

“EFFECTIVE IMPLEMENTATION OF ERP IN INFRASTRUCTURE CONSTRUCTION INDUSTRY”

Abhijit N. Bhirud¹, Bhushan M. Revatkar²

Department of Civil Engineering

¹ Assistant Professor, Imperial College of Engineering & Research, Wagholi,

² P.G. Student, Imperial College of Engineering & Research Wagholi,
Pune, India

¹ abhijitbhirud11@gmail.com

² rewatkarbhushan3@gmail.com

Abstract— ERP or Enterprise Resource Planning can enable companies to optimize their business processes and allows for necessary management. Thus, ERP can be said as system software that can integrate several activities in a project & deliver a unison result for bettering performance & increase profits. A construction ERP system provides Cost optimization, incorporate design changes, Consistent quality conformance, Reliable, Faster and on time delivery, Incorporates value engineering, Collaborative work environment, team tracking facility.

The case study relating to ERP implementation by firms operating in the Infrastructure construction industry is investigated. It is found that to ensure efficient implementation firms must first have a good reason why ERP should be implemented, determine the tradeoffs, choose an appropriate re-engineering process, identify and mitigate risks that may arise. Based on the findings, strategies for managing the implementation of ERP in the construction industry are developed.

Index Terms— Enterprise Resource Planning (ERP), Business Process, ERP Implementation

I. INTRODUCTION

Information technology offers many options to optimize business processes. To succeed in today's highly competitive environment, there is a need to manage business processes as efficiently as possible. ERP systems are integrated business transaction, processing and reporting systems that focus on business processes. They are modular application software, related to areas of customer order management, manufacturing planning and execution, purchasing, and financial management and accounting, which enable business to increase their productivity of critical components. ERP is a structured approach to optimizing a company's internal value chain. The goal of ERP is to support one-time entry of information at the point where it is created and to make it available to all the participants within the organization. Significant complexity

exists, though, since no system was originally designed to share information with other systems.

The Infrastructure construction companies have several exceptional needs that must be taken into contemplation. There are few studies carried out for the implementation of ERP systems in the Infrastructure construction companies. The nature of the construction company, combined with the lack of appropriate customized ERP systems suitable for the particularities of the company, complicates the assessment and selection processes of suitable ERP system.

II. LITERATURE REVIEW

A. Khalid Al Marri, 2014

ERP gives a solution to the complications identified as flaws in project tracking, resource management, and decision-making of project-based establishments in the construction industry. The effective implementation of an ERP system along with refining the knowledge management infrastructure at these organizations will enable them to recognize many benefits through improving their merchandises, cutting costs, and gaining real time information needed for an active decision making process.

The successful application of ERP system can produce a superior integrated shared data system that can link all departmental scope of the association such as human resources, customer relations, suppliers' relations, financial management, development management. The savings in the working capital, the ability to manage the extended departmental services, and the availability of real time information about all processes, are some of the potential benefits ERP systems bring about to the enterprise (Xu et al., 2006).

Following are the benefits according to Elragal and Al-Serafi (2011):

- ERP is very vital and the ERP system in general has a countless effect on business performance.

presented in Table 1. Within each category, various difficulties are listed together with a short description.

TABLE 1 PROBLEMS OCCURRING DURING ERP IMPLEMENTATION

The most significant success factor of ERP system implementation

This study's respondent also represented their viewpoints about ERP system implementation success factor (see Table 2).

TABLE 2 ERP SYSTEM IMPLEMENTATION SUCCESS FACTOR (BASED ON SOJA P.2006)

Problem	Details
Organizational Problems:	
Project aims	Lack of clearly defined aims of the implementation project; incorrectly defined aims
Decision making	Problems with decision making (e.g. regarding personnel) indecisiveness of company representative
Implementation management	Mistakes in project management; lack of risk management; lack of implementation tasks coordination
Training	Insufficient training phase of a project; cutting training
Social problems:	
Employees knowledge	Lack of management competence; lack of computer knowledge; lack of consciousness about company operation; ERP system implementation
Top management	Lack of top management support and their involvement; lack of project understanding by top management
Implementation team	Lack of implementation team members obligation
Motivation	Lack of employees motivation to perform implementation task and learn innovative skills
Resistance to new system	Resistance of middle management, IT staff, and system users; people avoiding implementation duties
Resistance to change	People highly accustomed to existing solutions and unwilling to change

- ERP helps saving a lot of time doing tasks and jobs by reducing the number of tasks needed to finish the business processes.
- The ERP has helped the leader to reduce the routine on the job.
- The ERP system was very effective in providing more data to the financial manager regarding business processes.
- ERP has reduced the time required to deliver products to the customer.
- ERP has an abundant effect on the ability of the company to produce or provide more products and services.
- ERP has minimized the amount of inventory, improved greatly the ability to respond to clients.
- ERP has condensed the number of errors in shipping and sales returns.
- ERP has a countless effect in improving communication with customers and integration with partners.
- ERP system has better customer satisfaction.

