

Enterprise Systems Benefits: How Should They Be Assessed?

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Abstract

This paper proposes key points for the timing and scope of enterprise systems benefit assessment. Enterprise systems (ES) such as enterprise resource planning (ERP) systems support a wide range of enterprise processes influencing organizational management in various areas. Due to the complexity of the system design the learning curve is long, and with constant changes in technology and business needs the functionality and use of these systems are changing continuously throughout their lifetime. Assessing the benefits of enterprise-wide information systems, therefore, requires a longitudinal view on multi-dimensional aspects. The available methods of IS assessment can assist a good understanding of enterprise-wide system benefits of certain parts or for certain periods of time, but cannot address them in holistic and longitudinal terms. This study distinguishes ES from traditional information systems and forms propositions about ES benefit assessment. Through longitudinal case studies of four medium-sized Australian utility companies, this study suggests that the benefits from ES are likely to be realized at different rates for different core processes in each of the five dimensions, i.e. operational, managerial, strategic, IT infrastructure and organizational. It is hoped that the benefit differences between dimensions, different time periods and core processes will clarify conflicting perceptions of ES success, with the finding that the time point of the assessment and the range of ES benefit assessments can strongly affect the evaluation results.

Keywords: enterprise systems, ERP, IS benefits, IS effectiveness, perceived benefit flow

1. Introduction

Enterprise systems (ES) are software packages that include enterprise resource planning (ERP) software and such related packages as customer relationship management (CRM), and supply chain management (SCM) from vendors such as SAP, Oracle, and PeopleSoft. Such packages have become increasingly popular in recent years. According to AMR Research (2003), worldwide revenue for ERP, CRM, and SCM vendors was a total of US\$37B in 2002. Since total project costs for purchasing and implementing the software are frequently of the order of five times the cost of the software license, the worldwide cost of ES once implemented in client organizations must be of the order of fifty to one hundred billion US dollars per annum. In addition to high returns, organizations also expect their systems to be long-lived: the expected life of an Enterprise System ranges from ten to twenty years.

In order to justify current and future investments in ES, and to gain long-term benefits from these complicated systems, managers not only need to assess the returns from this major investment, but also need to be able to track the benefit realization process throughout the system's life in order to respond with appropriate management initiatives. Traditional methods of IS assessment can assist in understanding enterprise-wide system benefits of certain parts or for certain periods of time. But the snapshot approach also creates controversy regarding ES effectiveness. System successes and failures are reported in various areas at different time points including, for instance: speedy month-end closing but problematic payroll administration, negative comments by front-end users but positive feedbacks from decision-makers. These conflicting benefit indicators make it difficult to manage enterprise systems effectively throughout their lives.

The focus of this paper is on the most important class of enterprise system software, namely ERP software. ERP software integrates information and processes of management functions, such as financial, manufacturing, distribution and human resources management to enable enterprise-wide management of resources (Deloitte Consulting 1998; Davenport 1998). Using ERP systems takes a long period of learning by users in different areas, and the process of benefit realization varies continuously as both technological and business needs change. Measuring ERP benefits therefore requires a longitudinal view of broad-scope business activities.

According to Davenport (2000), Deloitte (1998), Markus et al. (2000), Ross and Vitale (1999) ES benefit realization is a process involving different stages during which performance fluctuates. Many IT and ES value-assessment frameworks (Cookie et al. 2001; Holland et al. 1999; Irani et al. 2001; Shang and Seddon 2002) have observed wide-scope possible benefits of ES, ranging from operational improvements through decision-making enhancement to support for strategic goals. But these frameworks do not tell us how the dynamics of the benefit realization process can be captured. For effective management of the ES benefits we would need to know when and how to measure these different types of benefits and how they are inter-related.

