Assessing and managing the benefits of enterprise systems: the business manager's perspective

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Abstract. *This paper focuses on the benefits that organizations may achieve from their investment in enterprise systems (ES). It proposes an ES benefit framework for summarizing benefits in the years after ES implementation. Based on an analysis of the features of enterprise systems, on the literature on information technology (IT) value, on data from 233 enterprise systems vendor-reported stories published on the Web and on interviews with managers of 34 organizations using ES, the framework provides a detailed list of benefits that have reportedly been acquired through ES implementation. This list of benefits is consolidated into five benefits dimensions: operational, managerial, strategic, IT infrastructure and organizational, and illustrated using perceived net benefit flow (PNBF) graphs. In a detailed example, the paper shows how the framework has been applied to the identification of benefits in a longitudinal case study of four organizations.*

Keywords: Enterprise systems, ERP systems, business benefits, IS effectiveness, perceived net benefit flow, operational benefits, managerial benefits, strategic benefits, IT infrastructure benefits, organizational benefits

INTRODUCTION

Organizations invest in enterprise system software from vendors such as SAP, Oracle, PeopleSoft, Siebel and i2 Corporation in order to gain access to powerful, computer-based information systems more cheaply than through custom-built software development. Total revenue from the enterprise system software and services market was US$18.3 billion in 1999 and $19.9 billion in 2000 (Gilbert, 2000; Jakovljevic, 2001). Enterprise system implementation costs are often reported to be five to 10 times the cost of software licences (Davenport, 2000; Scheer & Habermann, 2000). If so, organizations worldwide spent about US$100 billion p.a. on the purchase and implementation of enterprise systems in both 1999 and 2000. In short, in the last decade, organizations around the world have made huge investments in enterprise systems.

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Enterprise systems (ES) are large-scale organizational systems built around packaged enterprise system software. Enterprise system software (ESS)

- is a set of packaged application software modules with an integrated architecture, which can be used by organizations as their primary engine for integrating data, processes and information technology, in real time, across internal and external value chains;
- contains deep knowledge of business practices accumulated from vendor implementations in a wide range of client organizations;
- is a generic 'semi-finished' product with tables and parameters that user organizations and their implementation partners must configure, customize and integrate with other computer-based information systems to meet their business needs.

ESS includes enterprise resource planning (ERP), customer relationship management (CRM), supply chain management (SCM), product life cycle management (PLM) and eProcurement software. The focus of this paper is on ERP, the most important class of ESS. ERP software integrates management information and processes, such as financial, manufacturing, distribution and human resources, for the purpose of enabling enterprise-wide management of resources (Davenport, 1998; Deloitte Consulting, 1998; Klaus *et al*., 2000). Configuration and customization of any type of ESS to fit the needs of the client organization is a major task that involves business and IT managers, users and implementation partners working together to understand the capabilities of the software and to define and implement new operational and managerial processes.

According to Markus & Tanis (2000), 'the key questions about enterprise systems *from the perspective of an adopting organization's executive leadership* are questions about success. For example: Will our investment pay off? Did our investment pay off?'. It is these questions about success that motivate this paper. To be precise, this study focuses on the *benefits* that organizations gain from their use of enterprise systems *in the years after implementation.* Research into IT evaluation has shown that, although costs are hard to quantify in post-implementation audits, benefits are harder to identify and quantify (Hochstrasser & Griffiths, 1991; Willcocks Y & Lester 1999, Irani *et al*., 2001; Seddon *et al*., 2002). For that reason, this paper focuses on post-implementation benefits from enterprise systems.

According to Davenport (2000), Deloitte Consulting (1998), Markus & Tanis (2000) and Ross & Vitale (2000), business benefits from ES use are multidimensional, ranging from operational improvements through decision-making enhancement to support for strategic goals. Irani & Love (2001), Wilderman (1999), Holland *et al*. (1999), Cooke & Peterson (1998), Scalea *et al*. (1997), Campbell (1998), Gartner Group (1999) and Jacobs (1998) also mention ES benefits in these areas, including both tangible and intangible benefits. However, the ES benefits discussed in the above studies tend to be either snapshots taken at one moment in the life of an ES or very high-altitude pictures of ES benefits. None of them offers the comprehensive view of long-term benefits needed if sound evaluations of investments in enterprise systems are to be made. Given that organizations around the world have spent hundreds of billions of dollars on ES, the question addressed in this paper is: what types of benefits can organizations achieve from their ES, and when are these benefits realized? To answer this question, a com-

prehensive framework is presented that lists and classifies the wide range of benefits that many different organizations have been able to achieve from the use of ES.

This paper is largely devoted to an explanation of how the benefits framework was developed. Towards the end of the paper, a simple graphic technique for summarizing perceived net benefit flows (PNBFs) in the years after ES implementation is also presented. To illustrate the usefulness of both the framework and the PNBF graphs, the paper concludes by showing how benefits from ERP use were assessed in four longitudinal case study organizations over three years. The framework and PNBF graphs can be used as both a checklist and communication tool for consensus building in within-firm discussions about benefit realization and an assessment instrument for managing benefit realization issues.

DEFINING CRITERIA FOR THE ASSESSMENT OF ENTERPRISE SYSTEMS

Seddon *et al*. (1999) recommended that, before seeking to evaluate an IT investment, it is necessary to have clear answers to each of Cameron & Whetten's (1983) seven questions on organizational effectiveness measurement. These questions are shown in the left-hand column of Table 1. Answers to their questions, as they apply to this study, are shown on the right.

To answer the first question 'From whose perspective is effectiveness being judged?', this paper seeks to develop an ES benefits classification that considers benefits from the point of view of what it calls 'business managers'. Business mangers are the middle-level managers responsible for what Anthony (1965) described as 'management control' and 'tactical planning'. Combining detailed knowledge of operational issues with a thorough understanding of strategic goals, they manage the links between business strategy and business operations. Business managers are responsible for proposing feasible business plans and implementing business strategies.

Table 1. Seven questions to answer when measuring organizational performance (source: Cameron & Whetten, 1983, 270–274)

Seven questions for measuring organizational performance	Answers in this study for evaluating investment in enterprise systems
1. From whose perspective is effectiveness being judged?	Business managers
2. What is the domain of activity?	Enterprise systems
3. What is the level of analysis?	Both organizational and functional
4. What is the purpose of evaluation?	Planning, management and improvement
5. What time frame is employed?	Years after the enterprise system goes live
6. What types of data are to be used?	Objective and perceptual
7. Against which referent is effectiveness to be judged?	Markus' optimal success; stated goals of the organization, i.e. the business case; past performance of the organization

In evaluating the benefits of ES, the decision to focus on business managers' interests, rather than on those of the chief executive officer or operational managers, was deliberate. At the top of Anthony's (1965) three-level planning and control systems pyramid, strategic planners (senior business executives and boardroom decision makers) tend to focus on the financial performance of their IT investments. The difficulty with evaluating investments in ES at this very senior level (Singleton *et al*., 1988; Sircar *et al*., 2000) is one of causality: one cannot be sure that investments in IT are the cause of observed changes in sales, corporate profitability or market share.

