



# Analysis of Enterprise Resource Planning Implementation to Identify Critical Factors and Development of a Framework for its Success

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**Abstract:** Unlike advanced countries, organizations in developing markets face distinct challenges for standard ERP implementation. The less than appreciable internal and external environment potentially undermine the promising returns in developing world. A study that may thoroughly articulate critical issues and possible remedies in ERP implementation is clearly missing in Pakistan's case. Therefore, the present study aims to present a framework based critical success factors of ERP implementation that can optimistically help the corporate sector in Pakistan while confronting country specific issues. To obtain the expected framework of ERP implementation, the present study concludes based on semi-structured interviews that top level management commitment, change management, project management, vendor support, business process re-engineering, training and education are the major six focused areas while implementing ERP system. However, appear to be weakly associated with ERP success to gain success in ERP. The result extracted from the study is based on these important factors and has a valuable contribution for the ERP implementers.

**Keywords:** Critical Factor, ERP Implementation, Framework for Success

## 1. ERP SYSTEM: A NEED OF INDUSTRY

Many organizations invest huge amount of money to implement ERP system, supposedly it is expecting a positive impact on the organization and its functions. Organizational variables influence directly or indirectly the information system. Most of the studies inspected that system success is inefficient in small organizations as compare to large. If employees give proper time to an application, they can get more accurate results from system. Most of the studies found that individual has impact that influence them to enclose a wide range of intuitive measurements like courage in decisions made and problem solving, and the time acquire to get a decision.

information and processes that specify the departments of the firm and that is the one advantage of regularity. Well ERP system connect overall enterprise functions and operations and performing sections for all subsets, thus all subsets have connection with related knowledge as proceedings happened. When any organization employed ERP system, its accountability increases [1]. A positive attitude of individuals, senior management and other workforce towards the system is very important because if they believe that the system will be helpful they pay full attention to improve the system. ERP system increases the work efficiency of the organization. It saves time and eliminates errors automatically. Education/training is necessary to operate the ERP system.

Integration is the combination to collect

Top management support is necessary to

develop confidence, interest between workers who operate ERP system. Consultants and coordinator backing is an initiative calculate of the intensity of inspiration bring them and capable by a talented worker in allocating the information with other colleagues, guide them properly, employing solutions to work relevant issues, acceptance of communication, freedom for direct interactions and automated meetings to share and use information [2]. ERP system has many benefits to the organization where it is implemented. However, the first phase is to reduce the critical success factors of ERP implementation and to develop a framework for its success. This is neglected area particularly in Pakistan. No study was found where the framework was provided for the industry of Pakistan where ERP system has been implemented or it is in implementation phase. The present study aims to identify the critical success factors and develop a framework to reduce the rate of failure.

## **2. CRITICAL SUCCESS FACTORS OF ERP IMPLEMENTATION SUCCESS**

Yu (2005) [3] defined different stages of ERP system i.e., implementation pre-implementation, implementation, and post-implementation. Ifinedo, et al [4] argued that critical success factors are commonly involved in implementation and pre-implementation stage of ERP system while the result in term of performance is measured in post-implementation stage of ERP system. Critical success factors are the factors which become the reasons of successful implementation of ERP project [5].

ERP project specification, budget and time are the key proxies which have been commonly used to measure the implementation success of ERP project [6, 7] which means ERP is successfully implemented if the project is completed within the specification, budget and time. ERP project is very time taking, costly and complex and it has a high failure rate reported in the past studies due to over budget and time. A number of resources are required for its successful implementation [8]. Budget, time and ERP project scope are considered as the measures of ERP system/project implementation success in many studies.

Different studies reported different critical success factors for example Motwani, et al. [9]

applied case study approach and found that cultural readiness has a positive influence on the successful implementation of ERP project. Similarly, Ngai, et al. [10] selected 10 organizations and applied case study analysis. They reported that business plan, data management, appropriate business and IT legacy systems, ERP teamwork and composition, project management, change management, communication, culture and program, project champion, business process reengineering, monitoring and evaluation of performance, software development, top management support, organizational characteristics, testing, ERP vendor, ERP strategy, troubleshooting, fit between ERP and business process and implementation methodology are the critical success factors of ERP successful implementation. In the same lines, Nattawee & Siriluck (2008) [11] applied case study approach in 10 Thai SMEs. They found that competence and knowledge sharing, vendor support and user involvement are very influential factors for the successful implementation of the system. In Pakistani few studies identified critical success factors of ERP project e.g., Shah, et al. [12]; Shad, et al. [13]; Nelson & Somers [14]; Ijaz, et al. [5].