By longitudinally tracing the benefit realization processes of four utility companies in Australia, this study strives to answer the key question: *how should ES benefits be assessed?* The objective is to build a thorough understanding of the different patterns and unique nature of ES benefit realization processes and to propose appropriate guidelines for assessing ES benefits. It is believed that the proposed concepts for assessing enterprise-wide system benefits provides greater understanding of the flow of ES benefits in the case-study organizations and assists business managers to develop more effective strategies for maximizing benefits from their own organizations' enterprise systems.

2. What do we know about ES benefits?

In this study, we are interested in ES benefits as perceived by senior management. Although poorly managed implementation projects can have a huge effect on benefits after going live (Seddon and Shanks 2003), the considerable body of prior research on ES implementation projects (Brown et al. 2003; Holland et al. 1999; Parr et al. 1999; Scott et al. 2002; Somers et al. 2001; Sumner 1999; Umble et al. 2003) have little to say about benefits from ES in the years after going live. Based on several reports we built our preliminary understanding of ES benefits in the following sections.

2.1 Benefits from enterprise systems are realized in different dimensions

In one of the earliest studies of actual benefits from ES, Deloitte Consulting's (1998) study of 85 global companies, 90% with revenues over US\$1 billion, reported both *tangible* benefits including cost savings (34% of firms) and faster processing (19%), and *intangible* benefits including improved information visibility (63% of firms), new/improved processes (31%), and improved customer responsiveness (20%). Other benefits such as labour, process and inventory cost savings, improved decision-making, and savings from dismantling legacy systems were also reported (Davenport et al. 2002; Ross 1999). To build a comprehensive view of the ES benefits that an organization might expect to realize from ES, Shang and Seddon (2002) classified the benefits reported in 233 ERP-system success stories into the five main dimensions: operational, managerial, strategic, infrastructure, and organizational. Their benefits categories are discussed in more depth below and are used in the Results section to analyze benefits in all five dimensions.

Table 1: ES Benefit Dimensions (based on Shang and Seddon 2002)

Dimension	Benefit Definitions (all consequences of ES use)
Operational benefits	Operational benefits are usually reflected in cost reduction, cycle time reduction, productivity improvement, quality improvement, and improved customer service.
Managerial benefits	Improved management decision-making, e.g., improved allocation and control of organization's resources, monitoring of operations, performance improvement and support for strategic decisions.
Strategic benefits	Support for strategic action such as business growth, alliance, globalization, innovation, product differentiation, and external linkages.
IT Infrastructure benefits	Reduced IT costs, increased capability for quick and economic implementation of new applications, and enablement of greater organizational flexibility.
Organizational benefits	Consequences of ES use that make an organization more focused and cohesive, better at learning, and better at executing its chosen strategies. Evidence of organizational benefits includes increased employee morale and satisfaction, greater employee accountability, and the transformation of users from doers to planners with broadened skills.

2.2 Benefits from enterprise systems are perceived differently by different stakeholders

As summarized in Table 2, Shang and Seddon (2002) suggest that ES benefits are perceived differently by different stakeholders and that it is important to ask appropriate informants about the benefit realization. Operational benefits are observed in many processes by different end-users. The most useful information about managerial benefits is provided by business managers, who have a clearer picture of the impact of the adoption of ES on the overall organisation, including their's and their colleagues' decision-making. Strategic benefits appear to flow from a broad range of activities in internal and external areas, and are described in terms of general competitiveness, product strategies, and other strategic capabilities. The most accurate informants about these benefits are senior managers such as chief executive officers, since they have a clearer understanding of the competitive position of their organisations. On the other hand, senior IT managers appear to be the most reliable to ask about IT infrastructure benefits. They can speak with authority about IT-related benefits. Finally, organisational benefits are mainly reflected in individual attitudes (e.g. employee morale) and interpersonal interactions. The best informed people to ask about organisational

benefits are again business managers since they have an encompassing view of how the adoption of ES has affected employee morale and the sense of purpose within individual parts of the organisation.