At the bottom of Anthony's (1965) pyramid, operational managers (e.g. foremen in a factory) are more likely to be interested in system attributes such as information quality (are the data accurate, timely, etc.?) and ease of use. If evaluation of ES were conducted at this level, instruments such as those from Doll & Torkzadeh (1988) and Davis (1989) could be distributed to a sample of employees to gauge their satisfaction with the parts of the ES that they interacted with. The problem with evaluating an ES at this level is that such perceptions of success are based on the needs and interests of those individuals, whose perceptions may take little account of organizational goals such as cost saving, improved productivity and improved customer service. Yet, achievement of these organizational goals is often the key to realizing benefits from investment in ES.

Because the views of strategic managers are too broad to identify causal links between ES investment and benefit realization, and those of operational managers are too narrow to consider all relevant organizational goals, this paper argues that the most appropriate management level for the evaluation of ES is that of the business manager (the middle level of Anthony's pyramid). Business managers have a comprehensive understanding of both the capabilities of ES and the business plans for system use. It is therefore these business managers whom we address in developing our framework of benefits from ES.

Cameron & Whetten's (1983) questions 2 and 3 ask about the domain of activity and the level of analysis evaluation. Our answers (see Table 1) are that the domain of activity is the organization's ES, and the proposed level of analysis is at both the organizational and the functional level. Analysis at *both* these levels is necessary because some benefits, such as strategic benefits, may be best assessed at the organizational level, and others, such as operational benefits, are best assessed in functional areas. For example, the financial module of an ES may be implemented and used quite differently from the firm's logistics module. Because the nature of the benefits for each function may be quite different, they need to be evaluated as distinct modules.

The answer to question 4 is that the purpose of the evaluation is mainly to help business managers to plan, manage and improve ES use. Our goal is to develop a benefits framework that will assist in the identification of the various types of benefit, including efficiency, effectiveness and the social aspects of information systems (Mirani & Lederer, 1998; Smithson & Hirschheim, 1998). The answer to question 5 is that the time frame for evaluation is the years after the system goes live. In answer to question 6, we envisage that both objective (including financial) and perceptual data will be used for assessing benefits. The problem with restricting analysis to, for example, financial measures such as return on investment (ROI), is that many

of the benefits of ES use are hard to quantify because of their intangibility. For this reason, we believe that perceptual data must also be included in the evaluation.

Finally, in answer to question 7, 'Against which referent is effectiveness to be judged?', three valid answers are proposed. If the task force were to compare the performance of the ES a year after implementation, with the business case for the investment, they would be using the 'stated goals of the organization' as the referent. The two other referents that may be useful in some cases are 'some other organization' (which is called benchmarking in IT parlance) and 'some ideal level of performance'. Markus & Tanis (2000) recommended the use of the latter referent (some ideal level of performance) when they say:

> 'To accommodate the multidimensionality and relativity of enterprise systems success from the adopting organisation's perspective, we define a standard of 'optimal success'. Optimal success refers to the best outcomes the organisation could possibly achieve with enterprise systems, given its business situation, measured against a portfolio of project, early operational, and longer-term business results metrics.'

All three possible referents could be valuable for evaluating benefits from ES.

METHODOLOGY FOR BUILDING THE BENEFITS FRAMEWORK

The four-stage process used to build the benefits framework presented in this paper was as follows:

1 Search the popular press and vendor websites to gain a general understanding of features offered by ES, reasons why organizations adopt ES, problems caused by ES and benefits gained from ES.
2 Review the academic literature on IT evaluation and success, identify benefit dimensions relevant to ES use and propose an ES benefit framework.
3 Use the proposed framework to analyse, in detail, data from web-published vendor success stories on ES. This included making direct contact with managers in about 15% of case study organizations to verify the 'facts' published by the vendor. Steps 3.2, 3.3 and 3.4 of the six-step process for web case analysis are illustrated below with a detailed example of the analysis of one success story from one vendor website (Exhibit 1).
4 Produce a consolidated list of ES benefits for use as a checklist in planned future case study interviews.

With respect to stage 3, at the time of this study, the ERP vendors had begun to realize the power of the World Wide Web for disseminating information about their products. We realized that the success stories published by the vendors on their websites represented a rich source of carefully collected, accessible, up-to-date information about ERP benefits that had not been available hitherto for research into information systems. Vendor web cases share characteristics, in that they:

- present a detailed picture of ES investment, including details of business environment, background, objectives, competitive strategy, IS support, ES investment decisions, system implementation and benefits realized;
- include traceable evidence such as the names of organizations and project sponsors, so that follow-up verification is possible;
- are reported from a business users' points of view.

The risks in using vendor-published stories were that vendors would be presenting their products in the most favourable light; they would be unlikely to discuss failures; and they might overstate successes and anticipate benefits that had not actually been achieved. On the other hand, vendors would have had to gain approval from client organizations to publish stories about them and, also, clients could be contacted directly to confirm details of the claimed benefits. On balance, it seemed that, provided the above limitations were recognized and compensated for, web-published vendor success stories represented a new and valuable source of information about benefits from ERP systems.

DEVELOPING THE FRAMEWORK FOR CLASSIFYING BENEFITS FROM ENTERPRISE SYSTEMS

Results from the above four-stage process are now discussed in detail.

Stage 1: Understand the features offered by ES

By the end of this stage, a broad picture of ERP systems had begun to emerge. Most of this understanding is summarized in the introduction to this paper.

Stage 2: Review and consolidate existing IT benefit frameworks and propose an ES benefit framework

The benefits framework resulting from this stage is shown in Table 2. The following discussion focuses on the five main benefit dimensions in the left-hand column of the table. The first three categories are based on Anthony's (1965) earlier cited classic work on planning and control systems. Many IS benefit analyses and frameworks have been organized around Anthony's trinity of operational, managerial and strategic levels of management. For example,

- Weill (1990) evaluated the pay-off from three types of IS investment, i.e. in transactional, informational and strategic systems, in the US valve industry. He found that the greatest benefits came from investment in transactional level IT.
- Gorry & Scott Morton (1971) and others (Ginzberg & Reitman, 1982; Keen & Scott Morton, 1982; Money *et al*., 1988; Rockart & DeLong, 1988; Le Blanc & Kozar, 1990; Silver, 1990; Demmel & Askin, 1992) reported significant benefits from using IT for managerial decision support.

