERP?'

2   A more detailed list of anticipated benefits from ES implementation is shown in the table 1.

3   A complete review of literature of ES is available in Esteves and Pastor (2001)

4   The independent dimensions of success should be positively associated and when combined should yield a single valid measure of overall ES success

5   An important criteria of an ES success measurement model is that it not only addresses the importance of IS success but also it does so in such a manner that it does not overlap with another measure.

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