

Evaluation of ERP Implementation in an Indian Company: A Case

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Abstract

Enterprise Resource Planning (ERP) systems are used in the industrial organizations for information integration and aligning & streamlining their processes for delivering high value to the customers. As the earlier research reported varied results of ERP implementation, it was necessary to evaluate it afresh. This research work seeks to critically evaluate the implementation and performance of ERP system with six dimensions. A study was carried out in one of the company in Southern India. The results indicate that with "predetermined objectives and goals of implementation" and "proper ERP software selection", its implementation was successful. While studying the various dimensions of its implementation and performance, it revealed that, though the ERP was implemented as a precondition of merging this industry with the other group, with the clear goals of "improved resource utilization" and "information integration", the system is successfully working. While analyzing the most benefited area among others, "Improved accountability for inventory" was found significant besides other tangible and intangible benefits. The Logit regression analysis is done to arrive at a conclusion. This study also identified the critical success factors, "The top management support" and "Standard ERP software" as the

most significant factors. The present work clearly outlines that proper implementation of ERP with full support of top management is successful.

Key words: ERP implementation; Goals; Business Process Reengineering; Tangible and Intangible Benefits; Critical Success Factors

Introduction

The need for ERP comes from the fact that in today's world, there is unprecedented level of global competition. Organizations today need to be smart enough to face the challenges and become flexible to meet the complex and challenging requirements of global business. They should respond quickly to the market changes, continuous design improvement, manufacturing flexibility, efficient logistics control and better management for the entire organization. This requires sharing the organization resources including information to the maximum possible extent. They need to have a competitive edge over their competitors. Organizations are therefore seeking for an ERP solution, which would get the whole organization work together, align with their strategy and establish a competitive advantage. It is a best application of Information Technology in manufacturing companies. Earlier it was misconception that

IT can't help in manufacturing but it has shown its importance even on shop floor. ERP helps the decision makers in order to achieve the flexibility in design, manufacturing not only to satisfy but to delight the customers. Almost all large scale organizations have already implemented ERP. After focusing on the large scale companies, the ERP vendors are targeting on SMEs (Yen et al, 2002, Jan Ollaghar, 2003). ERP implementation is a complex and high cost process but the implementation of ERP is not successful all the time. One third ERP implementations fail, or are not successful as per their expected goals (Joseph Sarkis, 2003). In spite of many resources needed to perform a careful planning and implementation of ERP in case of large enterprises, there are many failures (Bingi et al, 1999; Hayes et al, 2001; Mandal and Gunasekaran, 2003). Most of the time, the failure is attributed to improper implementation of ERP system. On the other hand, there is also evidence indicating numerous tangible and intangible benefits of ERPs. They reduce cost by improving efficiencies through computerization; enhance decision making by providing accurate and timely enterprise-wide information (Robin Poston, 2001). According to Davenport (1998), enterprise systems can deliver great rewards, but the risk they carry are equally great. So while implementing the enterprise system, manager should be careful that their enthusiasm about the benefits does not blind them to the hazards.

ERP Implementation in India is recent phenomenon after its wide implementation and popularity in developed countries. Most of the large scale industries in India, have implemented it and some are in the process of implementation (Yen et al, 2002).

The literature on the ERP is scant and very less work is carried out in Indian environment than the developed countries. However, the studies were mostly focused on critical success factors and methods of

implementation of ERP. As the cost involved in installing these systems is huge, there is need to evaluate the performance of industries which have implemented ERP. This paper is aimed to measure the effects of implementation of ERP on the performance of the industry. This will help other similar industries to effectively implement ERP.

Literature review

The implementation of ERP is a complex exercise and many adopters have encountered problems in different phases. Improper implementation of ERP has taken the companies to bankruptcy and several organizations decided to abandon the ERP implementation projects. The high failure rates in the implementation of ERP calls for a better understanding of the process. In spite of the initial failure results, most of the companies are adopting ERP to stay in a competitive market, by learning from past experience and getting fruitful results. The number of studies though very scant, have been attempted to identify the implementation procedure, critical success factors in the implementation of ERP and problematic cases. Most of the studies are based on analyzing one of the parameters of its success or failure.

