Identification of progress and success factors during implementation of Enterprise Resource Planning Package in Indian Steel Industry - A case study on Bhilai Steel Plant

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Abstract— Although the phenomenal recognition of Enterprise Resource Planning (ERP) tool as reported in various practitioner magazines, there has been little academic research published to date about critical success factors related to ERP adoption and implementation in Indian steel industries. In this study the authors have concentrated on critical success factors (CSFs) of ERP implementation in Indian steel industry. This research provides preliminary findings from an interview conducted at Bhilai Steel Plant, Chhattisgarh. A series of interviews were conducted on selected top management, middle management and end users to identify most critical success factors (CSFs) that are able to enhance the progress and success for Bhilai Steel Plant. All interviewees have adopted ERP implementation progress is associated with the identification of critical success factors before and after the implementation. The identified critical success factor will be considered in developing model of ERP tool development for Indian steel industry.

Index Terms— BPR, CSFs, ERP, MES, SAP.

I. INTRODUCTION

The enterprise resource planning (ERP) system is a common term for a wide set of activities supported by multi-module application tool that helps organizations to manage their resources in better way. The ERP system has been shown to be able to provide significant improvements in efficiency, productivity and service quality, and to lead to a reduction in service costs as well as to more effective decision-making (E.W.T. Ngai et.al. 2008). ERP implementations are usually large, complex projects, involving large groups of people and other resources, working together under considerable time pressure and facing many unforeseen developments (H. Akkermans et.al. 2002). ERP provides two major benefits that do not exist in non-integrated departmental systems: (1) a unified enterprise view of the business that encompasses all functions and departments, and (2) an enterprise database where all business transactions are entered, recorded, processed, monitored, and reported. (Elisabeth J. Umble et al., 2003). The available data and data analysis indicates that the vital Critical Success Factors (CSFs) to implement ERP package successfully. This paper provides a technique to identify CSFs and suggest method to manage the same.

II. LITERATURE REVIEW

The concept of CSFs was first proposed by D. Ronald Daniel (1961) and refined and popularized by John F. Rockart of MIT's Sloan School of management, nearly 20 years later. Implementing an ERP system is not an inexpensive or risk-free venture. In fact, 65% of executives believe that ERP systems have at least a moderate chance of hurting their businesses because of the potential for implementation problems (Elisabeth J. Umble et al., 2003). Al-Mashari and Al-Mudimigh in describes a case study of a failed implementation of SAP R/3 to re-engineer the business processes of a major manufacturer. They point out that the change management is one of the main factors that led to failure in ERP implementation. In fact, many cases of the failure to implement ERP because of either cancellations or cost/time over runs have been reported. The effective implementation of an ERP system requires change management strategies and an understanding of organizational culture [5]. Change management involves the effective balancing of forces in favor of a change over forces of resistance. There are many important processes and tools in change management [17]. The previous studies present different techniques and strategies have been used in change management also the authors in those previous studies used different processes, methods, and tools to change organization without any resistance and make the employee accept the new ERP system (Hala M.Al-Shamlan et al., 2011). It is therefore worthwhile to examine the factors that, to a great extent, determine whether the implementation will be successful. These factors, often referred to as critical success factors (CSFs) are as: Rockhart (1979) explained are “Areas of activity that should receive constant and careful attention from management”, (Almahidi.M.S. Ibrahim et al., 2008). The literature has cited a surplus of Critical Success Factors that can affect the success or failure of the implementation of an ERP system in an organisation.

