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A Comprehensive Framework for Classifying the Benefits of ERP Systems

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Abstract

This paper presents a framework for assessing the business benefits of Enterprise Resource Planning (ERP) systems. After analyzing the features of ERP systems, the literature on IT benefits, data from 233 ERP-vendor success stories published on the web, and interviews with 34 ERP cases, we have produced a consolidated framework of five benefit dimensions. This framework tries to classify the types of benefit that organizations can achieve by using ERP systems and provide a comprehensive foundation for planning, justifying, and managing the system. The framework focuses on benefits only, from the point of view of management as stakeholders; it does not consider costs.

Introduction

According to AMR Research, total revenue in the Enterprise Resource Planning (ERP) software and services market in 1999 was US$18.3 B (Gilbert, 2000). ERP system implementation costs are often reported to be five to ten times the cost of software licenses (Davenport, 2000). If so, organizations world-wide spent something like US$90-180 billion on ERP systems in 1999. Most organizations that have implemented ERP systems expect to continue using them for many years.

ERP systems are integrated, enterprise-wide, packaged software applications that impound deep knowledge of business practices accumulated from vendor implementations in many organizations. ERP systems are evolving to incorporate new technologies, such as E-commerce, data warehousing, and customer relationship management. ERP software is a semi-finished product with tables and parameters that user organizations and their implementation partners configure to their business needs. Implementation of ERP systems therefore involves both business and IT managers who work together to define new operational and managerial processes.

If organizations around the world spent US$100B or more on ERP systems last year***, what sorts of benefits did they, or can they,*** achieve***?*** To answer this question, this paper presents a comprehensive framework of benefits that organizations might be able to achieve from their use of ERP systems. This framework provides a meaningful benchmark of ERP benefits for comparing benefits across different firms. The framework could be used as a good communication tool and checklist for consensus-building in within-firm discussions on benefits realization and development.

The Literature on ERP System Benefits

The focus of this paper is on the business benefits of ERP systems only, not the costs. Seddon et al. (1999) argue that is not meaningful to talk of benefits of IT systems without identifying the stakeholder group in whose interest benefits are judged. Our goal in this paper is to develop a benefits classification that considers benefits from the point of view of an organization's senior management.

We were forced to develop our own classification of ERP system benefits because there do not appear to be any rigorous methods for comparing benefits from ERP systems across organizations. In the 1980s, Ives, Olsen, and Baroudi (1983), Davis (1989), Baroudi and Orlikowski (1988), and Doll and Torkzadeh (1988) developed a number of general-purpose measures of success of information systems. However, these measures are too general purpose for benchmarking. In addition, they all focus on benefits from the point of view of individual users as stakeholders, not management, so they are inappropriate for our purposes.

Our search for a way of structuring the benefits management might expect to gain from use of ERP systems began with a wide-ranging review of the IT value literature since 1970. The result of this stage was the list of five different types of benefits shown in Table 1. Markus (1999) argues that no single measure of enterprise systems success is sufficient for all the concerns an organization's executives might have about the enterprise system experience, and that different measures are needed at different stages in the systems lifecycle. We focus here on the system in use, not the system implementation project, and consistent with Markus's view, we do not expect that all ERP systems will produce benefits in each dimension. However, we do expect the list in Table 1 to provide a good starting point for comparison of benefits for different organizations. Each of these five types of benefit is now discussed in turn.

Operational Benefits (Dimension 1)

Information technology has a long history of use in cutting costs and raising outputs by automating basic, repetitive operations. There is evidence that investment in information technology to streamline processes and automate transactions provides business benefits by

speeding up processes, substituting labor, and increasing operation volumes (Weill and Broadbent, 1998; Weill, 1990; Lichtenberg, 1995; Blackburn, 1991; Smith, 1991; Morrison and Berndt, 1990; Brynjolfsson and Hitt, 1996; Brynjolfsson and Hitt, 1993). Since ERP systems automate business processes and enable process changes, one would expect ERP systems to offer all five types of benefit summarized in points 1.1 through 1.5 of Table 1, i.e., to improve costs, productivity, cycle time, quality, and customer service.