Thomas Davenport (1998) first time made alert to the ERP implementers that if they are not careful in selecting the ERP system, Business Process Reengineering and proper implementation; their dream of information integration can turn into nightmare. According to Cliffe (1999) 65% of executives believe that ERP systems could be harmful. The findings of result of implementing ERP in an organization did not, however always prove successful. Many large organizations have installed an ERP system but had to abandon their implementation (Soh et al, 2000). Though 80% of the larger industries implemented ERP, approximately one-third of

such systems are said to be failures (Joseph Sarkis, 2003).

On the other hand, there is also evidence indicating numerous tangible and intangible benefits of ERPs. They reduce costs by improving efficiencies through computerization; enhance decision-making by providing accurate and timely enterprise-wide information (Robin Poston (2001), Vincent Mabert et al. (2003), Jan Olhager and Erik Selldin (2003). Purnendu Mandal and A. Gunasekaran (2003) in their findings have stated that ERP significantly improves the efficiency of the company, when it is implemented correctly. The planning for ERP systems and their implementation requires an integrated approach to meet the requirements of various functional areas. They conducted case study regarding ERP Implementation in Water Corporation, revealed that some of the intricacies during planning and implementation stages may result in poor utilization of ERP systems.

Jen-her Wu (2002) emphasized that there should be a mechanism for determining whether the ERP is needed and once implemented, whether it is successful. They have studied '*User satisfaction*' as one of the evaluation mechanism for determining system success. Christopher (1999), T. R. Bhatti (2005) and Jiang Yingjie (2005) identified numerous Critical Factors (CF) which contribute to the ERP success or failure. *Top management support* and a *clear business vision* have critical influence on the implementation process and outcome.

The studies on ERP in India are very rarely found. In the initial phase, companies adopting ERP were Indian operations of MNCs and large companies. But more importantly these companies were not ready for the business process re-engineering and associated organizational changes at that time. Vendors also did not fully understand the user needs and Indian business processes at that time. This resulted in failure of some of the

implementations, which hampered the growth of the market. Only 42% of the ERP users were satisfied with the implementation of their ERP package. Indian market suffered a negative growth of 12% and total revenues came down in 2001. The break up of the industry segment which has implemented ERP, are Manufacturing 45%, Telecom 15%, Financial 18% and others 22% (Dinesh Jindal et al. 2002).

RRK Sharma and Rajesh (2005) has undertaken case study in one of the Indian companies which had implemented ERP and found changes in manager's job for the organization chosen. They found, use of *power* increased significantly with ERP implementation. This facilitated the change process and was consistent with all management levels. They also found that *Flexibility* of the organization had increased with ERP. Executives were spending less time in implementation and the free time is employed more in planning activities. They found that *standardization, specialization, and formalization* had increased due to ERP implementation.

Milind K. Sharma et al (2006) in their work concluded that Indian industries have shifted from protection towards competitiveness. They have substantially increased their Information system investment but their success in exploiting these technologies for bettering their business performance squarely lies in devising an effective Information System management processes and deploying its sound strategy.

In spite of the varied results of ERP implementation, the use of ERP system in the market is increasing every year. According to AMR research, world wide ERP software sales grew by 14% in 2006 to \$28.8 billion in 2007 and expected to grow @ \$47.7 billion by 2011. (AMR Research-2007) Small and Medium Scale industries are also adopting ERP packages to stay in competitive market.

The present work seek to evaluate the performance of ERP system in an organization with following dimensions: Motivational force to go for ERP, Goals set by the company, current status of implementation, effects on the working of industry, benefits of it and critical success factors.

Data collection

This study was conducted in one of the medium scale industry in Southern India, who is a vendor for large automobile manufacturers. The industry selected is from the convenience point of view and readiness to share the information for research work. This organization has implemented SAP as ERP software at all its locations. This study was done in Jan-June 2009. So at the time of study, the organization was having three years of experience using ERP system. The data was collected from the key personnel working in the department of manufacturing, quality, planning, purchase, maintenance, steering committee members and end users.

The questionnaire was designed with *five* parts. The *first part* contained details about respondents, *second part* had questions on motivational factors to implement ERP system, *third part* was having questions related to goal of ERP, *fourth part* regarding ERP benefits and *fifth part* had questions regarding critical success factors for implementation of ERP in the company. The perceptions from the respondents were collected on five-point Likert scale.