B. Andrejs Tambovcevs, 2010

The enterprise resource planning software market has been developing at a very fast pace over the last few years and has been predictable to keep rising rapidly in the long term.

The respondents opinions regarding the problems observed in ERP system, divided in to the described categories are

Factor	Factor description
Project manager	The project manager is the person from the enterprise who sacrifices most of his working time to implementation obligations.
Project team	The implementation team consists of numerous people having high qualification and knowledge about the enterprise. The empowerment of the project team members to make decisions and their high position in the enterprise hierarchy
Top management	Top management participation in the project schedule and goals definition. The top management support for the project and the management members participation in the implementation duties. Top management consciousness regarding the project goals and complexity.
Detailed schedule	Detailed implementation scope, plan and schedule with responsibility distribution. The work time assured for the implementation team member (work time table).
Pre-implementation analysis	The enterprise examination and diagnosis former to the start of implementation and the creation of the enterprise functioning model with the integrated system support.
Organizational change	The change in the enterprise association and its business courses.
Monitoring and feedback	The implementation monitoring and feedback-information exchange among the project team and end users.
Appropriate training	The adequate training program appropriate to the enterprise's needs.
Financial budget	The financial resources assured during the implementation.
Implementation experience	The project team members' experience gained during former information schemes implementation.

Above success factor have been identified based on analyses. Team work and composition In the ERP implementer-vendor-consultant is a key factor influencing ERP implementation success. Good coordination and communication among the implementation partners are essential. Other critical factors include top management support, business plans and vision, effective communication, project management, software development, monitoring and assessment of performance. With a better understanding of the issues involved in ERP implementations, management will be able to make critical decisions and assign resources that are required to make ERP implementation a success.

III. PROBLEM STATEMENT & OBJECTIVE

In the Case study of ERP implementation in Infrastructure Construction Company some problems are discussed and steps to be adopted to implement ERP system.

Infrastructure Construction Company could either drop the idea of implementing ERP or choose to go by it. Such a decision could be arrived only by comparing with parameters like the reaction of their customers. The organization could go ahead with ERP by modifying the software to suit their needs but as earlier discussed it leads to other complications and dilutes the working of ERP if the company decides not to go about in searching for another alternative arrangement.

OBJECTIVE :

1. To Implement an ERP system is the single technological platform to increase efficiency of Infrastructure Construction Company.
2. To find out the necessary steps for the implementation of an ERP and implementation challenges and their benefits.

IV. CASE STUDY

A. Implementation of ERP in HCC

HCC (Hindustan Construction Company) is an integrated group spanning construction, real estate, and infrastructure development. HCC was using decentralized systems which had in-house-developed FoxPro-based ASP at the front-end and SQL server, FoxPro and Oracle as database.

B. Industry's perspective and need for ERP

Improvement in technologies as well as the decrease in costs encouraged many construction firms to change their approach towards IT.

- HCC planned Project Sankalp under which it implemented SAP R/3 (ERP) and SAP BW for the data warehouse, to handle the growing volumes of business, and their failure to give a holistic view of the business at any given point of time.
- Lack of expert mechanical engineers to plan and budget the equipment requirement.
- For equal distribution on man-hours between various Projects.
- For integrating multiple and remotely located sites.

C. Taking the decision for selection of ERP

A number of factors were considered before going in for SAP. It was first tested to see whether the technology was functionally fit to meet HCC's requirements over the next five years by observing demonstrations of a number of ERPs available in the market. The other criterion was to check if the product was technologically fit, i.e. whether the software integrated with the Intel-based, Unix-based and Oracle-based architecture. The third aspect was the presence and commitment of the vendor in India. Before implementation

HCC studied customer references but as they could not get Indian references of Construction Companies implementing ERP, they scouted for information from across the world. They analyzed strength of the implementation vendor and its partner community, they worked on the TCO (Total cost of ownership) & the cost of software, hardware, IT team and implementation partner.

D. ERP selection

HCC visited Construction companies in Germany & Netherlands whose line of work matched with that of HCC, They decided to go for SAP as they found that SAP was endowed with the confidence of a successful implementation of ERP. The team looked at the offerings from vendors including Oracle, Baan, and even some construction specific ERP offerings. However, after carefully evaluating their specific requirements, the team selected my SAP from SAP.

E. Project in action

As a result of the decision, IBM became the implementation partner, providing a team of 20 consultants with HCC's in-house team of 20 functional resources and nine technical resources. HCC and IBM teams worked together for the project, while the SAP team supported HCC from Germany.

The implementation of the first phase was done within seven months i.e. one month ahead of schedule, and within the assigned cost.

The task of assessing the liability of each of the projects at month-end was a significant exercise using the legacy system; this has become reasonably effortless after the SAP implementation, while the availability of timely and accurate information has led to the improvement in the quality of decisions.