Managerial Benefits (Dimension 2)

Zani (1970), Gorry and Scott-Morton (1971), Ginzberg (1982), Keen (1982) and Rockart (1988) have all focused on the informational benefits to senior managers of information systems. With their centralized database and built-in data analysis capabilities it seems likely that ERP systems will similarly provide informational benefits to management. As shown in Table 1, points 2.1 through 2.3, informational benefits might help an organization achieve better resource management, improved decision making and planning, and performance improvement in different operating divisions of the organization.

Table 1. Proposed ERP benefits framework

Dimensions	**Sub dimensions** (21 in total at this stage)
1. Operational	1.1 Cost reduction, 1.2 Cycle time reduction, 1.3 Productivity improvement, 1.4 Quality improvement, 1.5 Customer services improvement
2. Managerial	2.1 Better resource management, 2.2 Improved decision making and planning 2.3 Performance improvement
3. Strategic	3.1 Support business growth 3.2 Support business alliance 3.3 Build business innovations 3.4 Build cost leadership 3.5 Generate product differentiation (including customization) 3.6 Build external linkages (customers and suppliers)
4. IT Infra-structure	4.1 build business flexibility for current and future changes 4.2 IT costs reduction 4.3 Increased IT infrastructure capability
5. Organiza-tional	5.1 Support organizational changes 5.2 Facilitate Business learning 5.3 Empowerment 5.4 Built common visions

Strategic Benefits (Dimension 3)

Porter and Miller (1985) define three generic strategies where IT could be used to contribute to achieving business competitive advantages: cost leadership, differentiation and focus. McFarlan (1984) and Earl (1989) argue that IT has matured to become an integral part of the way enterprises conduct their business. Rackoff, Wiseman, and Ullrich (1985) expanded Porter's model to five strategic thrust areas where the company could make a major offensive or defensive move. These five thrusts are: differentiation, cost, innovation, growth and alliance.

Integrated information systems present a new opportunity for achieving competitive differentiation by customizing products or services for individual users at a lower cost (Victor and Boynton, 1998; Pine II, 1993; Jaikumar, 1986; Ferdows and Skinner, 1987), to directly support a tight link with customers (Clemons and McFarlan, 1986; Vitale, 1986; Malone and Yates, 1987) and to all related business parties (Venkatraman, 1994). ERP systems, with their large scale of business involvement and internal/external integration capabilities, could assist in achieving these strategic benefits: business growth, alliance, differentiation, innovation, cost, and external linkages (points 3.1 through 3.6 in Table 1).

IT infrastructure benefits (Dimension 4)

IT infrastructure consists of sharable and reusable IT resources that provide a foundation to enable present and future business applications (Keen, 1991,Duncan, 1995 #138, Davenport, 1994 #60; Earl, 1989; McKay and Brockway, 1989; Niedman et al., 1991, Truijens, 1990 #139). Weill and Broadbent (1998) highlight infrastructure building as one of the fundamental management objectives in IT investment.

As shown in Table 1, points 4.1 through 4.3, ERP systems with their integrated and standard application architecture provide an infrastructure that could support 1) business flexibility for future changes, 2) reduced IT costs and marginal cost of business units' IT, and 3) increased capability for quick and economic implementation of new applications.

Organizational benefits (Dimension 5)

In Peters and Waterman's (1982) observations of forty-three successful US corporations, information technology was highly relied upon for its integrated processes and flexible system co-ordination in either supporting employee "common vision" communications or facilitating a flattened organizational structure and empowering users. IT tools, accumulated information, and application knowledge are key factors that facilitate organizational learning behavior (Garvin, 1993; Baets and Venugopal, 1998, Argyris, 1992; Andreu, 1996).

As summarized in points 5.1 through 5.4 of Table 1, the integrated information processing capabilities of ERP systems could affect the establishment of the organizational capabilities by: 1) supporting organization structure changes, 2) facilitating employee learning, 3) empowering workers, 4) building common visions.

Web Case Analysis to Refine and Extend Table 1

The literature reviewed in the previous section lacks focus on the specific types of benefits that may flow from use of ERP systems. Since there are few details of benefits of ERP systems in the academic literature, we were forced to turn to the trade press and the web for ERP-specific benefits. After reviewing literally hundreds of trade-press articles and vendor-published "success stories" on the web, we decided to use web cases as the major source of data for enhancing Table 1. Vendor web cases were used because:

- They present a complete picture of the ERP investment scenario, including details of: business environment, background, objectives, competitive strategy, IS support, the ERP investment decisions, system implementation and the realized benefits.
- Most of the cases were consolidated and summarized by experienced writers with consistent documentation structure.
- They are traceable evidence with organization's name and project sponsor's name and title, so follow-up verifications are possible.
- They are reported from business users' points of view.