Table 2: Stakeholders' perceptions of ES Benefits in Different Dimensions

Enterprise Systems Benefit	Appropriate stakeholders to ask about each benefit category
Operational Benefits	Business managers who know about business value chain processes, and business stakeholder support activities
Managerial Benefits	Business managers who know about different kinds of resources affected, and different levels of decision-making
Strategic Benefits	Senior managers who know about achievement of the various strategic goals
IT infrastructure Benefits	IT managers who know about IT cost items and different types of business and technology changes
Organisational Benefits	Business managers who know about individual attitudes and interpersonal interactions

2.3 When and how are these benefits realized?

Benefits from different classes of IT investment in transactional, informational, strategic, and infrastructure systems are reported to take different lengths of time to develop (Weill et al. 1998). One of the most consistent findings reported in the literature about ES benefits is that there is a dip in organizational performance in the six to twelve months after going live (Deloitte_Consulting 1998; KPMG_Consulting et al. 2000; Markus et al. 2000; Ross 1999) (Cookie et al. 2001). Benefits seem to start after the first year or so, when problems like corrupt master file data and lack of adequate user training have been sorted out (Holland et al. 2001; Markus et al. 2000; Ross 1999). The recent Accenture study (Davenport et al. 2002) reports that benefits did not all appear immediately (Fig. 15, p.26). For instance, cost savings were noted in most organizations while other benefits, such as increased revenue, grew significantly in the four or more years after implementation. It seems that different types of benefits are realized differently in different situations.

3. Research methodology

3.1 The research design

The objective of this study is to track ES benefit realization along a system's lifespan. This requires an exploratory and descriptive method of longitudinal analysis. The analysis needs to take a process view and an emergent perspective, which analyzes the results of the interaction between the system and users so that both short-term operations and long-term strategies can be examined. As noted by Shang and Seddon (2002), many insights into benefits and problems can be gained from observing processes at both organizational and core-process levels. The analysis in this paper is therefore based on a mix of organizational and process levels to provide a solid understanding of a constantly growing and changing environment. Since Shang and Seddon (2002) consider the broadest range of benefits of the various studies reviewed earlier, we chose to use their framework (summarized in Table 1) as the starting point for examining benefits for this study. The study thus investigates ES benefit realization in the five ES benefit dimensions with the following focuses:

- different patterns of ES benefit realization in different dimensions, over time
- interactions among benefits in different dimensions

3.2 Data collection

The main subject of this study, business benefits, is multi-dimensional and may be perceived differently in different organizations. For that reason, the presence of the researcher during the data collection process is considered essential: to clarify concepts and to ensure that the understanding of the concepts involved is consistent and precise across the subjects. The research method should therefore be able to accommodate a perceptual approach and also build concepts from multiple sources.

Use of multiple case studies is the recommended method for studying poorly understood phenomena in a real-world setting (Yin 1994). After initial discussions with a number of different ERP-using organizations, it was decided that this study would focus on the four Australian utility companies described in Table 3. The aim was to conduct in-depth case analyses within homogeneous business environments to eliminate complications in case analysis. These cases all have had general ES experience over a similarly long period and have all applied ES for multiple purposes. So it was expected that benefits would be observed in most if not all benefit dimensions in Table 1.

Table 3 The Four Australian Utility Companies in the in-depth Case Studies

Companies	UtilityA	UtilityB	UtilityC	UtilityD
Established	Oct. 1994	July 1995	1995	Oct. 1994
Employees	950	1,122	900	1,200
Utility businesses	Electricity Gas	Electricity	Electricity Gas	Electricity
Customers	1,100,000	733,783	800,000	555,000
Total sales	A\$ 700 M	A\$ 600 M	A\$ 711 M	A\$ 692 M
Motivation for adoption of the ES	Support business changes Year 2000 (Y2K)	Reduce costs Year 2000 (Y2K) Enable business changes	Support new strategies Replace old legacy systems	Replace old legacy systems Year 2000 (Y2K) Support new business
Period of implementation	10/95-07/96 9 months	12/96-12/97 12 months	01/97-11/97 one more year for other phases	06/96-11/97 17 months
Years of ES use	3.5	3	3	3
ES users	450	250	600	630
ES adopted	SAP	SAP	PeopleSoft	SAP