Table 2. Proposed enterprise system benefits framework

Dimensions	Subdimensions (21 at this stage)
Operational	1.1 Cost reduction
	1.2 Cycle time reduction
	1.3 Productivity improvement
	1.4 Quality improvement
	1.5 Customer service improvement
Managerial	2.1 Better resource management
	2.2 Improved decision making and planning
	2.3 Performance improvement
Strategic	3.1 Support for business growth
	3.2 Support for business alliance
	3.3 Building business innovations
	3.4 Building cost leadership
	3.5 Generating product differentiation
	3.6 Building external linkages
IT infrastructure	4.1 Building business flexibility for current and future changes
	4.2 IT cost reduction
	4.3 Increased IT infrastructure capability
Organizational	5.1 Changing work patterns
	5.2 Facilitating organizational learning
	5.3 Empowerment
	5.4 Building common vision

- Porter & Millar (1985) and others (McFarlan, 1984; Rackoff *et al*., 1985; Wiseman, 1985; Fredericks & Venkatraman, 1988; Clemons, 1991; Cronin & Davenport, 1991; Pine, 1993; Venkatraman *et al*., 1993) noted significant benefits from the use of IT in pursuing strategic goals.
- Mirani & Lederer (1998) adapted Anthony's framework to build an instrument for assessing the organizational benefits of IS projects.
- Hicks (1997), Reynolds (1992) and Schultheis & Sumner (1989) also used Anthony's categories in classifying IT benefits as operational, tactical and strategic. The categories were also used as frameworks for analysing the benefits of general and enterprise-wide information systems (Wysocki & DeMichiell, 1997; Irani & Love, 2001).
- Willcocks (1994) and Graeser *et al*. (1998) adapted Kaplan & Norton's (1996) balanced scorecard approach in assessing IS investment in financial, project, process, customer, learning and technical aspects, and measured organizational performance along Anthony's three levels of business practice.

In short, there are very strong precedents in the IS literature for attempting to classify the benefits of ES in terms of operational, managerial and strategic dimensions.

The last two categories of benefit in Table 2 are 'IT infrastructure benefits' and 'organizational benefits'. Both of these benefit types have also been mentioned in a large number of pre-

vious studies. The benefit types are discussed in detail below in the examination of the subdimensions of each of the five main benefit dimensions.

Operational benefits (dimension 1). Operational activities process day-to-day activities that involve acquiring and consuming resources. The activities are usually repeated periodically, such as daily, weekly and monthly. Information technology has a long history of use in cutting costs and raising output by automating basic, repetitive operations. As mentioned above, there is evidence that investment in information technology to streamline processes and automate transactions provides business benefits by speeding up processes, substituting labour and increasing operation volumes (Morrison & Berndt, 1990; Weill, 1990; Blackburn, 1991; Smith, 1991; Brynjolfsson & Hitt, 1993, 1996; Lichtenberg, 1995; Weill & Broadbent, 1998). As ES automate business processes and enable process changes, they would be expected to offer benefits in terms of cost reduction, cycle time reduction, productivity improvement, quality improvement and improved customer service. These five types of benefit are listed as points 1.1–1.5 in Table 2.

Managerial benefits (dimension 2). Business management activities involve allocation and control of the firm's resources, monitoring of operations and supporting of business strategic decisions. These activities usually rely on summarized information or exception reports. As mentioned earlier, Zani (1970), Gorry & Scott Morton (1971), Ginzberg & Reitman (1982), Keen & Scott Morton (1982) and Rockart & DeLong (1988) all focused on the managerial benefits to business managers of information systems. In this paper, we argue that ES, with their centralized databases and built-in data analysis capabilities, are ideally placed to provide decision and planning benefits to management. As shown in points 2.1–2.3 in Table 2, real-time enterprise information may help an organization to achieve better resource management, improved decision making and planning and improved performance in different operating divisions of the organization.

Strategic benefits (dimension 3). The attainment of sustained IT-based competitive advantage may be a process of building organizational infrastructure in order to enable innovative action strategies, as opposed to 'being first on the scene' (Kettinger *et al*., 1994). Strategic activities involve long-range planning regarding high-level decisions, such as business merging and acquisition, marketing competition, product planning, customer retention and capital sourcing. Porter & Millar (1985) defined three generic strategies in which IT could be used to contribute to achieving business competitive advantages: cost leadership, differentiation and focus. They also identified the strength that IT could build into the business value chain and market competition, as suggested by Tallon *et al*. (2000) and Sethi & King (1994). Rackoff *et al*. (1985) expanded Porter's model to five strategic thrust areas, where the company could make major offensive or defensive moves. These five thrusts are differentiation, cost, innovation, growth and alliance. McFarlan (1984) and Earl (1989) argued that IT had matured to become an integral part of business conduct. Divisibility and expandability are opportunities for IT to maintain competitive advantages (Clemons & Weber, 1990).

Integrated information systems present a new opportunity for achieving competitive differentiation by customizing products or services for individual users at a lower cost (Jaikumar, 1986; Ferdows & Skinner, 1987; Pine, 1993; Victor & Boynton, 1998) and by directly supporting

tight links with customers (Clemons & McFarlan, 1986; Vitale, 1986; Malone & Yates, 1987) and all related business parties (Venkatraman, 1994). Enterprise systems, with their large degree of business involvement and internal/external integration capabilities, have the potential to assist in achieving the following strategic benefits: business growth, alliance, innovation, cost, differentiation and external linkages (points 3.1–3.6 in Table 2).

IT infrastructure benefits (dimension 4). IT infrastructure consists of sharable and reusable IT resources that provide a foundation for present and future business applications (Earl, 1989; McKay & Brockway, 1989; Keen, 1991; Niedman *et al*., 1991; Davenport & Linder, 1994; Duncan, 1995). Weill & Broadbent (1998) showed that infrastructure building is one of the fundamental management objectives in IT investment, and that a large proportion of most organizations' IT budget is devoted to expenditure on IT infrastructure.

Although ES may not be as clearly identifiable as IT infrastructure as are investments in telecommunications networks and mainframe computers, they nevertheless represent a significant investment of a firm's resources and create an application infrastructure within the business infrastructure. With their integrated and standard application architecture, ES provide an infrastructure that supports: (1) business flexibility for future changes; (2) reduced IT costs and marginal costs of business units' IT; and (3) increased capability for prompt and economic implementation of new applications. These benefits are summarized in points 4.1–4.3 in Table 2.