Although cases provided by vendors may exaggerate product strength and business benefits, and omit shortcomings of the products, the purpose of this study is not to evaluate the degree of achievement of these benefits. Our purpose is simply to build a broad list of possible business benefits from a large range of ERP users. Therefore, web-published business cases can be used as a starting point for understanding the benefits of ERP systems. The process for case selection and review is summarized in Table 2.

As shown in Table 3, 233 cases were selected in step 2 of the case selection process, from 470 cases reviewed. The size of case organizations ranged from a $50,000 p.a. consulting services firm 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 4,000 users of an Oracle system in a UK petroleum company. ERP systems were implemented between 1995 to 1999. Implementation periods ranged from four months to three years. These cases were reported in their first or second year of ERP system use. All cases provided details of the business background, the ERP implementation, and benefits from

Table 2: Case selection and Review process

Step	Process
1	Visited ERP vendor websites for SAP, Oracle, Peoplesoft, Baan, Oracle, and J D Edwards for customer case studies (or customer success stories). Printed out case lists for: SAP, Peoplesoft, and Oracle. Lists from Baan and JD Edwards were not selected because they lacked complete information.
2	Reviewed these cases and selected qualified stories. Built three files with sets of qualified ERP product cases: SAP cases, Peoplesoft cases, and Oracle cases. The criteria for case selection were: a) They have applied ERP systems to manage major enterprise resources. Cases with a single ERP module used by an organization to manage certain core processes and not linked with other core resource management processes were not selected. b) They have sufficient information about the case, with organization background, implementation descriptions, and benefit descriptions. c) They were focused on business benefits, not the product benefits. d) They have quantitative measures or precise business benefit descriptions.
3	Verified reliability of cases by contacting project managers in a convenience sample of 18 cases in Australia and randomly selected sample of 16 cases in US, Singapore and Taiwan.
4	Built analysis table of cases with 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.
5	Analyzed benefit differences between industry, vendors, and firm sizes.
6	Assembled case benefits according to the dimensions in the framework. Benefits were selected and highlighted in the file only if a similar benefit had been achieved in more than two firms using products from different vendors. Three files organized by the ERP benefit framework were built: SAP benefits, Peoplesoft benefits, and Oracle benefits.
7	Consolidated benefits details from three benefit files into each benefit dimension. Modified the ERP benefit framework with some sub categories removed or added. Prepared a list of benefits with 1) analyzed results, 2) benefits descriptions and 3) typical case examples. See the appendix for a three-page summary of ERP benefits at the end of this process.

Table 3: Summary of Cases Selected

ERP vendor	Cases published	Cases selected	Case scope
SAP	256	84	19 industries, 45 countries.
People-soft	124	65	11 industries, 10 countries
Oracle	90	84	Approximately 12 industries, 6 countries
Total	470	233	

the ERP system. Thirty-four (34) firms were contacted through telephone, fax and E-mail. The stated benefits were confirmed and detailed by business system project managers in 32 of these firms. In one firm, the relevant person to discuss the ERP issues was unavailable due to frequent organizational restructuring. The other firm experienced constraints in developing new products.

Example Web Case and Analysis

To illustrate steps 2, 3, and 4 of the process in Table 2, we have selected a mid-sized case from the 233 cases. This case, presented in Exhibit 1, is from the Peoplesoft web site. It contains an example of the least-mentioned benefit dimension: Organizational impact.

******** **Exhibit 1: Peoplesoft Case 34** **********

(Source: http://search.peoplesoft.com/ **and search for "Health First in Great Shape". Result:** http://checkers.peoplesoft.com/ourcust.nsf/217ddbdffa305e1b8825665d007666c0/7b58fdf47b358db68825665d000c04a0?OpenDocument**)**

Health First in Great Shape with Peoplesoft Financials and Human Resources

"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 healthcare 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 healthcare expertise. "They understand the unique needs of our industry, and they build that knowledge into their products."