There were 153 employees who were using ERP software in the organization. The modified questionnaire was administered to 105 personnel during March 2009. Out of 105 questionnaires, 96 questionnaires were received back, 8 responses were rejected due to incomplete opinion and remaining 88 responses were accepted. Out of 88 valid responses, 7 questionnaires were received from senior management level officers, 17

questionnaires from middle management level officers and 64 questionnaires from junior management level officers. The break up of respondents to whom questionnaires was distributed and filled in questionnaire is received across the various management level officers is shown in **Figure-1**. It is seen that the response from the junior management level officer who are handling the software most of the time was around 73%.

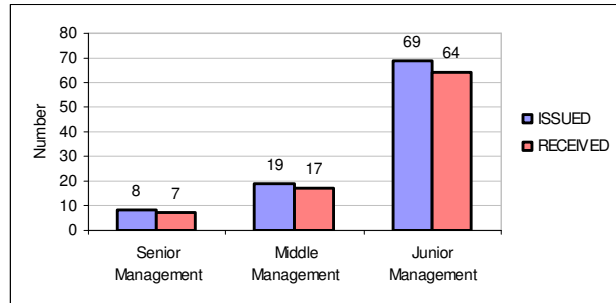


Figure-1: Respondents from different levels of Management

Analysis of survey data

The data collected through questionnaire was analyzed by using *Proportional odds model based on Logit Regression* (Douglas, 1991) to find out the most significant motivational factor in implementation of ERP, to know the status of ERP implementation, to appreciate the benefits of ERP and finally, to identify the critical success factor in implementation of ERP in the organization. Appendix-A summarizes the ERP performance. The results show the regression analysis parameters like β -coefficient, **Z**-value and **p**-value for each of the performance measure.

Results and discussion

It is clear from Table-1, that though this company has implemented ERP as a precondition of “*merging with other group*” (p-value 0.00415 which is less than 0.05), they had urge to “*link with global activities*” (p-value 0.0268 which is more than 0.05 but less than 0.1), as the company has collaboration

TABLE -1: REGRESSION ANALYSIS FOR MOTIVATIONAL FACTORS

Factors	Regression Analysis parameters		
	Coefficient (β)	Z-Value	p-Value
A2 Merger with other group of companies	0.3302	2.642	0.00415
A11 Link to global activities	0.3707	2.520	0.0268
A8 Improved interaction and communication with suppliers and customers	0.3253	1.636	0.05155
A4 Process standardization across the group	0.2588	1.588	0.05592
A6 Inventory reduction	0.2812	1.433	0.07636
A9 Customer/suppliers have gone for ERP	0.2565	1.231	0.10935
A7 Pressure to keep up with competitors	0.1931	1.181	0.11941
A1 Replacement of legacy system	0.216	1.142	0.12175
A10 Gain strategic advantage	0.1465	0.837	0.20046
A3 Overall cost reduction	0.1283	0.743	0.22965
A5 Organizational restructuring	0.0912	0.4436	0.32997

TABLE -2: REGRESSION ANALYSIS FOR GOALS OF ERP

Factors	Regression Analysis parameters		
	Coefficient (β)	Z-Value	p-value
B5 Integrating information	0.2521	2.493	0.00639
B3 Provide better customer service	0.3787	1.914	0.02807
B8 Organizational growth	0.3602	1.743	0.04093
B6 Improve resource utilization	0.2805	1.671	0.04746
B7 Identify and solve problems proactively	0.2457	1.322	0.09342
B1 Reduced direct and indirect cost	0.1608	0.745	0.22663
B2 Reduced logistics cost	0.1761	0.694	0.2451
B4 Pre-empt potential competitors	0.0388	0.214	0.41683

TABLE -3: REGRESSION ANALYSIS FOR STATUS OF ERP

Factors	Regression Analysis parameters		
	Coefficient (β)	Z-Value	p-Value
C8 Level of access to information using SAP is high.	0.374	2.63	0.00427
C2 At the present, ERP system is being successfully used.	0.275	2.019	0.02169
C1 Quantum of data entered in SAP is more.	0.297	1.525	0.06426
C7 Transition to SAP went smoothly from previous package	0.276	1.415	0.07781
C4 Planning and execution of ERP implementation process is effective	0.232	0.947	0.17106
C5 Extent of business process reengineering for ERP project.	0.188	0.896	0.18406
C3 Required functionality of ERP system has been fulfilled.	0.181	0.821	0.20611
C6 Compatibility of Software and Hardware in ERP project.	0.102	0.430	0.3336