Organizational benefits (dimension 5). Organizational benefits arise when the use of an ES benefits an organization in terms of focus, cohesion, learning and execution of its chosen strategies. Peters & Waterman's (1982) observations of 43 successful US corporations suggest that IT is often used to help build integrated processes, improve employee communication, foster the development of a 'common vision' and user empowerment, support customer services and facilitate a flattening of organizational structure. IT can assist in organizational learning (Argyris, 1992) by virtue of the following: it is economical for generalizing from single to multiple settings; it is usable by others than its creators; it is informative about the general characteristics of the setting; and it can be validated by objective knowledge and objective processes that go beyond the information processing capacities of any given individual.

In addition, IT applications can play an active role in accelerating the evolution of the organizational context (Andreu & Ciborra, 1996), resulting in a shift in organizational culture (Detert *et al*., 2000). As a standardized resource widely available through the organization, IT transforms resources into capability and eventually into core capabilities (Andreu & Ciborra, 1996). IT tools, accumulated information and application knowledge are key factors that facilitate organizational learning behaviour (Garvin, 1993).

IT organizational benefits were also identified by Farbey *et al*. (1993) when consolidating past research findings on IT benefits. Organizational benefits appear in employees' development of a shared vision for the future of the organization and in better communication between people, which in turn improves mutual understanding. Also, through the integrated decision-making process, consensus may readily be created for subsequent actions. The learning can alter the way in which employees perceive and think about the organization and its environment.

As summarized in points 5.1–5.4 in Table 2, ES may be expected to produce organizational benefits such as improved working patterns, greater organizational learning, empowered workers, a greater sense of common vision across the organization and, possibly, an improvement (from the perspective of senior managers) in organizational culture.

Stage 3: Select, confirm and analyse web cases

The six-step process for case selection and review at this stage of our study is described in steps 3.1–3.6 of Table 3. Criteria for case selection are presented in step 3.2. As summarized in Table 4, 233 cases were selected using these criteria, from 470 cases reviewed.

In step 3.3, a total of 34 of the 233 firms were contacted via telephone, fax and email. The benefits were confirmed by business system project managers in 32 of these firms. In one firm, the relevant person to discuss the ES issues was unavailable because of frequent organizational restructuring. In the other, the claimed benefits appeared to have been overstated.

Results from step 3.4 show that the size of case organizations ranged from a consulting services firm with US$50 000 p.a. in revenue in the US to a $57 billion p.a. consumer products company in Europe. Project sizes ranged from 20 users of a PeopleSoft system in a US financial services firm to 4000 users of an Oracle system in a UK petroleum company. All ES were

Table 3. Case selection and review process

Step	Process
3.1	Visited ES vendor websites for SAP, Oracle, PeopleSoft, Baan, Oracle and J D Edwards for customer case studies (or customer success stories). Printed out case lists from SAP, PeopleSoft and Oracle. Lists from Baan and JD Edwards were not selected because they lacked complete information.
3.2	Reviewed these cases and selected eligible stories. Built three files with sets of eligible ES product cases: SAP, PeopleSoft and Oracle. The criteria for case selection were: a) ES had been applied to manage major enterprise resources. Cases with a single ES module used by an organization to manage certain core processes and not linked with other core resource management processes were not selected. b) Cases had sufficient information, with organization background, implementation descriptions and benefit descriptions. c) Focus was on business benefits, not product benefits. d) Cases included quantitative measures or precise business benefit descriptions.
3.3	Verified reliability of cases by contacting project managers in a convenience sample of 18 cases in Australia and a randomly selected sample of 16 cases in US, Singapore and Taiwan.
3.4	Used a spreadsheet to summarize, for each case, information about country, industry, user size (if available), modules installed, implementation stages and benefits achieved by the five categories. Three tables were constructed: SAP case analysis, PeopleSoft case analysis, Oracle case analysis.
3.5	Analysed benefit differences among industries, vendors and firm sizes.
3.6	Assembled case benefits according to the dimensions in the framework in Table 2. Benefits were selected and highlighted in the summary file only if a similar benefit had been achieved in more than two firms using products from different vendors. Three files organized according to the ES benefit framework were built: SAP benefits, PeopleSoft benefits and Oracle benefits.

Table 4. Summary of cases selected

ES vendor	Cases published	Cases selected	Case scope
SAP	256	84	19 industries, 45 countries.
PeopleSoft	124	65	11 industries, 10 countries
Oracle	90	84	Approximately 12 industries, six countries
Total	470	233	

implemented between 1995 and 1999. Implementation periods ranged from four months to three years. These cases were reported in their first or second year of ES system use. All cases provided details of business background, ES implementation and benefits from ES.

A detailed example of steps 3.2–3.4 is presented in the next section. The final benefits framework was produced in step 3.7. This framework is included in full as Appendix 1.

Stage 4: Produce a consolidated ES benefit framework

In this final stage of benefit framework construction, the three detailed lists of benefits from step 3.6 were consolidated into one list and grouped into subcategories. The approach to grouping was similar to axial coding in grounded theory (Strauss & Corbin 1990), although it was guided by the initial categories in Table 2.

The result of stage 4 was that the ES benefit framework from Table 2 was expanded and enhanced with detailed descriptions. The five major benefit classes from Table 2 were unchanged, but the 21 subdimensions from Table 2 were expanded to 25.

- Under the heading 'strategic benefits', two subdimensions, '3.6 Enabling worldwide expansion' and '3.7 Enabling E-commerce', were added to expand and replace the previous '3.6 Build external linkages (customers and suppliers)'. 34% of ES users, across the three vendors, indicated 'enabling E-commerce in their business' as a major strategic benefit.
- Under the same 'strategic benefits' heading, one new subdimension, '3.8 Generating or sustaining competitiveness' was added for classifying the effects of ES on business competitiveness.
- Under the heading 'Organizational benefits', two new subdimensions were added, '5.5 Shifting work focus' and '5.6 Increased employee morale and satisfaction'. A number of firms mentioned that their ES had helped in shifting employee focus to core business functions in planning and managing and in serving customers. Moreover, satisfied employees with efficient support from ES created better morale in the workplace. This is considered to be a key driver for achieving excellent business outcomes (Kaplan & Norton, 1996).
- In addition to the new subdimensions, 89 dot-point examples were added to provide more details of each benefit category.

The resulting detailed list of major benefit categories, subcategories and examples is shown in the summary of ES benefits in the Appendix.