Ehie & Madsen [15] found that project management, feasibility and evaluation, consulting services, cost issues and business process reengineering are the most influential determinants of ERP project successful implementation. Yingjie [16] identified many critical success factors in the context of Finland industry these are: effective project management, user involvement, top management support, suitability of software and hardware, education and training, business process reengineering. Similarly, Fang & Patrencia [17] found that project team, top management support, BPR, Effective communication, change management have a significant influence on the successful implementation of ERP system. In the same lines, Shah, et al. [12] also explored technical and socio-technical factors influencing the ERP project success. Khattak, et al. [18] compared the critical success factors in both Pakistani and Chinese organizations.

## **3. RESEARCH METHODOLOGY**

The present study has employed survey research design to investigate the critical success factors and to develop the framework to reduce the failure of

ERP implementation. This study is qualitative in nature. In the first phase, extensive literature review has been conducted to identify the common critical success factors in the literature. After the effort total 87 critical success factors were identified. However, finally 60 factors were finalized with the comparison of the literature. These factors were divided into five major categories based on the expert opinion. The purpose was only to identify the failure reasons and develop a strategy to handle these critical factors.

Data was collected through semi-structured interviews of the representatives of the organization. Total 40 participants from twenty different organizations were participated in the interview sessions. Each interview comprises of 30 to 40 minutes recording. Convenience sampling was applied which is given preferences in qualitative research. Thematic analysis was employed on the qualitative data with the help of NVivo 10 software. The purpose was to identify different critical factors of ERP implementation success and to develop a framework to implement ERP system successfully. Tree maps, word clouds, tag clouds, word tree etc. are the different tools which are commonly used for the data analysis. The present study has applied tree map analysis and hierarchical of themes analysis.

## 4. FINDINGS OF THE STUDY

### 4.1 Tree Map Analysis

Tree map shows the significance/importance of each theme of the study just the  $\beta$  (beta) values in regression. In regression analysis those independent variables which have more  $\beta$  (beta) values means they have more influence on the dependent variable. In the same lines, tree map shows the colorful regions for different themes of the study i.e., critical success factors of ERP system implementation. Themes in the larger regions show more critical success factors while themes in the smaller regions are less critical success factors. Fig. 1 shows that effective planning, Training, motivate people, clarity in objective and good leadership is found to be more significant themes of the study.

### 4.2 Critical Factors for ERP System Implementation Success

All qualitative data was entered in NVivo software to apply thematic analysis to find out the key themes

of the study. Data coding was done after the critical reading of the statements of different people during their interviews. Initially 87 factors were identified. However, total 60 critical success factors were finalized with the support of the literature. These 60 critical success factors were categorized into 6 main categories, i.e., top level management commitment, change management, project management, training and education, vendor management and business process reengineering.

## 5. CONCLUSION AND RECOMMENDATIONS

Despite ERP implementation failures, as evident from the literature, such management policy has gained considerable weight in strategic intentions of organizations across the globe. This apparently yields conflicting realities about ERP significance. The present study aimed to present a framework based critical success factors of ERP implementation that can optimistically help the corporate sector in Pakistan while confronting country specific issues. With the empirical efforts, the following six categories of the critical success factors were identified:

1. Top Level Management Commitment: The study concludes that top level management commitment is the key factor while implementing ERP system. Top management decides the realistic time line for the EPR projects. The project can be sustained with the support and involvement of top management. In the same lines, the ERP project implementation can be ensured within the specific period without any delay. If management is committed, they also empowered their lower management to take the immediate decisions based on the best information. They identified the key end users and assigned them the key role and responsibilities which leads to the successful implementation of ERP project. Top management's ownership also leads to implement better technological infrastructure for ERP project implementation they also provide sufficient funds for the technology and the people. They pay high rewards to the team involved in ERP project implementation. Ultimately, the project can be aligned with the key business processes and fulfill the need of the business.