In the four case-study organizations, interviews were conducted with five to seven people in a range of roles in each organization. Interviews were typically one hour. A total of 31 interviews were conducted with multiple interviews with some key informants. To reduce the possibility of recency-effect bias several data-triangulation tactics were applied. During each interview, subjects were asked to think retrospectively regarding the details of business conditions, the implementation project, benefits and problems in the first year of use, benefits and problems since then, likely future developments, and to supply supporting evidence. Shang and Seddon's (2002) 84-point checklist was used to remind interviewees of possible types of ES benefit and to trigger recollections of the benefit realization process. The results were cross-validated with internal and external documents and various interviewees in the same organization. In addition, key informants were interviewed twice, once in 1999 and once in 2000. The first interview, in 1999, collected information about the first two years of system use. The second interview, in 2000, verified the previous years' findings and collected information about the latest year.

The technique we used for tracing ES benefit realization processes was to draw perceived benefit flow graphs for various benefits dimensions. An example the benefit graph is shown in Figure 1. The graphs provide a convenient impressionistic way of summarizing benefits to an organization of its investments in information technology during the years after implementation. As with prior studies such as Davenport et al. (2002), perceived, rather than monetary measures were used for the vertical axis because such measures are relatively easy to collect and it is usually difficult to quantify benefits from IT investments any more accurately.

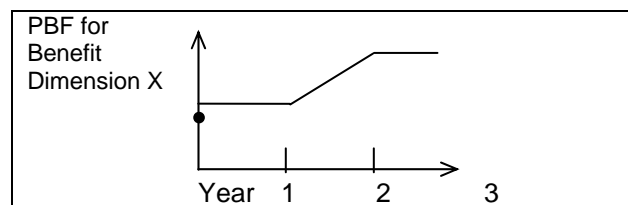


Figure 1: Perceived Benefit Flow graph with annual benefits rising in the second year (the dot on the vertical axis represents the level of benefits from the prior system)

We decided not to collect details of costs such as initial licence fees and implementation costs, nor even ongoing maintenance fees that are essentially locked in once an organization has decided to implement ES. Thus our graphs show perceived benefits after factoring in the negative consequences of various problems, but not perceived net benefits.

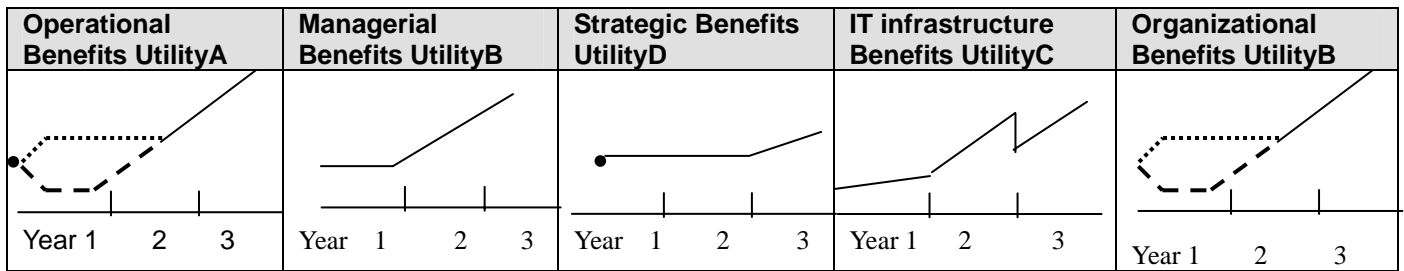
For each of the three years after “go-live”, process owners were asked to indicate benefits relative to the prior system on a five point scale with the midpoint representing no change. Their answers were used as anchors for the patterns of benefits depicted in the graphs. All graphs (in all five dimensions) have been checked with key informants in each organization.