TABLE-4: REGRESSION ANALYSIS FOR EFFECTS OF ERP

Factors	Regression Analysis parameters		
	Coefficient (β)	Z-Value	p-value
D4 The information, which could be obtained earlier, only from other departments, now available over the system	0.245	2.017	0.02169
D5 Feeling of ownership improved among the functional heads and end users	0.152	0.917	0.17879
D6 The interdepartmental relation improved	0.188	1.265	0.10204
D3 Paper work has been reduced in the organization	0.188	1.041	0.14917
D1 ERP helped in saving end user time	0.154	1.018	0.15387
D7 Productivity improved	0.089	0.451	0.32636
D2 ERP simplified user task	0.052	0.263	0.39743

TABLE-5: REGRESSION ANALYSIS FOR TANGIBLE BENEFITS

Factors	Regression Analysis parameters			
	Coefficient (β)	Z-Value	p-value	
E6	Improvement in accountability of inventory	0.3736	2.4264	0.00755
E10	Improved communication	0.2419	1.2884	0.09853
E3	Improved customer service	0.1659	0.6843	0.24825
E5	Reduced cost of production	0.1668	0.6802	0.24825
E7	Reduced error in ordering	0.1429	0.6794	0.24825
E2	Reduced manufacturing cycle time	0.1569	0.6262	0.26435
E1	Reduced planning cycle time	0.0986	0.5018	0.29116
E8	Increased in sales volume	0.1439	0.5452	0.29116
E9	Improved competitive position	0.0257	0.1102	0.45621
E4	Decreased lead time of production	0.0148	0.0591	0.47608

TABLE-6: REGRESSION ANALYSIS FOR INTANGIBLE BENEFITS

Factors	Regression Analysis parameters			
	Coefficient (β)	Z-Value	p-value	
F3	Reduced information delay	0.3536	2.2544	0.04093
F6	Improve the organizational processes as a whole	0.2603	1.3137	0.0951
F1	Better coordination in between managers	0.1478	0.7945	0.21477
F4	Improved decision making	0.107	0.567	0.2843
F5	Streamline the business processes	0.0705	0.3885	0.34827
F2	Improved forecasting	0.0473	0.3422	0.36693

TABLE-7: REGRESSION ANALYSIS FOR CRITICAL SUCCESS FACTORS

Factors	Regression Analysis parameters			
	Coefficient (β)	Z-Value	p-value	
G1	Top management support	0.1982	2.5853	0.0048
G12	Data accuracy	0.3498	2.0894	0.03144
G8	Great ERP software selected	0.2291	1.4847	0.06811
G2	Strong MIS department	0.2124	1.0182	0.15387
G15	Degree of communication of top management with ERP team	0.1368	0.9886	0.16109
G9	User's involvement and participation	0.2022	0.9712	0.16603
G4	Functional area support	0.2301	0.8669	0.19215
G10	A good understanding of the concept of ERP	0.1710	0.7301	0.2327
G7	Efficient change management	0.1058	0.532	0.29806
G3	Quality of ERP team	0.0935	0.458	0.32276
G11	A good IT infrastructure in place of ERP	0.0743	0.4361	0.32997
G5	Strong and meaningful training programs	0.0683	0.3821	0.35197
G13	Decision making capability of ERP team	0.0324	0.1859	0.42466
G14	Degree of communication of ERP team with employees	0.0238	0.1376	0.44433
G6	Good planning for the ERP Project	0.0317	0.1175	0.45224

with multinational company which is using ERP and the company is exporting its product to big giants in the area of automobile. *“Improved interaction and communication with suppliers and customers”* was also the third priority factor for implementing the ERP (with p-value 0.05155 which is more than 0.05

but less than 0.1 i.e. significant at 90% confidence level).

It was found from Table-2 that company has kept certain goals while implementing ERP. *“Integrating Information”* (p value-0.00639), *“providing better customer service”* (p-value 0.02807), *“overall organizational growth”* (p-

value 0.04093) and “improving resource utilization” (p-value 0.04746) are found to be the significant goals respectively in priorities (All p-values less than 0.05).

Keeping these clear-cut goals in mind, the company implemented the ERP system which has high reputation in world as well as in Indian market. While analyzing the status of its implementation (Table-3), it was found that though with only two years of its life go, it started functioning successfully (p-value 0.02169). It has switched over from earlier legacy system to new system smoothly which faces problems in most of the implementations. The users realized that the “level of access of information” in this ERP system is very high (p-value 0.00427) compared to earlier system. The information, which could be obtained earlier from other departments, was then available over the systems (p-value 0.02169, Table-4) which lead to faster decision making and saving of time.