SAMPLE WEB CASE AND ANALYSIS

To illustrate steps 3.2, 3.3 and 3.4 of the process outlined in Table 3, a mid-sized case was selected from the 233 cases. This case (see Exhibit 1) is from the PeopleSoft website. It contains an example of the least-mentioned benefit dimension: organizational impact (see box 4 below).

Exhibit 1: PeopleSoft case 34

Health First in great shape with PeopleSoft financials and human resources (Source: *http://checkers.peoplesoft.com/ourcust.nsf* and search for 'Health First Incorporated' under Health care industry).

'When we formed this integrated delivery system, the complexity of our organization increased tenfold overnight', says Rich Rogers, vice-president and chief information officer of Health First, Inc. Located on Florida's 'Space Coast', Health First was formed in 1995, when Holmes Regional Medical Center and Palm Bay Community Hospital merged with Cape Canaveral Hospital. Today, the organization includes three hospitals, 29 primary care physician clinics, a commercial HMO and a Medicare HMO.

From an information services standpoint, bringing together three large health care facilities was even more challenging because each had its own set of financial, payroll and human resource systems. 'We had a number of different vendor systems and we were trying to piece them together to act as one organization,' recalls Rogers. 'In this industry, we make very fast decisions. Our old systems just didn't have the flexibility to react to the market that quickly.'

Looking to consolidate its human resource and financial systems and gain functionality, Health First selected PeopleSoft in mid-1996. According to Rogers, PeopleSoft was chosen primarily because of its health care expertise. 'They understand the unique needs of our industry, and they build that knowledge into their products.'

Improved resource management. During the 12-month implementation, Health First engaged CSC Pinnacle for project management and consulting support. After PeopleSoft was operational in

1

October 1997, the most immediate productivity gain that the organization realized came in payroll processing, a task that had previously taken four days (processing 12 separate payrolls). With PeopleSoft Payroll, that time was reduced to four hours.

PeopleSoft has also enabled Health First to track its 5000 employees across all its organizations. 'Salary is our biggest expense,' states Rogers. 'Before PeopleSoft, we had no way of managing or tracking our people as they moved around our 70 locations. For example, we had nurses working a couple of days a week in our home care department as well as in one of our hospitals. They would be on two different payrolls.'

Faster decision making. With PeopleSoft, reports accountant Cindy Ward, the finance department can deliver more accurate and timely information in a fraction of the time that it

took previously. ‘We can now serve our customers 10 times better. The quantity and quality of the information is much improved, and the detail level that we can go down to is phenomenal.’

2

For Health First’s directors, that means having the financial information necessary to make critical decisions. ‘It’s been a big benefit on the productivity side,’ says Rogers. ‘Our drill down capability has improved tremendously. We can zone in on a problem a lot more quickly than we did before. It’s helped us evaluate the profitability of the business units.’

In addition, the department can now deliver accurate monthly cost allocations to each organization within Health First. Says Desmond Almarales, project manager, financial systems, ‘We used to do it with spreadsheets, which was very cumbersome. With PeopleSoft, we can allocate our costs much faster. and we can change it on a dime.’

Creating a corporate culture.

3

Now that they have PeopleSoft up and running throughout the organization, Health First will re-engineer some of their processes, incorporating workflow to gain additional productivity. ‘That’s where we’re going to see the biggest benefit from our investment in PeopleSoft,’ says Rogers. ‘It’s going to have a direct effect on our bottom line, and will ultimately help us deliver better care because we’ll have information at our fingertips a lot faster than we’ve ever had before.’

A healthy future.

4

Beyond the improvements in productivity and information access, having PeopleSoft financial and human resources products throughout the enterprise has yielded another interesting advantage. Explains Rogers, ‘Once you start using the same tools and the same reports, it goes a long way to establishing a corporate culture. It brings different parts of the organization together. They start to act as one, and work as a common unit.’

Health First also plans to upgrade to PeopleSoft 7.5 to deliver self-service functionality to its employees through the Internet. ‘We’re strong believers in the cost effectiveness of delivering information and functionality to occasional users through the Web,’ says Rogers. ‘It will alleviate having to continually upgrade all of our PCs, which is a big expense.’

Products. PeopleSoft General Ledger, Payables, Asset Management, Human Resources.

Step 3.2: Select cases

The Health First case, from Florida, USA, was selected because the ES system was used to manage major enterprise resources – inventory and human resources – for this 5000-employee group of medical service providers. This case was then copied to the PeopleSoft case file as case number P34.

Step 3.3: Verify reliability

The vice-president and CIO (Rogers) was contacted by telephone and fax. A 30-minute telephone interview was conducted with the project manager, who was previously the director of finance but had chosen to transfer to the project team after the system had gone live two years previously. The benefits reported in the case were further confirmed by two business users in finance and human resources. Each sent a two- to three-page email replying to questions regarding the ES system benefits. As users in this organization gained experience with the system, the flexibility of the system to support business growth in a changeable environment was perceived as the key achievement of the ES in this 5000-employee business.

Step 3.4: Classify benefits

Four benefit dimensions are noted in this case.

1 Operational benefit in payroll processing cycle time reduction: four days down to four hours (see box 1 in Exhibit 1).
2 Managerial benefit in resources management and decision making: the human resources management capability of the PeopleSoft package was used to track the movements of the 5000 employees across 70 locations and produce accurate salaries. Accurate, time-effective information delivered to managers improved the speed and quality of decision making and assisted with cost control (see box 2 in Exhibit 1).
3 IT infrastructure benefit in IT cost reduction and increased capability: perceived IT infrastructure benefits came from the confidence of being able to add new applications, conduct business changes, enable web services and save IT cost in PCs (see box 3 in Exhibit 1).
4 Organizational benefit in building a consistent vision across the organization: organizational consistency across the 70 units and three newly merged organizations was enhanced using the integrated system. The quote by the vice president in box 4 of Exhibit 1 suggests that this benefit was obtained as a result of use of the PeopleSoft system.

After Step 3.4, the four quotes highlighted in Exhibit 1 were copied to benefit dimension files for later consolidation in steps 3.5 and 3.6 of the process described in Table 3.

DISCUSSION

Business benefits from the other 232 selected cases were analysed in the same way. As noted earlier, the resultant benefits framework after stage 4 is shown in Appendix 1. Table 5 summarizes the types of benefits. Six comments on the overall analysis are presented below.