3.3 Data analysis

This study applied Eisenhardt's (1989) suggested key steps in analyzing case data: within-case analysis, cross-case search for patterns, shaping propositions and proposition verification. To do so a three-level iterative data analysis process was used. At the first level, a timetable was constructed for each of the four cases with business changes, ES implementation and use, and dimensional benefits and problems noted along the three years of Enterprise Systems use. At the second level, each case was further analyzed according to five benefit dimensions. A table of patterns of perceived benefit flows, and explanations of initial and later benefits and problems was created for each case. At the third level, the analysis of these four cases was reassembled by benefit dimensions in order to examine general patterns of benefit in each dimension. Five tables, one for each benefit dimension, were formed. Finally, the summarized results were developed from the five-dimensional benefit analysis.

4. Results and propositions

This section presents propositions formed from the multiple levels of cross-case analysis with supporting evidence and representative benefit-flow graphs from the different companies as depicted in Figure 2. The intention in presenting the perceived benefit flow graphs is not to present a general pattern of ES benefit realization, nor to compare benefit realization across organizations. The objective is to demonstrate possible benefit-realization patterns through the life of an enterprise system.



..... Finance Management - - - - Work Management _____ Both

Figure 2: Representative perceived benefit flow graphs

4.1 Proposition 1: ES benefits should be assessed longitudinally in different dimensions; enterprises should expect benefits to emerge in different dimensions at different rates.

If you came a year ago, the system would be classified as a disaster. We almost dumped it. Many complicated processes needed to be learned and simplified. (Business Analyst, Warehousing, Purchasing - Utility A)

In the business case, what we really did well was the IT cost reduction side. We had that right from the beginning and it is still improving. (Business Coordinator – Utility C).

As shown in Figure 2, benefits in different dimensions are realized at different points in time. Immediately after going live operational benefits and problems were quickly apparent in most processes. In many cases, it took more than a year for these problems to be solved and for users to learn to run their operational systems effectively. Second, it took a longer time (an average of 18 months in the four cases) for data-retrieval processes to be ironed out, and for managers to learn and trust the new reporting capabilities. Third, strategic benefits appeared only after senior managers learned to apply the power of their systems to strategic ends, which in some cases took years. As depicted in Figure 2, Utility D has not realized any strategic benefit in the first two years until the company started to learn how its integrated IT infrastructure supported acquisition of new business units. Fourth, some IT Infrastructure benefits were realized immediately after replacement of legacy systems, in some cases IT Infrastructure benefits continued to grow as the organizations learned to build on their new infrastructures. But with Utility C, as depicted in Figure 2, the cost per unit of processing increased, and IT benefits decreased, in the second year, after the company sold a business branch which was the major user of the HR module. The cost structure was readjusted after the company outsourced the HR process to a professional HR agent in the third year. Finally, in a number of cases, it took more than two years for organizational resistance to the new systems to ease and for positive Organizational benefits to start to emerge.

4.2 Proposition 2: ES benefits should be assessed along the system’s life, and organizations should expect management initiatives to lead to increased benefits.

It’s continually built. I’m cautiously optimistic that we can grow with it rather than use it for a period and discard it. In the next few years there will be more productive improvement. I think that’s just a natural progression with any ERP system (Controller-Utility D).

Proposition 2 is based on the observation that continuous benefits can be accrued from the enterprise systems. The benefits of enterprise systems grow and grow. As depicted in Figure 2, benefits in all dimensions show growth. In the four cases, three key factors caused the benefits to increase: the evolving functionality of the software; process enhancement programs; and the expansion of the use of the application infrastructure.

Enterprise system functionality evolves with regular upgrades and constantly advancing technologies. Mandatory system upgrades and frequently developed new functionality provide businesses with a continuous stream of new technology and business processes which enabled, drove and inspired business changes in the years after the system went live. In addition, business-initiated process-change programs also led to better-optimized process effectiveness. Finally, add-on software and better integration with other applications (e.g., supply chain management) further enhanced benefits from the enterprise systems.