Table 1: Summary of most prominent Critical Success Factors for the ERP implementation
<table>
<thead>
<tr>
<th>Critical Success Factors</th>
<th>Author’s Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Top management support</td>
<td>Fiona Mary Sumner 2000, Toni M. Somers et al. 2001, H Akkermans et al. 2002,</td>
</tr>
</tbody>
</table>

**Vendor support**

**Careful package selection**

**Data analysis & conversion**

**Dedicated resources**
Toni M. Somers et al. 2001, Robert Plant et al. 2007,

**Use of steering committee**
Toni M. Somers et al. 2001, Robert Plant et al. 2007,

**User training on software**

**Education**

**Business Process Reengineering**

**Minimal customization**
Toni M. Somers et al. 2001, Robert Plant et al. 2007,

**Architecture choices**
Toni M. Somers et al. 2001, Robert Plant et al. 2007,

**Change management**

**Partnership with vendor**
According to Rockart (1979), critical success factors (CSFs) are the “few key areas that must go right for the business to flourish”. If they are not performed well, it is unlikely that the mission, objectives or goals of a business or project will be achieved. A comprehensive, well-grounded list of CSFs and case studies of ERP implementations in U.S. companies was developed by Somers and Nelson (2001). Toni M. Somers et al. 2001 have suggested the impact of Critical Success Factors (CSFs) across the stages of Enterprise Resource Planning (ERP) implementations. The result of this research provides an advice to management on how best to utilize their limited resources to choose those CSFs that are most likely to have an impact upon the implementation of the ERP system.

### III. RESEARCH OBJECTIVE

Objective of this research work

1. To identify the most Critical Success Factors for the effective implementation of ERP package in Indian steel sector i.e. Bhilai Steel Plant.
2. To identify the impact of that most Critical Success Factors within the organisation to avoid any bottlenecks in the effective implementation of ERP package to enhance the production, productivity and effectiveness of the organisation.

### IV. RESEARCH DESIGN

As Yin (1989) mentions, a research design in a case study is a technical plan that attempts to link the beginning and end of a research study, helping the researcher to get from “here” to “there”. There are then five important aspects of a research design: (1) The study’s questions, (2) Its propositions, if any, (3) Its units of analysis, (4) The logic linking the data to the propositions, and (5) The criteria for interpreting the findings. (Ioannis Ignatiadis- Ph.D. Thesis). A preliminary literature review revealed an interview protocol that had been developed and used in a study of ERP implementation in Bhilai Steel Plant. Chart-I shows various steps involved for this research work.

![Fig.1. Research Design- Strategy for the research work](image)

### V. PROFILE OF CASE ORGANIZATION-BHILAI STEEL PLANT

Bhilai Steel Plant (BSP) is the flagship unit of Steel Authority of India Limited, the largest producer of steel in India and one of the leading players worldwide. According to World Steel Dynamics, SAIL with a turnover exceeding $10 billion—ranks second in the league of ‘world class’ steel makers evaluated in terms of a slew of performance measurement yardsticks. Currently producing five MT of steel, BSP—the largest in the SAIL family after a capacity expansion program that’s currently underway—is set to produce seven MT of crude steel per annum by 2012. (Source: Express computer, business weekly Aug 02,2010). Ten - times winner of Prime Minister's Trophy for best Integrated Steel Plant in the country, Bhilai Steel Plant (BSP) Chhattisgarh is India's sole producer of rails and heavy steel plates and major producer of structural. Since BSP is accredited with ISO 9001:2000 Quality Management System Standard. At Bhilai IS0:14001 have been awarded for Environment Management System in the Plant. BSP has
Past studies have identified a variety of CSFs for ERP implementation, among which context related factors inconsistently appear. The case study approach attempts to capture and communicate the reality of a particular surroundings at a point in time (Jenkins, 1985). According to Walsham (1995) in the case of an outside observer in interpretive case studies, interviews are the primary data sources, since this is the best way to access the interpretations and views of the respondents. In interpretive study the data collected are mostly qualitative. If the interviews are too closely directed, important data may be lost, and hence the richness of interpretation which is very important in interpretive case studies is lost [18]. On the other hand, over-submissive, i.e. by not offering the researcher’s own ideas or by not prompting with questions following a new direction taken by the interviewee, may lead to the conclusion by the interviewees that (1) the researcher is not interested in interview, (2)The researcher has no vision of his/her own regarding the subject in question. Regarding recording of interviews, Walsham (1995) stated that tape-recording interviews can provide a full transcript of what was said, interview subjects may be reserved on the sight of a tape-recorder regarding sensitive or confidential material. The disadvantage of full tape-recording is the time needed to write down the interviews or to extract something meaningful out of them. The alternative to tape-recording is to make a widespread note during the interview and to write them up fully as soon as possible after the interview [18]. The data for this research are purely qualitative, collected by means of semi-structured interviews. The interviewees were asked some open-ended questions according to written interview guidance notes, but they were free to elaborate on their own thoughts. The interviewees in BSP were selected according to their degree of involvement with the ERP system, as well as selecting a cross-section of users and managers from various departments. The interview questions have been based on determining the CSFs in Implementation of ERP, SAP in Bhilai Steel Plant, and the executives of BSP were free to ask some questions and answer the selected questions. The most CSFs identified by executives and are significant for the success of ERP implementation in Bhilai Steel Plant (BSP) is tabulated in table no.-2. Table 2 is shown in Appendix .it describes Weightage of Critical Success Factors. Figure 4 shows Weightage of critical Success Factors and Figure 5 shows Executive wise Importance of CSF’S