Further investigations were carried out to find out which areas were benefited most (Table-5). “Improvement in accountability of inventory” was seen significant beneficial (p-value 0.00755) compared to other areas of benefits

like “improved communication” (p-value 0.09853), “reduced cost of production” (p-value 0.24825), etc. Beside these tangible benefits, its intangible benefits were also perceived by the users (Table-6). “Information delay” was reduced significantly (p-value 0.04093) and found “overall improvement in whole organizational processes” (p-value 0.0951).

It was interesting to find out the critical factors which lead to system success (Table-7). The respondents gave favor to “top management support” (p-value 0.0048) and “the accurate data” (p-value 0.003144) which is fed to the system. Few of the respondents were giving credit to the “great software” (p-value 0.06811) which is being used for ERP. Though the ERP system was implemented forcefully (as a precondition to merge with other group of industries), it lead to conclusion that with clear-cut set of goals, proper selection of ERP system and implementation with strong top management support, the ERP systems start giving fruitful results immediately after implementation.

The following model evolves from the study to determine success of ERP as shown in Fig 1.

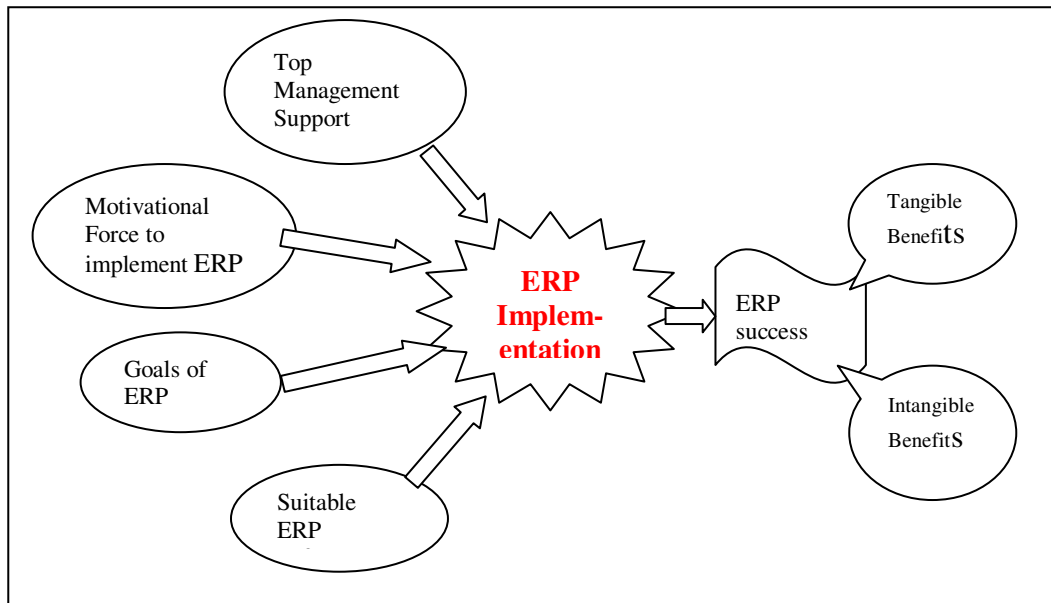


Fig. 1: The Conceptual Model to achieve ERP Success.

Conclusions

The present work focused on the evaluation of ERP performance in one industry. The data collected was analyzed with 'proportional odds model based on Logit Regression'. The Regression analysis parameters such as Regression coefficient (β), Z-value and p-value were calculated using Statistical Package for Services and Solutions (SPSS) software. It was found that in spite of the various failure stories, ERP implementation in this industry was successful and the reason behind it was found that the *goals* were clear while implementing the system and the *ERP software selection* was proper. The critical factors which lead to the success were found as "*top management support*" and "*accuracy in data feeding*" as most significant.

Limitations of the present work

The present work is based on the perception of the users as the actual data of the industry before and after the implementation of ERP was difficult to obtain. Hence the actual benefits of ERP implementations could not be measured. This work therefore has a usual limitation of its relevance based on the perception. If the factual data of the industry under study would have been made available before and after ERP implementation, the benefits and the performance could have been evaluated exactly

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