Comment 1: Validity of the framework verified

Examples of each benefit dimension were found in cases from each ES vendor. Every business achieved benefits in at least two dimensions. Operational and infrastructure benefits were the

Table 5. Summary of benefits showing percentage of cases selected

	SAP	PeopleSoft	Oracle	Total
Total cases published	256	124	90	470
Cases selected in step 3.2	84	65	84	233
Operational benefits	75%	57%	83%	73%
Managerial benefits	57%	65%	45%	55%
Strategic benefits	62%	71%	38%	56%
IT infrastructure benefits	89%	80%	80%	83%
Organizational benefits	13%	23%	7%	14%

Table 6. Descriptions of ES benefits in different dimensions

ES benefits	Measures	Links with business benefits	How to identify these benefits?
Operational benefits	Tangible with measurable figures	Direct link with end-results in operations	Business managers asked about business value chain processes and business stakeholder support activities
Managerial benefits	Intangible	Reflected through the use of information and consequent benefits	Business managers asked about different kinds of resources affected and different levels of decision making
Strategic benefits	Intangible	Direct links with business expansion, and with product and marketing competition	Senior managers asked about achievement of the various strategic goals
IT infrastructure benefits	Tangible in IT cost	Indirect support for all kinds of business changes	IT managers asked about IT cost items and different types of business and technology changes
Organizational benefits	Intangible in IT capability Intangible	Indirectly driving positive outcomes in various parts of the business	Business managers asked about individual attitudes and interpersonal interactions

most quoted benefits: 170 cases (73% of 233) claimed to have achieved operational benefits, and 194 cases (83%) claimed IT infrastructure benefits.

Comment 2: Measures and informants for each of the five ES benefit dimensions

As summarized in Table 6, the case studies suggest that operational benefits such as cost, speed and error rates are measurable in many cases. Managerial benefits, although less tangible, are linked directly with information used at different decision-making levels and with different resources. The most useful information on both these dimensions was provided by

business managers or process owners, who had a clearer picture of the impact of the adoption of ES on the overall organization, including their 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 case studies suggest that the most accurate informants about these benefits are senior managers such as chief executive officers, as they have a clearer understanding of the competitive position of their organizations. 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, organizational benefits are mainly reflected in individual attitudes (e.g. employee morale) and interpersonal interactions. The best informed on organizational benefits were again business managers and process owners, as they had an encompassing view of how the adoption of ES had affected employee morale and the sense of purpose within individual parts of the organization.

Although the dimensions have been outlined separately, they nevertheless interact. Operational benefits may come with increased managerial effectiveness; strategic benefits rely on operational efficiency; and organizational benefits can be realized in parallel with managerial benefits.

Comment 3: More benefits likely after additional experience with the system

Of the 34 firms contacted, 32 mentioned more benefits in the same dimensions as in the web-published cases or in areas not mentioned in the cases. This could be the result of organizational learning. Some of these benefits had become more apparent since the cases were written. More benefits were found especially in increased infrastructure capability to extend systems to new applications or support new strategies. One utility company in Australia was planning to establish a new business to provide ES-enabled shared services to external customers.

Comment 4: Contingency factors

Although it was not the objective of this study to analyse the influences of contingency factors, some preliminary comments can be made.

- Industry: there were no apparent differences in types of benefits across industries.
- Vendor: although products from the three ES vendors provided similar functions, there were some differences (perhaps resulting from the style of case writing, but also possibly more fundamental). First, SAP cases had an above average number of cases citing benefits in all five dimensions. Flexibility in supporting business changes was the most noted benefit for SAP users (89% of SAP users). Secondly, the PeopleSoft cases mentioned more strategic and organizational benefits than average (71% compared with 56% and 23% compared with 14% respectively). Thirdly, the Oracle cases mentioned more operational benefits than average (83% compared with 73%).

- Firm size: benefits gained by large and small organizations seemed to be similar. All gained benefits in the five dimensions, except that smaller organizations seemed to have more quantified evidence of benefits than larger companies. This is probably because smaller companies gained tangible benefits more quickly than larger organisations. However, the degree of benefits realized could not be compared because of lack of standard measurement across cases.

Comment 5: Criteria for selection of the chosen ES

Enterprise system product selection was based on the following factors (listed in order of frequency of citation): (1) business fit; (2) ease of implementation; (3) vendor services and support; (4) special industry or application capabilities; (5) product affordability; (6) compatibility with other systems.

Comment 6: Long expected system life for ES

Most organizations seem to expect a long-term return on the investment in their systems. In the cases studied, the expected life of the ES system ranges from 10 to 20 years. Other studies have reported much shorter life expectancies, e.g. 6 years (Gartner Group, 1998). Expected longevity of ES is probably because they are implemented as a base for extension and expansion. In addition, regular vendor-supported system upgrades will keep the technology up to date.

AN APPLICATION OF THE ENTERPRISE SYSTEMS BENEFIT FRAMEWORK

The framework presented in this paper was developed to help business managers assess the value of their Enterprise Systems (Shang 2001). In this section, we show how the framework has been applied in case studies from four organizations. The four organizations were recently privatized utility companies in two states in Australia. Before 1994, all were parts of state government-owned electricity- and gas-producing organizations. After privatization, they found that they needed more sophisticated information systems, and all elected to implement ES. By 2000, all four organizations had been using their systems (three SAP and one PeopleSoft) for at least three years.

Up to 10 business managers were interviewed and tape-recorded in each organization. In each interview, the framework in Appendix 1 was used to guide managers in their assessment of past, current and future benefits from their ES. The framework served as a checklist for retrospective and prospective thinking, with the detailed sample benefits providing guidance as to the meaning of each benefit class. Although some benefit items (e.g. strategic benefits of building external linkages or e-commerce) were not relevant in some companies, they prompted business managers to ask 'If someone else has achieved this, why can't we?'. All interviewees agreed that the capabilities in the Appendix were achievable if they planned to pursue them. Executives in two companies requested copies of the framework for their own use. As one busi-

Table 7. Summary of ES benefits realized by Utility company A (UtilityCoA)

ES phase	Year	Business changes	ES use	Operational benefits	Managerial benefits	Strategic benefits	IT infrastructure benefits	Organizational benefits
1994–96	1994	Electricity Corporation Act passed						
	1995	UtilityCoA established by UtilityCoA US	(Oct) SAP system selected					
	March 1996	Business restructured and downsized						
First year of ES use	July 1996		SAP system live	Decreased efficiency in work management Extended month end closing	Better decision making for real-time information		Reduced IT infrastructure costs for replacing 17 legacy systems	Low employee moral in work management (negative PNBF)
Second year of ES use	Aug 1997	New business in telecommunication	ES revitalization project started	50% cost reduction in accounting	Better resource management Effective performance management			