As per above available data from the Bhilai Steel Plant, Chhattisgarh, among top ten vital Critical Success Factor namely Top Management, Change management, Vendor support, User training and Education, Customization, Careful package selection, Project team competence, Business Process Reengineering, Use of consultants and Interdepartmental communication and cooperation (Figure 3.), Change Management was mostly emphasized by the executives.
Six business areas of BSP were covered through seventeen different modules of SAP.

200 as-is processes mapped to 140 to-be processes in ERP after rationalization.

More than 650 unit tests were carried out to ensure working of the software.

174 scenarios were tested during integration testing of the software.

647 developments were carried out in the system to suit the plant’s specific needs.

Involvement of sister plants in detailed designing Implementation Highlights (Source: Metal Asia, June 2010).

VIII. CONCLUSION

Enterprise Resource planning (ERP) package gives a common platform for sharing information and helping higher management to fulfill the target and take quick decision. Identification of critical success factors was the challenging job for the implementation of ERP in Bhilai Steel Plant (BSP). The outcomes of interviews among top management, middle management and end users illustrate that identifying the most CSF was a primary concern in ERP implementation in BSP. In this research, five most critical success factors are identified as per their rankings. In order to facilitate a smooth ERP implementation, organizations must be competent with these CSFs. The study indicates that managing these CSFs effectively by acknowledging importance to employees concern, having regular and open communication, get everyone's participation, and promote skills and development are some of the ways to manage these issues. The study has proved that efficient change management is one of the critical success factors to successful implementation of ERP package in BSP. Change management initiatives were found to be positively related to user satisfaction. Many training and education system were developed to involve the end users and to manage resistance to change. According to this study, top management support and vendor selection stands in second and third position respectively. An organisation must learn to identify various CSFs that greatly affect the ERP implementation and identify when in the process to address the end users effectively to ensure that the pledged gain can be comprehended and the ERP package can be implemented successfully.

REFERENCES


[18] Ioannis Ignatiadis, “ERP Use, Control and Drift: An Agency Perspective” University of Bath, School of Management (2007).

AUTHOR BIOGRAPHY

Suraj Kumar Mukti is appointed as an Assistant Professor in the department of Mechanical Engineering at National Institute of Technology Raipur Chhattisgarh. He has teaching experience of eleven years in the field of technical education. He is handling some vital portfolio like Anti-ragging committee, blood donation encampment, preparing ready the students for interview and material testing etc. in the Institute. Suraj Kumar Mukti is the Lifetime Member of The Institute of Engineers (India) and teaching the AMIE students on honorary basis. He has been appointed as a University question Paper Setter and Valuer in Pt. Ravishankar Shukla University Raipur Chhattisgarh, Guru Ghasi Das University Bilaspur and Chhattisgarh Swami Vivekananda Technical University Bhilai Chhattisgarh. He has presented so many technical papers in various national and international seminars and conferences. He has worked as an Engineer in CSEB Korba and has received so many excellence awards in CSEB Korba also. He has served as a Senior Lecturer in Shri Shankaracharya college of Engineering & Technology Bhilai C.G. He has started his career as a Lecturer in the department of mechanical engineering at Government Engineering College Jagdalpur C.G. on 2000. He has completed his Master Degree from Bhilai Institute of Technology Durg C.G. Presently he is pursuing his Ph.D. program in the field of Management and Technology from his own institute i.e. National Institute of Technology Raipur, Chhattisgarh.