4.3 Proposition 3: ES benefits should be assessed in different processes so that the specific benefits and problems of the different processes can be addressed.

This proposition is based on the observation that ES benefits of different dimensions are realized at different rates in different processes and different functions. For example, one year after the system went live, when users in Finance management celebrated their achieved goal of 20% cost reduction and two day's faster month-end closing, their colleagues in Work Management of Utility A were disappointed and regretting the change. Cumbersome Work Management processes implemented in the ES decreased efficiency and did not fit the work environment in the engineers' shop.

It was like a noose around the business' necks. The ES ... became a barrier to doing business (Business System Manager - UtilityB).

A similar situation was also found in Utility C, where the logistics managers were happily allocating goods to different warehouses and considered that their ES helped with enterprise resources management, whereas the operators in the same warehouses were confused about complicated data entry processes and complained about the delays caused by the extra work they had to do at the front-end. Frequent errors were made and productivity was low. Similarly, people in Finance Management accepted the system and felt empowered with their new responsibilities, whereas people in Work Management were low in morale and disliked the system. Similar situations, with differing perceptions of benefits from the same system from the point of view of different functions, were found in three of the four cases.

4.4 Proposition 4: Interrelationships among different dimensions of ES benefits need to be analysed so that these different dimensions can be holistically planned, and problems eliminated.

This proposition is made on the basis of the observation that ES benefits in different dimensions interact and depend on one another. Benefits and problems in any one dimension may lead to benefits and problems in the other dimensions, and vice versa. Focusing first on the Operational Benefits, the most visible early effects of ES use were Operational benefits and problems. Improvements in this benefit dimension underpinned benefit realization in the other four dimensions: managerial benefits started only after operations were stable and reliable information was being captured in the database; strategic benefits were realized only after operations were stable and senior managers recognized the power of their systems as tools for wringing benefits from newly-taken-over organizations; IT infrastructure benefits

were achieved early, but increased once mature operations were in place; and organizational benefits though generally negative initially, started to increase after benefits became apparent in the other dimensions.

Second, focusing now on Managerial Benefits, once managers began to realize Managerial benefits, e.g., in the form of improved decision making and control, operational efficiencies began to increase. For example, flexible resource management in Utilities B and D led to reduced cost of inventory and increased the speed of customer service.

Third, as managers realized Strategic benefits, they tended to expand and extend the use of their ES infrastructure. This, in turn, affected business operations, management and organizational learning.

Fourth, with improvement in the above business areas, the capacity and capability of the IT Infrastructure provided by the ES became practical and visible. New strategies of business expansion, web-based services, and linkage with other Utility application systems all built on the new application infrastructure. In the third year of ES use, the systems studied were able to support many business changes, including changes with the new Australian tax system, the GST (Goods and Service Tax), and managerial requests from head offices, as well as strategic initiatives involving takeovers of other utility companies.

Finally, as Organizational knowledge grew, operational, managerial, and strategic benefits all increased. UtilityC, for instance, gained confidence in their ES and established shared services for internal and external customers. More reports were used for decision-making and individual efficiency improved. These improvements all came from the users' greater capacity to use the system and their increasingly positive attitudes towards the ES.

The interplay between benefits in these different dimensions gradually led to new and more effective ways of running the organization.

4.5 Proposition 5: ES benefits need to be assessed when there is a change to the software and business processes. Businesses need to monitor the possible change triggers and conduct pre and post change assessment so that the possible problems in different dimensions can be prevented and further benefits can be planned.

Can I say that in the beginning, you didn't plan to have this. However the product kept upgrading capabilities, and business kept changing strategy or changing objectives – probably before you didn't think it was important. As you change you're happy that this system also can change with you. (Financial Controller – Utility C).

