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**DATABASE OPTIMIZATION ISSUES IN ERP IMPLEMENTATION**

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**ABSTRACT**

Enterprise Resource Planning is principally an integration of business management practices and modern technology. Due to its extensive scope it may even take years to implement in a large organization. However, without successful implementation of the system, the projected benefits of improved productivity and competitive advantage would not be forthcoming. Information in large business organizations is accumulated on various servers across many functional units that geographical boundaries sometimes separate. Such information islands can possibly service individual organizational units but fail to enhance enterprise performance, speed, and competence. In order for a software system to be considered ERP, it must provide a business with much functionality that have features like flexibility, modularity & openness, broadness, the finest business processes, and global focus. Enterprises implementing packaged applications should solicit DBA participation in the package selection process to avoid future database management problems.

**KEYWORDS:** Enterprise Resource Planning(ERP), Database, DBA, DATA REPOSITORY.

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**INTRODUCTION**

In order for a software system to be considered ERP, it must provide a business with many functionalities that have features like flexibility, modularity & openness, broadness, the finest business processes, and global focus. Enterprise resource planning (ERP) integrates internal and external management information across an entire organization, embracing finance/accounting, manufacturing, sales and service, customer relationship management, etc. ERP systems automate this activity with an integrated software application. Its purpose is to facilitate the flow of information between all business functions inside the boundaries of the organization and manage the connections to outside stakeholders. ERP systems can run on a variety of hardware and network configurations, typically employing a database as a repository for information.

**RELATED WORK ON ERP IMPLEMENTATION**

**Business Intelligence**

One of the newer components of most modern midmarket ERP packages, BI shines a bright light into the heart of a company's performance. In general, an ERP suite's analytics or BI tools allow users to share and analyze the data that the ERP applications collect from across the enterprise from a unified repository. The end result is more informed decision making by everyone from executives to line managers to human-resources professionals to accountants. A variety of automated reporting and analysis tools can help streamline operations, as well as improve an organization's business performance. With greater control and visibility of data across the enterprise, business leaders can better align the company's operations with its overarching strategic goals.

**CRM**

CRM has long been a core component of any ERP offering, giving manufacturers a way to improve customer service by pulling together tools to fulfill customers' orders, respond to customers' service needs, and often, create marketing campaigns to reach customers. Most vendors include sales tools to provide customers with sales quotes process their orders and offer flexible pricing on their products. Another important CRM component is service management, which may arm customer-service agents with scripts for talking to customers, as well as allow them to authorize product returns and search a knowledge base of support information. The third main component is usually marketing, which may include tools to manage campaigns, create sales literature and develop a library of marketing collateral.

Additionally, CRM often has tools for account management, SFA, and opportunity or lead management, as well as self-service tools for customers and an e-commerce storefront builder.

### **Financial Management**

Of all the ERP modules, the financials applications tend to be the most frequently utilized. Across the board, these include general ledger, accounts receivable and accounts payable, billing, and fixed asset management. Because many midmarket companies deploy ERP to support efforts at breaking into global markets, it is imperative that their ERP packages support multiple currencies and languages. The financial-management applications may also include tools for creating and adhering to budgets, cash-flow management, expense management, risk management and tax management.

### **HCM**

For the most part, the HCM module includes tools for human-resources management, performance management, payroll, and time and labor tracking. Some vendors also provide functionality for administering benefits, managing compensation, dealing with salary taxes, recruiting new employees and planning workforce needs. Some also include self-service tools for managers and employees. Even though HCM is generally considered core ERP functionality, some vendors offer it as an add-on module.

### **Manufacturing**

The manufacturing module is where much product differentiation happens, including industry-specific functionality. In general, these applications are intended to make manufacturing operations more efficient and simple. Most vendors support different modes of manufacturing, include configurable product capabilities, perform different types of job costing and offer a BOM (bill of materials) tool.

Applications often include PDM (Product Data Management), CRP (Capacity Requirements Planning), MRP (Materials Requirements Planning), forecasting, MPS (Master Production Scheduling), work-order management and shop-floor control.

### **SCM**

Of all the ERP modules, SCM has the greatest variability between vendors: It is vast and varied, yet often adapted to the needs of specific industries. In general, SCM improves the flow of materials through an organization's supply chain by "managing planning, scheduling, procurement, and fulfillment for optimum service levels and maximum profitability," according to Lawson Software. Some vendors segment their SCM into smaller modules. Oracle's JD Edwards, for instance, breaks it down into Supply Chain Planning, Supply Chain Execution (Logistics) and Supply Management (Procurement).