F. Handling tough times by systematic Implementation

Major challenge faced by HCC was to help its employees cope with the transition, and assist them to be in-sync with the technology and process changes happening in the organization.

To overcome this challenge, HCC involved people at all levels in Project Sankalp. They formed a project steering committee consisting of the heads and the deputy heads of all departments to view the progress of the implementation every month. Demonstrations were made and debates were encouraged in quarterly review meetings to receive feedback. Newsletters distributed in the company helped in communicating the project developments to the 3,000 employees through interesting formats such as quizzes and puzzles.

To help people get used to the new technology, power users with extra training were developed in each department. These power users enjoyed the privilege of being more knowledgeable, and became the immediate help-desk for their respective departments. To improve the know-how of the users, HCC also made it mandatory for employees to practice with dummy data for at least one hour every day.

From the product manager's point of view in a construction company, a major challenge is making decisions on budgeting and the actual costs incurred during execution of projects for its customers; this was solved by having project management reports on SAP. The issue of managing the huge equipment base of cranes, rollers etc was solved by having data-entry on the utilization and location of equipment. Other aspects specific to the construction business (such as subcontracting information and subcontracting reference masters) were also mapped by SAP.

G. HCC won SAP ACE 2008

Award signifies HCC's position as the Best SAP implementer in the emerging business of Construction and Infrastructure, setting global benchmarks in excellence by deploying innovative solutions in every implementation across project sites.

H. Case study findings:

By systematic implementation of ERP System, company observed many benefits such as fully automated documents, Project cost reduced, better Business Course efficiency, auto generation of reports to assist for decision making and streamlining of process and manpower.

V. RECOMMENDATIONS & CONCLUSIONS:

A. RECOMMENDATIONS:

1. Right time to grasp opportunity:

ERP as a business tool is providing ample opportunity for businesses to compete globally, respond to competitive pressures, and increase revenue. There is no doubt that the market for Enterprise Resource Planning (ERP) systems is in great demand. In such testing times of global recession, where the market scenario is awful and also the ERP vendors are looking for customers, we suggest to all the organizations in infrastructure business to inculcate ERP systems in their business ethics. Since, this will help them in a huge manner to overcome the flaws in their business process and to stand up in the times to come where business opportunities are endless.

2. Selecting the appropriate option:

Infrastructure construction industries have very different requirements and procedures in which off-the-shelf (standard) software may not be able to handle. On the other hand, smaller construction firms may adopt customary software as it would be too expensive to develop and maintain customized software which needs computer specialists. Instead of reaping competitive advantage, the firms may have higher overheads.

B. CONCLUSIONS

Systematic implementation of ERP system added more benefits to infrastructure construction enterprises in various divisions i.e. integration of all business processes, fully computerized generation of reports to assist in decision making, and attainment of competitive advantage.

As Infrastructure construction is fragmented and ERP system having modest benefit helps infrastructure firms to gain more projects. The problems faced by Infrastructure construction enterprises in implementing ERP include insufficient training of employees and short software testing period. Infrastructure construction company do not rush into implementing ERP directly, but be mindful that it may be easier to change the software than change the human being one possible.

However, it is believed that the findings of this study can still help firms to take the first step towards management of ERP implementation and earn high benefits in terms of saving cost and time for future projects.

REFERENCES

- [1] Andrejs Tambovcevs, (2010) "ERP System implementation: a case study of the construction enterprise" Economic and management: 2010. 15, 1095- 1096.
- [2] Elragal, A. and Al-Serafi, A. (2011). The Effect of ERP System Implementation on Business Performance: An Exploratory Case-Study, German University in Cairo (GUC), New Cairo City, Egypt.
- [3] Hindustan Construction Company, www.hccindia.com.
- [4] Jonathan Shi, Illinois Institute of Technology. Daniel Halpin, Purdue University, "Construction Enterprise Resource Planning (Construct-ERP)".
- [5] Khalid Al Marri, (2014) "ERP implementation in the project-based organizations of the construction industry" The British University in Dubai (BUID), United Arab Emirates, The Business & Management Review, Volume 4 Number 4, March 2014, 17-18.
- [6] Shi, J J and Halpin, D W (2003) Enterprise Resource Planning for Construction Business Management. Journal of Construction Engineering and Management.
- [7] Soja, P. (2006). Success factors in ERP systems implementations: Lessons from practice. Journal of Enterprise Information Management, 19 (4).
- [8] Voordijk, H, Leuven, A V and Laan, A (2003) Enterprise resource planning in a large construction firm: implementation analysis. Construction Management and Economic
- [9] Wen-Hsien Tsai, Shu-Ping Chen, (2010) "A Study of the Impact of Business Process on the ERP System Effectiveness" International Journal of Business and Management Vol. 5, No. 9; September 2010
- [10] Xu, L., Wang C., Luo, X., and Shi, Z. (2006). Integrating Knowledge Management and ERP in Enterprise Information Systems, Systems Research and Behavioral Science Journal 23,147-156