Proposition 5 is based on the observation that ES benefits change (increase and decrease) in response to internal and external triggers, and these changes bring additional benefits and problems. As shown in Figure 2, benefits change continuously. Regular software upgrades and technology advances, together with changes in business strategies, products and services, and organizational structures, plus changes in the regulation or other external environmental factors all triggered new processes of benefit realization in the five dimensions. In the second and third year of ES use, Utility A and D have gained benefits from the new version of their SAP software through its web-enablement. Utility C upgraded data analysis functions in its PeopleSoft software and further increased efficiency in inventory control in their second year. Utility B realized operational benefits from the use of a third-party integration tool to link

with their GIS and customer information system. New strategic movements (business alliances, business expansion, or business restructuring) initiated new process requirements and inspired new directions for ES use. For example, business acquisitions in Utility Co A and C gave rise to new needs for ES functionality and to changes to processes in newly merged business units. Moreover, changes in business products led to new ways of managing ES functions. For example, when a new series of combined utility services was developed in the Utility B, a project team with core process managers was formed, current processes were reviewed, and the ES software was reconfigured to support new production and promotion. Equally, after the sale of a construction unit, Utility Co C no longer needed ES support for large-volume ordering processes, and the operational costs were reduced by discarding the Ordering module. Regulations, for instance the new tax regulation in Australia, triggered new business processes and system flows.

Thus it is critical for businesses to monitor continuously changing conditions in their business environment, e.g., strategies, industry regulations, new technologies, new products, new structures, increased or decreased user experience, and personnel turnover, because all these factors are capable of creating the need for fresh process or system changes or new modes of ES management.

5. Implications

Although limited to one industry, the four cases capture general themes that would be expected to be found in many organizations. The PBF graphs explain the possible ups and downs in the ES journey; they reveal interrelationships between dimensional benefits, and highlight pivotal points in developing initial and further benefits. While it is certainly not possible to summarize the outcomes of an Enterprise System with five subjectively based graphs, the benefit flow graphs do provide a general view of how ES benefits are realized. Instead of capturing a snapshot of benefit realization at any particular point in ES life, the patterns of benefit flow in these graphs provide a useful picture of how ES affect the business in different business dimensions throughout the life of the ES. Additionally, identifying different benefits in different dimensions, different time periods, and for core processes, helps to explain conflicting perceptions of ES success throughout the organization. The date of assessment, and breadth of factors assessed, can strongly affect the evaluation results.

Organizations investing in ES need to understand that an assessment of benefits at one point in time does not represent the final gain or loss of their investment. No benefits at one time, does not mean no benefits for good. Many benefits may be found at a later stage, in a range of different dimensions. The evaluation of ES investment needs to take a longitudinal view with different types of benefits planned at different stages.

ES managers need to understand that further benefits in all dimensions are possible. A one-time gain may not mean an all-time win. Benefits realized at one time point can decrease later. Businesses must continuously evaluate current use and plan for future growth in all dimensions. It is therefore important for business managers to adopt a holistic view of the benefit realization and to manage the different effects in the different dimensions.

The most obvious limitation of this study is that the four utility cases selected were homogeneous in their business environments and core business processes. The strength of this was that the cases were directly comparable. Different outcomes could be more directly attributed to different management practices in the different cases. If the cases had been less homogeneous, it would have been much harder to attribute different outcomes to different

management practices because so many other differences, including company size, industry differences and cultural effects, might have caused the different outcomes. The possible weakness in this research design is that some would argue that findings from this study should not be generalized beyond this particular industry. However, we believe the longitudinal and broad-scope, five-dimensional benefit analysis in this study, will prove useful in many future studies in different industries. The reason is that we see nothing specific to the utility industry that drive our findings. Problems of organizational learning, change management, and difficulties in configuring software exist in all industries, not just the utility industry.

6. Conclusion

In the last decade, ES software has emerged as a major source of organizational benefits from IT. The objective of this study was to understand benefit-realization processes as organizations adopt and use ES software. Findings from the four case studies show that benefit realization is an ongoing process, with benefits in each of the five dimensions being realized at different rates in different core processes in different organizations. It is hoped that these findings provide insights into the nature of ES benefits, assist business managers to gain a deeper understanding of ES benefit realization processes, and can help managers to build more effective strategies for ES utilization. Understanding ES benefits, therefore, requires a complete assessment of all functions in the five benefit dimensions, and a careful tracking of these benefits over time.