Improved Resource Management
During the twelve-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 ten 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

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."

A Healthy Future

3

Now that they have PeopleSoft up and running throughout the organization, Health First will reengineer 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."

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

********** END OF EXHIBIT 1 **********

Step 2: Select Cases. This case, from Health First in Florida, USA, was selected because the ERP system was used to manage major enterprise resources—inventory and human resources – for this 5,000 employee group of medical service providers. This case was then copied to the Peoplesoft case file as case number P34.

Step 3: Verify Reliability. Vice president and CIO Mr. Rogers was contacted through phone and fax. An informative thirty minutes telephone interview was conducted with the project manager who was previously the Director of Finance, but who chose to transfer to the project team after the system went live two years ago. The benefits reported in the case were further confirmed by two business users in finance and human resources through E-mail. Each of them sent 2-3 pages replying to questions regarding to the ERP system's benefits. As users in this organization gained experience with the system, the flexibility of the system to support business growth in a changeable environment is perceived as the key achievement of the ERP system in this 5,000 employee hospital.

Step 4: Classify benefits. Four benefit dimensions are mentioned in this case:

1) **Operational benefit in payroll processing cycle time reduction:** payroll processing time was reduced from 4 days to 4 hours (see block 1 in Exhibit 1).
2) **Managerial benefit in resources management and decision making:** the human resources management capability tracked the 5,000 employee movements across 70 locations and produced accurate salaries. The time effective and accurate information delivered for managers improved the speed and quality of decision making and assisted with cost control. (see block 2 in Exhibit 1).
3) **IT infrastructure benefit in IT costs reduction and increased capability:** perceived IT infrastructure benefits came from the confidence of being able to add new applications, conducting business changes, enabling web services and saving IT cost in PCs. These increased IT infrastructure capabilities could be described by the paragraphs (see block 3 in Exhibit 1).
4) **Organizational benefit in building a consistent vision across organizations:** organizational consistency was built through the utilization of the integrated system across the 70 units and three newly merged organizations. The quote by the vice president in block 4 of Exhibit 1 suggests this benefit was obtained from the Peoplesoft system.

After Step 4, the four quotes highlighted in Exhibit 1 were copied to benefit-dimension files for later consolidation in Steps 5,6, and 7 of the process described in Table 2.

Discussion

Business benefits of the other selected 232 cases were analyzed in the same fashion as above. The resultant benefits framework at the end of the process (Step 7 of Table 2) is shown in Appendix 1. Table 4 summarizes the types of benefits. The structure of the benefits listed in Appendix 1 is similar to Table 1 (at the end of the literature survey), but differs in some important points. Eight comments on the overall analysis are presented below.

Table 4. Summary of Results showing % of cases *selected*

	SAP	People-soft	Oracle	Total
Total cases published	256	124	90	470
Cases *selected* in Step 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%

Comment 1: Validity of the framework verified

Examples of each benefit dimension were found in cases from each ERP vendor. Every business achieved benefits in at least two dimensions. Operational and infrastructure benefits were the most quoted benefits: 170 cases claim to have achieved operational benefits and 194 cases claim IT infrastructure benefits.

Comment 2: Enhancements to the framework

As a result of the web case analysis, the ERP benefits framework from Table 1 was expanded and enhanced with detailed descriptions. There was no need to change the five major benefit classes from Table 1, but the 21 sub-benefit dimensions from Table 1 had to be expanded to 25 sub-dimensions in Appendix 1. Under the heading "Strategic Benefits", two new sub-dimensions "3.7 Worldwide expansion" and "3.8 Enabling E-commerce" were added. 34% of ERP users, across the three vendors, indicated "enabling E-commerce in their business" as a major strategic benefit. Under the heading "Organizational benefits", two more new sub-dimensions were added: "5.5 Changed employee behavior", "5.6 Better employee morale and satisfaction", and were added. Firms mentioned the benefit of using ERP systems for shifting employee focus to core business functions in planning, managing and serving customers. Satisfied employees with efficient support from the ERP systems created better morale in the work place. In addition to the new sub-dimensions, seventy-eight (78) dot-point examples were added to "flesh out" (provide more details of) each benefit category.

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

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

Comment 4: Contingency factors.