**Table 1.** Critical Factors for the implementation of ERP System

S. No.	Themes Extracted	S. No.	Themes Extracted
1	Time Line	31	Competency of the Vendors
2	Understanding of Business Processes	32	Continuous Monitoring of Progress
3	Understanding of Key Requirements	33	Setting Data Collection Strategy
4	Top Management Involvement	34	Readiness to change
5	Effective Training Sessions	35	Project Ownership
6	Effective Training Material	36	Avoid the Early Retirement
7	Clear Scope	37	Volunteers Committee Composition
8	Change Management Strategy	38	Defining Job Description
9	Motivating Teams	39	Interdepartmental Coordination
10	Top Management Support	40	Module integration issue handling
11	Skillful personnel	41	Remove Fear
12	Continuous Improvement	42	Sharing of Benefits regarding Job Safety
13	Risk Management	43	Quick implementation and release
14	Time Management	44	Effective financial Management plan
15	Involvement of Power Users	45	Evaluation of Vendors
16	Vendor Support	46	Stability of employees
17	Domain Expert Committee	47	Alignment between IT and Business Strategies
18	Identification of Master Trainers	48	Strategic Fit between system and business
19	Management Persuasions	49	Sufficient Financial Resources
20	Effective Project Management Team	50	Optimal Utilization of Business Processes
21	Continuous Testing	51	Strong IT Infrastructure
22	Strategy for Integration Issues	52	User Acceptance Testing
23	Setting of KPIs	53	Stability in Job Postings
24	Clear Vision	54	Maintenance of Daily Activity Log
25	Inter-team cooperation	55	Quick Decision Making
26	User Support	56	Sharing Proposed Benefits of the System
27	Effective Planning and Documentation	57	Standard of the Project
28	Project Management Effectiveness	58	Good Relationship Building
29	Setting Task Prioritization	59	Vender Partnership
30	Effective Communication	60	Trust Building

2. Project Management: The study also concludes that ERP project is very complex project. The clear scope, defined objectives, timelines, resources, and cost are the key areas of planning the ERP project implementation. There are different phases of ERP project. The first thing is to develop a competent team who will be responsible for ERP project planning and execution. The team should have employees from the cross functional areas including

ERP consultants and internal staff members. In the beginning, clear and realistic milestone and end-dates should be decided. After the execution of the project monitoring is very important element found in this study. With the help of monitoring, daily logs, meetings and follow up, delays can be reduced. Role of project management is also very critical.

3. Change Management: The present study also

found that the change management is the key factor which influences the successful implementation of ERP system. Change has different levels in the organization, e.g., individual level change, group level change and organizational change. Creating a knowledge sharing culture encourage the employees to learn the new system of ERP. In the same lines, reducing fear of the use of ERP system and fear regarding their jobs and authority can be reduced with the effective change management at the individual level. Similarly, the group level change in the departments is very critical. After the implementation of ERP system all departments should work jointly because the output of one department becomes the input for another department. Therefore, all groups should change their existing behavior within the department and across the organization and leadership play a very important role for bringing the change in the departments.

4. **Business Process Reengineering:** Business process reengineering is another critical success factor found in this study. Alignment of ERP system with the legacy system of the organization is very important. Therefore, organizations must change their existing processes as per need of the ERP system. On the other side, minimal customization in the ERP system according to the need of the organization is also critical. Organizations should adjust the process according to the system and vice versa. Therefore, involvement of the domain expert having both business and technical knowledge about the information system is very important. These experts must test the user acceptance and alignment of the processes with the system to ensure the successful implementation of ERP system.
5. **Training and Education:** Training and education is also very critical factor of ERP implementation in Pakistani industry. Companies should arrange formal and effective training sessions for the end user relating to the business processes, documentations, dealing with the data on ERP system. Organizations should arrange the right master trainer and trainees with the right training material and training environment. Hands-on-practical training is very essential to learn the usage of ERP system to save their time and resources. Effective training ultimately build trust between employees and employer and reduce the maximum level of fear of working on entirely new information system.
6. **Vendor Management:** In the present study vendor/consultant management is very critical factor of ERP implementation success. Selection of the right and experienced vendor/consultant is very important step in the beginning which has ultimately a chain effect throughout the implementation phases of ERP system. They play an important role in adequate development, configuration, and testing of the completion information system. Moreover, organizations should select and manage the vendors who have multiple skills e.g., functional, technical, and interpersonal.