7. References

- AMR Research "AMR Research Spring Press Briefing, Scottsdale, Arizona,"), June 5 2003.
- Brown, C.V., and Vessey, I. "Managing the next wave of Enterprise systems: leveraging lessons from ERP," *MISQ Executive* (2:1) 2003, pp 65-77.
- Cookie, D., Gelman, L., and Peterson, W.J. "ERP Trends," *The Conference Board, Research Report R-1292-01-RR*, June 2001.
- Davenport, T.H. *Mission Critical: Realizing the Promise of Enterprise Systems*, Boston, Massachusetts, 2000.
- Davenport, T., Harris, J. and Cantrell, S. *The Return of Enterprise Solutions: The Director's Cut*, Accenture, October 14, 2002.
- Deloitte_Consulting *ERP's Second Wave -- maximizing the value of ERP-Enabled Processes* Deloitte Consulting, New York, 1998.
- Eisenhardt, K.M. "Building Theories from Case Study Research," *Academy of Management Review* (14:4) 1989, pp 532-550.
- Holland, C.P., and Light, B. "A Critical Success Factors Model for ERP Implementation," *IEEE Software* (16:3) 1999, pp 30-36.
- Holland, C.P., and Light, B. "A stage maturity model for enterprise resource planning system use," *Database for Advances in Information Systems* (32:2), Spring 2001, pp 34-45.
- Irani, Z., and Love, P.E.D. "The propagation of technology management taxonomies for evaluating investments in information systems," *Journal of Management Information Systems* (17) 2001, pp 161-178.
- KPMG_Consulting, and Institute, N.N. *SAP Benchmarking Report 2000*, 2000.
- Markus, L.M., and Tanis "The Enterprise Systems Experience --- From Adoption to Success," in: *In Framing the Domains of IT Research: Glimpsing the Future Through the Past*, R.W. Zmud (ed.), Pinnaflex Educational Resources, Cincinnati, OH, 2000.
- Parr, A.N., Shanks, G., and Darke, P. "Identification of necessary factors for successful implementation of ERP systems," in: *New Information Technologies in Organizational*

- Processes: Field Studies and Theoretical Reflections on the Future of Work*, O. Ngwenyama, L.D. Introna, M.D. Myers and J.I. DeGross (eds.), Kluwer Academic Publishers, Boston/Dordrecht/London, 1999.
- Ross, J.W. *The ERP Revolution: Surviving Versus Thriving* Sloan School of Management, Cambridge, MA, 1999.
- Scott, J.E., and Vessey, I. "Managing risks in enterprise systems implementations," *Communications of the ACM* (45:4) 2002, pp 74-81.
- Shang, S., and Seddon, P.B. "Assessing and Managing the Benefits of Enterprise Systems: the Business Manager's Perspective," *Information Systems Journal* (12) 2002, pp 271-299.
- Somers, T.M., and Nelson, K. "The Impact of Critical Success Factors across the Stages of Enterprise Resource Planning Implementations," Proceedings of the 34th Hawaii International Conference on System Sciences., 2001.
- Sumner, M. "Critical Success Factors in Enterprise Wide Information Management Systems," Proceedings of the Americas Conference on Information Systems, WI, 1999, Milwaukee, 1999, pp. 232-234.
- Umble, E.J., Haft, R.R., and Umble, M.M. "Enterprise resource planning: Implementation procedures and critical success factors," *European Journal of Operational Research* (146) 2003, pp 241-257.
- Weill, P., and Broadbent, M. *Leveraging the new Infrastructure* Harvard Business School Press, Boston, 1998.
- Yin, R. *Case Study Research: Design and methods* SAGE Publications, 1994.