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

- **Industry.** There were no apparent industry differences across industries.
- **Vendor**. Although products from the three ERP vendors provide similar functions there were some differences (that might be due to the style of case writing, but might also be more fundamental). First, SAP cases had an above average number of cases citing benefits from all five dimensions. Flexibility in supporting business changes was the most noted benefit for SAP users (89% of SAP users). Second, the Peoplesoft cases mentioned more strategic and organizational benefits than average (71% compared to 56%, and 23% compared to 14%, respectively). Third, Oracle cases mention more operational benefits than average (83% compared to 73%).
- **Firm Size.** Benefits gained by large and small sized organizations seem to be similar. All have gained benefits in the five dimensions, except that smaller sized organizations seem to have more quantified evidence of benefits than those with larger sized companies. This is probably because smaller sized companies gain tangible benefits more quickly than the larger organizations. However, the degree of benefits realized could not be compared due to lack of standard measurements across cases.

Comment 5: Different organizations gain different benefits from the same applications.

Consistent with Ragowsky and et al. 's (1996) study of the value of packaged applications, different organizations using the *same* application packages achieved different benefits in different dimensions.

Comment 6: Criteria for selection of ERP systems

ERP 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 7. Long expected system life for ERP systems

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

Comment 8. Comparison to Davenport (2000)

Davenport (2000) was published after this study was completed. A two-page comparison table available from the authors was used to compare the benefits reported in his book (pages 7-235) to the framework in Appendix 1. All of Davenport's benefits can be matched to benefits in our framework. No new benefit categories needed to be added.

Study Limitations

This study has a number of limitations:

- Second-hand data provided by ERP vendors may not be reliable, or may have been misinterpreted by us. However, since the main objective of this study is to understand comprehensively the possible benefits, and all the benefits summarized above were experienced by so many organizations (see Table 4), the schedule of benefits seems reasonable. In addition, the fact that 32 of the 34 organizations contacted directly have confirmed the facts presented in the vendor success stories inclines us to think that the information in the cases is reliable enough to be useful. As an additional precaution against incorporation of unlikely benefits, this study selected the benefit items shown in Appendix 1only if they were supported by more than three cases from at least two different product vendors.
- We have not investigated costs in this study. We plan to do so as part of the in-depth cases studies planned for later in this project.
- Most organizations are still in the early stages of working with their ERP systems, so no reliable information about the long-term impacts of ERP systems is available. Again, the planned in-depth longitudinal case studies may help.

Conclusion

The objective of this study was to prepare a comprehensive list of business benefits of ERP systems. Instead of evaluating Information systems success subjectively, the procedure used in most studies, it provides a new, comprehensive, and hopefully more objective, method for assessing the benefits of ERP systems. It provides a comprehensive base for further studies on the various factors that influence ERP system benefits, e.g. the influences of organizational characteristics on different benefit dimensions, the impact of implementation strategies on benefit achievement, and the consequences of business and IT strategies on the ERP benefit achievement. Results are presented in Appendix 1. It is not expected that all organizations will achieve business benefits in all five dimensions. Rather, our framework provides a blueprint of benefits that could be achieved with the ERP systems. Practical uses of this framework include:

- As a meaningful tool for benchmarking ERP systems across different organizations.
- As a tool for ERP system planning and management. This framework could be customized around an organization's practical goals and used to provoke effective communication within a business management team about goals for the system.
- As five distinctive dimensions in a balanced scorecard approach to evaluating the effectiveness of an ERP system investment.
-

Appendix 1: Summary of the ERP Business Benefits (after Step 7, Table 2)

I. Operational benefit summary

1.1 Cost reduction

- **Labor cost reduction:** the automation and removal of redundant processes or redesign of processes led to full time staff reduction in tasks in each business areas including: customer services, production, order fulfillment, administrative processes, purchasing, financial, training and human resources.
- **Inventory cost reduction** in management, relocation, warehousing, and improved turns.
- **Administrative expenses reduction** in printing papers and supplies.

1.2 Cycle time reduction. Measurable cycle time reductions were found in three kinds of activities that support customers, employees and suppliers.

- **Customer support activities** in order fulfillment, billing, production, delivery and customer services.
- **Employee support activities** in reporting, month-end closing, purchasing, or expense requisition, HR and payroll and business learning.
- **Supplier support activities** in speed payments and combined multiple orders with discount gained.