## 6. REFERENCES

1. Gattiker, T. F., & Goodhue, D. L. Understanding the local-level costs and benefits of ERP through organizational information processing theory. *Information & Management* 41(4): 431-443 (2004).
2. Kulkarni, U. R., Ravindran, S., & Freeze, R. A knowledge management success model: theoretical development and empirical validation. *Journal of management information systems* 23(3): 309-347 (2007).
3. Yu, C. S. Causes influencing the effectiveness of the post-implementation ERP system. *Industrial Management & Data Systems* 105(1): 115-132 (2005).
4. Ifinedo, P., B. Rapp, A. Ifinedo, & K. Sundberg. Relationships among ERP post-implementation success constructs: An analysis at the organizational level. *Computers in Human Behavior* 26(5): 1136-1148 (2010).
5. Ijaz, A., Lodhi, R. N., & Irfan, S. Critical Success and Failure Factors of ERP System: A Case Study of an Electric Supply Company of Pakistan. *10th Asian Academy of Management International Conference 2013 (AAM 2013): Malaysia (2013).*
6. Sun, A. Y., Yazdani, A., & Overend, J. D. Achievement assessment for enterprise resource planning (ERP) system implementations based on critical success factors (CSFs). *International Journal of Production Economics* 98(2): 189-203 (2005).
7. Khattak, M. A. O., Yuanguan, S., Irfan, M., Khattak,

- R. A., & Khattak, M. S. M. Examining critical success factors affecting ERP implementations in enterprises of Pakistan. *Interdisciplinary Journal of Contemporary Research in Business* 3(10): 606 (2012).
8. Saatcioglu, O. What determines user satisfaction in ERP projects: benefits, barriers or risks? *Journal of Enterprise Information Management* 22(6): 690-708 (2009).
  9. Motwani, J., Subramanian, R., & Gopalakrishna, P. Critical factors for successful ERP implementation: Exploratory findings from four case studies. *Computers in Industry* 56 (6): 529-544 (2005).
  10. Ngai, E.W.T., Law, C.C.H., Wat, F.K.T. Examining the critical success factors in the adoption of enterprise resource planning. *Computers in Industry* 59 (6): 548–564 (2008).
  11. Nattawee, A., & Siriluck, R. Developing ERP Implementation success factors of Thai SME's. *GMSARN International Conference on Sustainable Development: Issues and Prospects for the GMS* 12-14 (2008).
  12. Shah, S. I. H., Khan, A. Z., Bokhari, R. H., & Raza, M. A. Exploring the impediments of successful ERP implementation: A case study in a public organization. *International Journal of Business and Social Science* 2(22): 289-296 (2011).
  13. Shad, S. A., Chen, E., & Malik, F. Enterprise Resource Planning- Real Blessing or a blessing in Disguise: An Exploration of the Contextual Factors in Public Sector. Retrieved from <http://arxiv.org/ftp/arxiv/papers/1207/1207.2860.pdf> (2012).
  14. Nelson, K., & Somers, T. Exploring ERP success from an end-user perspective. *AMCIS 2001 Proceedings* 206 (2001).
  15. Ehie, I.C., & Madsen, M. Identifying critical issues in enterprise resource planning (ERP) implementation. *Computers in Industry* 56 (6): 545–557 (2005).
  16. Yingjie, J. Critical success factors in ERP implementation in Finland. *The Swedish School of Economics and Business Administration* 71 (2005).
  17. Fang, L., & Patrecia. Critical Success Factors in ERP Implementation. *Jönköping International Business School, Jönköping University, Sweden* (2009).
  18. Khattak, M. A. O., She, Y., Memon, Z. A., Syed, N., Hussain, S., & Irfan, M. Investigating Critical Success Factors Affecting ERP Implementation in Chinese and Pakistani Enterprises. *International Journal of Enterprise Information Systems* 9(3): 39-76 (2013).