## **IMPLEMENTING AN ERP SYSTEM**

Implementing an ERP system in an organization is an extremely complex process. It takes quite a bit of systematic planning, expert consultation, and a well-structured approach. Due to its extensive scope it may even take years to implement in a large organization. Implementing an ERP system eventually necessitates significant changes on staff and work processes. While it may seem practical for an in-house IT administration to head the project, it is commonly advised that special ERP implementation experts be consulted, since they are specially trained in deploying these kinds of systems.

Organizations generally use ERP vendors or consulting companies to implement their customized ERP system. There are three types of professional services that are provided when implementing an ERP system, they are Consulting, Customization, and Support.

- Consulting Services – are responsible for the initial stages of ERP implementation where they help an organization to bring their new system to life with product training, workflow, improvement in ERP's use in the specific organization, etc.
- Customization Services – extend the new ERP system's use or change its use by creating customized interfaces and/or underlying application code. While ERP systems are made for many core routines, there are still some needs to be built or customized for a particular organization.
- Support Services – include both support and maintenance of ERP systems, for instance, troubleshooting and assistance with ERP issues.

The ERP implementation process goes through five major stages: Structured Planning, Process Assessment, Data Compilation & Cleanup, Education & Testing, and Usage & Evaluation.

1. **Structured Planning:** is the foremost and the most crucial stage where any capable project team is selected, present business processes are studied, information flow within and outside the organization is scrutinized, vital objectives are set, and a comprehensive implementation plan is formulated.
2. **Process Assessment:** is the next important stage where the prospective software capabilities are examined, manual business processes are recognized, and standard working procedures are constructed.
3. **Data Compilation & Cleanup:** helps to identify data to be converted and the new information that would be needed. The compiled data is then analyzed for accuracy and completeness, throwing away the worthless/unwanted information.
4. **Education & Testing:** aids in proofing the system and educating the users with ERP mechanisms. The project team tests and verifies the complete database via multiple testing methods and processes. A broad in-house training is held where all the concerned users are oriented with the functioning of the new ERP system.
5. **Usage & Evaluation:** is the final and an ongoing stage for the ERP. The lately implemented ERP is deployed live within the organization and the project team checks it regularly for any flaw or error detection.

### PROPOSED DATABASE AND DATA REPOSITORY

This research is based on a database of information about changes in organizations due to the Implementation of an ERP system—in particular, Oracle applications—gathered from a large data repository of ERP system information. The data repository (titled “Oracle at Work”). The data repository is no longer available at that address or any other that the author could locate at <http://www.oracle.com>. We have contacted the Webmaster, but have not been able to find the new location, if it still exists. The specific data used in this study was downloaded on March 6, 1999. Since much of the focus of Oracle currently is on e-business, We doubt whether the information is still available on line. The original data repository from which this data is generated consisted of companies generated from 12 industries, including Alliances, Chemical/Pharmaceutical, Consumer Sector, Energy, Financial Services, Hardware/Software (HW/SW), Health Care, Manufacturing, Media/Entertainment, Natural Resources, Public Sector/Government, and Telecommunications. The industry divisions were provided by Oracle. We gathered the information listed on each of the companies from Hardware/Software and Manufacturing. The repository was for four Oracle products, including Oracle’s Server, Tools, Applications, and Services. For each firm in the repository the specific Oracle products used by the client were listed. The write-ups were company-dependent and no uniform.

In some cases, implementation issues were discussed, while in others, usage issues were discussed. There are a number of advantages of using data gathered from such a repository.

- First, Oracle ERP applications, whose primary competition is SAP and PeopleSoft, are generally conceded to have one of the top three ERP systems. According to Herrera (1999), Oracle has roughly 10 percent of the ERP market share. Thus, a substantial number of firms are affected specifically by Oracle.
- Second, each of the companies in the sample employs common software, minimizing differences arising from software differences. Focusing on a single “brand” of software is consistent with the previous literature. For example, Kremers and Dissel (2000) examined 24 BAAN installations. Similarly, Hayes et al. (2001) found that large ERP systems have a larger effect on ERP adoption announcements than with smaller ERP systems.
- Third, each of the studies apparently occurred at roughly the same time. These studies were copyrighted in 1995 and 1999, respectively. Thus, the effects of time also would be normalized.
- Fourth, the company profiles were based on information that is uniquely available to Oracle. There are many quotes from various information systems personnel that would not be generally available.
- Fifth, as a result, some of the information in the company profiles is quite specific (e.g., as noted in the In Focus summary, “For example, it takes only four days to close the quarterly general ledger books, compared with 8 to 11 days under the old system.”).
- Sixth, this approach allows us to make use of actual comments by the Chief Information Officer or equivalent personnel, gathered at a time when benefits were being analyzed, even if only implicitly. Many of these comments provide insight into the impact of ERP systems.
- Seventh, the information was placed in a public forum and was not aggregated or disguised. As a result, this suggests that the quality of the data that is given likely would be good; otherwise the companies for

which the results were attributed would be in a position to indicate the incorrectness of the data. This is particularly true since specific individuals from within the companies were quoted. Client individuals misquoted would likely ask Oracle to change the quotes.