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Table 7. *cont.*

ES phase	Year	Business changes	ES use	Operational benefits	Managerial benefits	Strategic benefits	IT infrastructure benefits	Organizational benefits
Third year of ES use	Aug 1998	UtilityCoA listed on Australian stock exchange. New companies merged	Problems fixed and ES system performance enhanced			Business growth and alliance underpinned	Extension of efficient use of ES	Users empowerd and skills enhanced
	Feb 1999	Ongoing mergers, including of gas companies	ES implemented in gas companies in 10 weeks	50% workforce reduction in new gas companies	Resource management and decision making improved	Leading system capability in gas industry. Linkage extended	Easily integrated with other systems	High acceptance in gas companies
	Jan 2000	Company reformed into four autonomous business units	Business restructuring supported	Further improved productivity expected		Cost advantage for reaching economies of scale in ES use	IT further reduced infrastructure costs in merged new companies	Organizational changes supported
	July 2000	Australian Goods and Services Tax implemented	New tax regulation changeove supported			E-commerce enabled		

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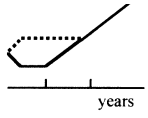
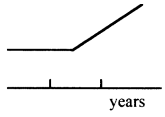
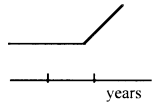
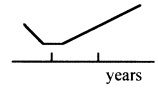
Table 8. Patterns of perceived net benefit development (based on findings from four case study organizations)

Dimensions of ES benefits	Operational benefits	Managerial benefits	Strategic benefits	IT infrastructure benefits	Organizational benefits
Path of ES benefit development					
Early benefits	Automation benefits from savings in labour and time	Quicker decision making using real-time information	No immediate strategic benefits	Replacement of legacy systems	Immediate drop in employee morale
Problems	Extra time and labour in data entry	Rigidity in resource allocation because of tightly linked system integration	Loss of competitive advantages when competitors use similar processes	Inflexible system changes Frequent system upgrades	Low employee morale due to extra work, mismatched processes, data errors and change pressures
Explanations for benefits and problems	Business process change ES modifications Organizational learning	Enhanced reporting functions Accumulated data Organizational learning	ES technology upgrading	Attain, expand and extend ES	Business and system changes Organizational learning
Pace of benefit development	1–2 year plateau for busines changes and organizational learning	1–2 year plateau for system enhancement and organizational learning	Depends on business strategies of ES use	Gradually increased with system expansion. Significantly increased when system use achieved economies of scale	2–3 years for users to forget initial problems and to build system knowledge

ness executive commented: 'This framework gives us a chance to really think about the impacts of our ERP system'. After the interviews, differences between stakeholders' recollections were reconciled item-by-item to ensure that the overall picture was consistent.

Based on the interviews, a summary table identifying business changes, benefits and problems over the three years of ES use was constructed for each case study organization. For example, Table 7 shows the summary table for one of the four case study organizations, Utility company A. The five benefit dimensions from our framework are shown in the five right-hand columns of Table 7.

The framework described in this paper made it possible to track benefit development by asking managers to assess net benefit development over time in each of the five dimensions.

Across the four case study sites, some common patterns of benefit realization were noted. These are summarized in Table 8. Rows 2–5 in Table 8 describe the early benefits achieved, problems encountered, explanations of the early and further benefits and comments about the pace of benefit realization in the four organizations.

Perceived net benefit graphs

The first row of Table 8 contains graphs that have proved to be particularly effective for communicating benefits to senior managers. We call them perceived net benefit flow (PNBF) graphs. They are an attempt to aggregate all the information in the remaining four rows of text in Table 8 into a single pictorial representation of net benefit flows. The horizontal axis in each PNBF graph shows years since ES implementation. There are three years in this example, because the case study organizations had been using their systems for this length of time. The vertical axis shows benefits year-by-year in each of the five benefit dimensions. They show benefits per period, not accumulated benefits, compared with perceived net benefits from the organization's previous system.

To make the meaning of the PNBF graphs clear, consider the following example. If a consequence of ES use was that three fewer staff were needed, and those staff savings continued in years two and three with no increase in workload, the operational benefits graph would be a horizontal line. However, if the work performed by the remaining staff also increased each year, for example the number of customer accounts managed increased with no staff increase, the benefits graph would rise in successive years. In the operational benefits example in Table 8, cost reductions occurred in the financial systems area of the case study organizations in the first year, but there were problems in the work management area. Therefore, the operational benefits graph shows two lines (one dotted and one solid) in the first year. By year three, most problems had been solved, so the benefits curves are shown as merged.

LIMITATION OF THE STUDY

The major limitation of this study is that the framework reported in Appendix 1 is derived from vendor web-site data classified by a single researcher (the first author). Second-hand data provided by ES vendors on their web sites may have been unreliable or misinterpreted. However, as the main objective of this study was to understand comprehensively the *possible* benefits of ES, and all the benefits summarized in the Appendix were experienced by a large number of organizations (see Table 5) and only reported if they were found in more than three cases from at least two different product vendors, the schedule of benefits seems likely to be useful in evaluating most ES. In addition, that 32 of the 34 organizations contacted directly confirmed the facts presented in the vendor success stories suggests that the information in the cases is sufficiently reliable for developing a benefits framework. Finally, in the course of over 30 in-depth case study interviews, it was not necessary to add any new categories to those in Appendix 1.

Conclusion

The objective of this study was to prepare a comprehensive list of ES benefits suitable for use by business managers seeking to assess the benefits of their ES. Instead of using some single subjective measure, such as 'Overall, are you satisfied with your enterprise system?', we have proposed a broad, and hopefully more objective, method for assessing the benefits of ES.

The benefit framework presented in Appendix 1 answers the research question: 'What business benefits can be achieved from the use of ES'? It establishes a base for future research and for use by managers responsible for the adoption and use of ES. It is not expected that all organizations will achieve benefits in all 25 subdimensions, or even in all five main dimensions. Rather, the framework provides a checklist of benefits that have been achieved in other organizations using ES.

The five-dimensional framework builds on the large body of previous research into IT benefits, which have been organized around the categories of operational efficiency and managerial and strategic effectiveness. In addition, it recognizes the value that IT infrastructure and organizational benefits can contribute to an organization. The framework contributes to IS knowledge about the various impacts of enterprise-wide packages on organizations. Results from the four case studies confirm that perceived net benefit flows (PNBFs) could be identified and graphed in each of the five dimensions on a year-by-year basis.