1.3 Productivity improvement. Products produced per employee or labor cost, customer served per employee or labor cost, or mission accomplished per employee in non-profit organization.

1.4 Quality improvement. Error rate reduction, duplicates reduction, accuracy rate or reliability rate improvement.

1.5 Customer services improvement. Ease of customer data access and customer inquiries.

II. Managerial benefit:

2.1 Better resource management.

- Better asset management for improved cost, depreciation, location, custodian, physical inventory and maintenance records control.
- Better inventory management for improved inventory turns, stock allocation, quick and accurate inventory information, just-in-time replacement and having a variety of options dealing with various requests.
- Better production management for optimized supplying chain and production schedules.
- Better workforce management for improved manpower allocation, and better utilization of skills and experiences.

2.2 Better decision making.

- Improved strategic decisions for improved market responsiveness, better profit and cost control, and effective strategic planning.
- Improved operational decisions for flexible resource management, efficient processes, and quick response to work changes.
- Improved customer decisions with flexible customer services, rapid response to customer demands and quick service adjustments.

2.3 Better performance control in a variety way in all levels of the organizations.

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

III. Strategic benefits:

3.1 Support current and future business growth plan in

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

3.2 Support business alliance by efficiently and effectively consolidate newly acquired companies into standard business practice

3.3 Build business innovation by:

- Enable new market strategy
- Build new process chain
- Create new business

3.4 Build cost leadership by achieving economies of scale through streamlined processes or shared services.

3.5 Generate or enhance product differentiation by

- Providing customized product or services for instance: early preparation for the new EMU currency policy and provide customized billing, provides individualized project services to different customer requirements, provides different levels of service appropriate for the varying sizes of customer companies.
- Providing lean production with make-to-order capabilities.

3.6 Build external linkage with suppliers, distributors and related business parties.

3.7 Enable Worldwide expansion with

- Centralized world operation
- Global resource management
- Multi-currency capability
- Global market penetration
- Deploy solution quickly and cost effectively across worldwide

3.8 Enabling E-business by attracting new or getting closer to customers through the web integration capability. The web-enabled ERP system provide benefits in business to business and business to individual in :

- Interactive customer service
- Improved product design through customer direct feadback
- Expanding to new E-market
- Building virtual corporation with virtual supply and demand consortium
- Deliver customized service
- Provide real time and reliable data enquiries

IV IT infrastructure benefits:

4.1 Increased business flexibility by response to internal and external changes quickly at lower costs and provide range of options in react to the change requirements.

4.2 IT costs reduction in:

- Legacy system integration and maintenance
- Mainframe or hardware replacing
- IT expense and staff for developing and maintaining the system
- Year 2000 compliance upgrade
- System architecture design and development
- System modification and maintenance
- Disparate information reconciliation and consolidation
- Technology R&D

4.3 Increased IT infrastructure capability: stable and flexible for the current and future business changes

Stability:

- Streamlined and standardized platform
- Global platform with global knowledge pipeline
- Database performance and integrity
- IS management transformation and increased IS resource capability
- Continuous improvement in system process and technology
- Global maintenance support

Flexibility:

- Modern technology adaptability
- Extendable to external parties
- Expandable to a range of applications
- Comparable with different systems
- Customizable and configurability

V. Organizational benefits:

5.1 Support business organizational changes in structure, and processes

5.2 Facilitate business learning and broaden employ skills

- Learned by entire workforce
- Shorten learning time
- Broaden employees' skill

5.3 Empowerment

- Accountability, more value-added responsibility
- More pro-active users in problem solving
- Work autonomously
- Users have ownership of this system
- Middle management are no longer doers but planners
- Greater employee involvement in business management

5.4 Changed culture with common visions

- Efficient interpersonal communication
- Interdisciplinary thinking, coordinate and harmonize differences, and interdepartmental processes
- Consistent vision across different levels of organization

5.5 Changed employee behavior with shifted focus

- More critical managing and planning matters
- More concentration on core work
- Customer and market focus
- Move from back office to the front office

5.6 Better Employee morale and satisfaction:

- Increased employee satisfaction with better decision making tools
- Increased employee efficiency of field operations and services
- Satisfied users for solving problems efficiently
- Built morale with better system performance
- Satisfied employees for better employee service

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