- Eighth, although the data functions as marketing data, it is representative of “real-world benefits.” Companies that are interested in the feasibility of the benefits can contact the companies and representatives listed in the studies for further information.
- Ninth, relative to individual case studies on ERP, the repository provides a large group of firms that can be analyzed together to make broader-based inferences that could be made with a single case study. In particular, by using a number of studies, we have the ability to use statistical analysis of the data.

### IMPLEMENTATION ISSUES

Based on the implementation experiences of a few companies like Cable System International (Appleton et al.1997), Amoco crop (Jesitus,1997) McKesson Corp(wilder,1998), BCAG, Ansett Australia the issues that confront ERP implementation are People, Business Process Reengineering , data migration, Hardware and Network topology and configuration issues, Enormity of the effect (i.e. interruption to production process) of go-live on production, integration of existing legacy system to ERP and above all the massive cost associated with a ERP Project which may result in cost overruns. The overwhelming effect of some or all of these issues have resulted in abandoning the ERP software midstream by a number of companies (WM, 1999) . Therefore there is enormous risk associated with such bold initiative. As in all project, risk management of ERP Project will need extreme attention in project management strategy. A quick appraisal of Project Management strategies required for ERP implementation compared to traditional IT project is not out of place.

### METHODOLOGY

In order to focus on Oracle’s ERP applications, companies that did not implement ERP applications were dropped from the analysis. In addition, companies that reported on the development-specific applications were also omitted. Further, some company discussions focused only on implementation issues, probably because of where they were in the ERP life cycle. As result, those companies also were omitted.

In the case of manufacturing and hardware/software, this meant 14 and 11 cases, respectively, were available for analysis, for a total of 25 firms. Content analysis was used as a basis to summarize the information in the data repository. That analysis focused on quotes and client company statements of the impact of the ERP system on the company. We did not include text focusing on which modules of the ERP system were implemented, unless it was in a quote from the client company. If a concept (e.g., “globalization”) occurred more than once in a single company, then it was only counted once.Changes in organizational outputs, resulting from the ERP system, were the primary focus of the analysis. For example, if implementing an ERP led to a reduction in the number of people and that information was reported, then it would be gathered as part of the database. In addition, specific changes were sought. For example, “IS headcount (now) stands at 16” and, as noted by one company,“The Financial Department took several weeks to close the books each quarter ... It now takes ...four days to close the books each quarter.” The content analysis was limited to quotes made by client personnel and client statements. Using the company discussions as input, we read the discussions and captured each discussion of apparent benefits. The original categories used by Deloitte Consulting (1998) (hereafter Deloitte Consulting Study) were used as the basis of categorization. By placing data in those same categories, we can compare the results to determine the extent of similarity. A priori, we might expect the results to be somewhat similar, since the data occurred at the same time. Whenever benefits were found that were not in one of the Deloitte Consulting Study categories, a new category was added. Those categories form the basis of an additional set of benefits. After the benefits were categorized by company, then industry and then total, a “test of proportions” was used to test the statistical significance of the differences in percentages of occurrences of benefits between the two industries in the study. A test of proportions (e.g., Dixon and Massey 1969) is used to test the hypothesis that two proportions from different populations are different.

### CONCLUSION, FUTURE WORK AND EXTENSION

Database research has been an active and diverse area, with many specializations, carried out since the early days of dealing with the database concept in the 1960s. It has strong ties with database technology and DBMS products. Database research has taken place at research and development groups of companies (e.g., notably at IBM Research, who contributed technologies and ideas virtually to any DBMS existing today), research institutes, and Academia. Enterprise Resource Planning (ERP) is all the rage these days. Some of the largest software vendors on the planet are

offering ERP solutions. These include companies like SAP, Oracle, and PeopleSoft. An ERP solution is basically a packaged-application that provides enterprise level computing support for key functions such as human resources, manufacturing, and financials.

ERP systems can be extended with third-party software. ERP vendors typically provide access to data and functionality through published interfaces. Extensions offer features such as:

- Archiving, reporting and republishing.
- Capturing transactional data, e.g. using scanners, tills or RFID.
- Access to specialized data/capabilities, such as syndicated marketing data and associated trend analytics.

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