In addition to the longitudinal case studies reported above, practical uses of this framework include:

- As a tool for ES planning and management. In this role, the framework could be customized around an organization's goals and used to stimulate more effective communication within a business management team about their goals for the system.
- As a tool for benchmarking ES across different organizations.
- As a source of five distinct dimensions in a balanced scorecard approach to evaluating the effectiveness of an ES investment.
- As a technique for measuring the dependent variables in research studies seeking to assess the impact of factors that influence ES benefits; for example the influence of organizational characteristics or organizational learning on different benefit dimensions, or the impact of different implementation strategies on benefit achievement.
- As the basis for a postal survey of ES user organizations; for example to explore possible linkages between costs, benefits (as measured by our framework) and bottom-line profitability.
- As a starting point for future benefit studies of ES 'bolt-on' systems, such as customer relations management, supply chain management, e-procurement, e-marketplace and workflow management.

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Biographies

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APPENDIX 1: ENTERPRISE SYSTEM BENEFIT FRAMEWORK

I. Operational benefits

1.1 Cost reduction

- Labour cost reduction in customer service, finance, human resources, purchasing, IT services and training.
- Inventory cost reduction in inventory turns, dislocation costs and warehousing costs.
- Administrative expenses reduction in printing and other business supplies.

1.2 Cycle time reduction

Measurable cycle time reductions in three kinds of activities that support customers, employees and suppliers.

- Customer support activities in order fulfilment, billing, delivery and customer enquiries.
- Employee support activities in month-end closing, requisition, HR and payroll and learning.
- Supplier support activities in order processing, information exchanging and payment.

1.3 Productivity improvement

Production per employee, production by labour hours, production by labour costs, increased work volume with same workforce and reduced overtime.

1.4 Quality improvement

Error rate, data reliability to data accuracy.

1.5 Customer service improvement

Ease of data access and inquiries.

II. Managerial benefits

2.1 Better resource management

- Better asset management for improved cost, depreciation, relocation, custody, physical inventory and maintenance records control, both locally and worldwide.
- Better inventory management in shifting products where they were needed and responding quickly to surges or dips in demand. Managers able see the inventory of all locations in their region or across boundaries, making possible a leaner inventory.
- Better production management for co-ordinating supply and demand and meeting production schedules at the lowest cost.
- Better workforce management for improved workforce allocation and better utilization of skills.

2.2 Improved decision making and planning

- Improved strategic decisions for greater market responsiveness, fast profit analysis, tighter cost control and effective strategic planning.
- Improved management decisions for flexible resource management, efficient processes and quick response to operation changes.
- Improved customer decisions with flexible customer services, rapid response to customer demands and prompt service adjustments.

2.3 Performance improvement in a variety of ways in all levels of the organizations

- Financial performance by lines of business, by product, by customers, by geographies or by different combinations.
- Manufacturing performance monitoring, prediction and quick adjustments.
- Overall operational efficiency and effectiveness management.

III. Strategic benefits

3.1 Support business growth

- In transaction volume, processing capacity and capability.
- With new business units.
- In products or services, new divisions or new functions in different regions.
- With increased employees, new policies and procedures.
- In new markets.
- With industry's rapid changes in competition, regulation and markets.

3.2 Support business alliance by

- Efficiently and effectively consolidating newly acquired companies into standard business practice.
- Building consistent IT architecture support in different business units.
- Changing selling models of new products developed by a merged company.
- Transiting new business units to a corporate system.
- Integrating resources with acquired companies.

3.3 Building business innovation by

- Enabling new market strategy.
- Building new process chains.
- Creating new products or services.

3.4 Building cost leadership by

- Building a lean structure with streamlined processes.
- Reaching business economies of scale in operation.
- Shared services.

3.5 Generating product differentiation by

- Providing customized product or services, such as early preparation for the new EMU currency policy, customized billing, individualized project services to different customer requirements, different levels of service appropriate for various sizes of customer organizations.
- Providing lean production with make-to-order capabilities.

3.6 Enabling worldwide expansion with

- Centralized world operation.
- Global resource management.
- Multicurrency capability.
- Global market penetration.
- Cost-effective worldwide solution deployment.

3.7 Enabling e-commerce by attracting new customers or getting closer to customers through the web integration capability. The web-enabled ES provides benefits in business to business and business to individual in:

- Interactive customer service.
- Improved product design through customer direct feedback.
- Expanding to new markets.
- Building virtual corporations with virtual supply and demand consortia.
- Delivering customized service.
- Providing real-time and reliable data enquiries.

3.8 Generating or sustaining competitiveness

- Maintaining competitive efficiency.
- Building competitive advantage with quick decision making.
- Staying ahead of competitors for better internal support.
- Using opportunities generated by ES to pull abreast of world leaders by using the same software and being compatible with customers.

IV. IT infrastructure benefits

4.1 Building business flexibility by rapid response to internal and external changes at lower cost and providing a range of options in reacting to changing requirements.
4.2 IT cost reduction in

- Total cost of maintaining and integrating legacy systems by eliminating separate data centres and applications, as well as their supporting costs.
- IT staff reductions.
- Mainframe or hardware replacement.
- Year 2000 compliance upgrading.
- System architecture design and development.
- System upgrade maintenance.
- System modification and future changes.
- Technology research and development.

4.3 Increase IT infrastructure capability
Stable and flexible support for the current and future business changes in process and structure.
Stability:

- Reliable platforms.
- Global platforms with global knowledge pipeline.
- Transformed IS management and increased IS resource capability.
- Continuous improvement in process and technology.

Flexibility:

- Modern technology adaptability.
- Extendibility to external parties.
- Expandability to a range of applications.
- Customizable and configurable.

V. Organizational benefits

5.1 Changing work pattern with shifted focus

- Co-ordination between different interdisciplinary matters.
- Harmonization of interdepartmental processes.

5.2 Facilitating business learning and broaden employee skills

- Learned by entire workforce.
- Shortened learning time.
- Broadened employee skills.
- Employees with motivation to learn the process.

5.3 Empowerment

- Accountability, more value-added responsibility.
- More proactive users in problem solving, transformed from doers to planners.
- Working autonomously.
- Users with ownership of the system.
- Greater employee involvement in business management.

5.4 Building common visions

- Acting as one and working as a common unit.
- Consistent vision across different levels of organizations.

5.5 Shifting work focus

Concentration on core work.

- Focus on customer and market.
- Focus on business process.
- Focus on overall performance.

5.6 Increased employee morale and satisfaction:

- Satisfied users with better decision-making tools.
- Satisfied users with increased work efficiency.
- Satisfied users in solving problems efficiently.
- Satisfied users in increased system skills and business knowledge.
- Increased morale with better business performance.
- Satisfied employees for better employee service.