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Dr. A.M. Rawani is Professor in Mechanical Engineering and Dean (Academic) at National Institute of Technology, Raipur. He has received his M.Tech. in Industrial Engineering and Management from IIT, Kharagpur and Ph.D. from I.I.T. Delhi. He has more than 29 years of teaching/research and administrative experience in Govt. Engg. Colleges /NIT. He has visited many countries like USA, Singapore, China, Mauritius, Hong Kong and Thailand either to deliver keynote speech or to chair the academic conferences. Dr. Rawani has published more than two dozen papers in International/National Journals and more than two dozen papers in International/National Conferences. He is the Editor-in-Chief of ‘International Journal of Strategic Management and Business’ and also of ‘Journal of Information and Operations Management’ (ISSN 0976-7762), Bio info Publications. He is Editor-in-Chief of ‘International Journal of Trade, Economics and Finance’, IACST Publication, Singapore (ISSN 2010-023X). He is also Editor-in-Chief of ‘International Journal of Social Science and Humanity’, IACST Publications Singapore. (ISSN 2010-3646). He is member of Editorial Board and reviewer of International Journal of Engineering, Science and Technology (IJEST), Nigeria (ISSN 2141-2839/2820). He is also Reviewer of African Journal of Business Management, South Africa. He has produced one Ph.D. and currently supervising four more candidates for their doctoral program. He has delivered invited lectures at the institutes of national repute. He was offered the post of Associate Professor at Indian Institute of Management, Lucknow in 2002. He has edited Conference Proceeding of the International Conference on ‘Management Technology and Applications’ published by Research Publishing Services Singapore in 2010 and also edited Conference Proceeding of the International Conference on ‘Humanities and Social Sciences’ published by World Academic Union, England UK. Dr. Rawani is conferred with 'Rashtriya Gaurav Award' in April-2010 by India International Friendship Society, India. He is the recipient of Best Management Case Award in 'GIFT CASE 2000' competition (executives category), from Global Institute of Flexible Systems Management.

APPENDIX

Table-2: Weightage of Critical Success Factors
### Critical Success Factors

<table>
<thead>
<tr>
<th>S.N</th>
<th>Critical Success Factors</th>
<th>Executives</th>
<th>AVE in %</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Top Management Support</td>
<td>100</td>
<td>90</td>
<td>90</td>
</tr>
<tr>
<td>2</td>
<td>Change management</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>3</td>
<td>Vendor support</td>
<td>90</td>
<td>100</td>
<td>90</td>
</tr>
<tr>
<td>4</td>
<td>User training and Education</td>
<td>95</td>
<td>95</td>
<td>95</td>
</tr>
<tr>
<td>5</td>
<td>Customization</td>
<td>95</td>
<td>90</td>
<td>95</td>
</tr>
<tr>
<td>6</td>
<td>Careful package selection</td>
<td>100</td>
<td>90</td>
<td>75</td>
</tr>
<tr>
<td>7</td>
<td>Project team competence</td>
<td>100</td>
<td>95</td>
<td>90</td>
</tr>
<tr>
<td>8</td>
<td>BPR</td>
<td>90</td>
<td>95</td>
<td>95</td>
</tr>
<tr>
<td>9</td>
<td>Use of consultants</td>
<td>80</td>
<td>75</td>
<td>85</td>
</tr>
<tr>
<td>10</td>
<td>Interdepartmental comm. and cooperation</td>
<td>85</td>
<td>90</td>
<td>100</td>
</tr>
</tbody>
</table>

**Fig. 4. Weightage of critical Success Factors**

**Fig. 5. Executive wise Importance of CSFs**