The Role of Enterprise Resource Planning and its Critical Success Factors in IT Issues and its Challenges in Management

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Abstract—**Enterprise Resource Planning is integrated software IT solutions provider and is also a business management software system. There are few IT issues as far as this ERP is concerned. These issues are coined as barriers or critical success factors in the light of ERP implementation in Indian Industries. This paper helps to resolve these IT issues concerned with ERP system in Indian context. Also, there are few challenges in management as far as this ERP system implementation is concerned.**

Enterprise Resource Planning is integrated software IT solutions provider and is also a business management software system. There are few IT issues as far as this ERP is concerned. These issues are coined as barriers or critical success factors in the light of ERP implementation in Indian Industries. This paper helps to resolve these IT issues concerned with ERP system in Indian context. Also, there are few challenges in management as far as this ERP system implementation is concerned.

The results and findings of this paper envisage the omission of few factors or barriers which are not used for effective implementation of the ERP system in Indian Industries.

Index Terms— **Enterprise Resource Planning (ERP), critical success factors (CSFs), ERP implementation, Indian Industries.**

I. INTRODUCTION

ERP systems' invention dates back to 1990s. This system covers entire facets of all types of industry functions for all the disciplines. These functions may be management and manufacturing related in various industries. While dealing with these functions by the ERP system, there is ought to be certain issues involved and in doing so, there are certain challenges in management of that particular industry.

Thus, the role of Enterprise Resource Planning and its critical success factors in IT Issues and its challenges in Management are dealt entirely about IT system in every industry. Therefore, this is definitely a challenge to the management of that respective industry.

The brief about the ERP system is that it is completely integrated software system which is used in IT industry and for various business functions which are taken care by management. This ERP system has total 35 different modules and this system has 6 different software packages. The various modules of ERP system include the following list. To name a few, they are –

Production Planning, Sales and Distribution, Inventory Control, Purchasing, Logistics, Marketing, Stores, Warehousing system, Accounting, Finance, Materials Management, Quality Control, Inspection, Manufacturing and Sales.

To name a few, the various ERP software packages include – SAP R/3, Baan, Oracle, J D Edwards, PeopleSoft, Any Customized Software. Thus, for all the above various functions, this ERP system is very much useful with the help of given software provided. But, in doing so, there are certain issues involved during the implementation of this system. They are termed as barriers or critical success factors in management parlors.

According to the literature studied, these CSFs are mentioned as below in the following table I.

TABLE-I: SUMMARY OF MOST PROMINENT CRITICAL SUCCESS FACTORS FOR THE EFFECTIVE IMPLEMENTATION OF ERP SYSTEM

Critical Success Factors CSFs	Sub factors of CSFs	Author's Name and Year of Publication
Project management	Effective Project Team, Project Planning and Preparation, Selection of Implementation Partner / Consultant	Mary Sumner 2000, H Akkermans et al.2002, Elisabeth J. Umble et al. 2003, Liang Zang et al.,2003, Weston (2003), Fiona Fui-Hoon Nah et al. 2003, Kim et al. (2005), Mary Sumner, Robert Plant et al. 2007, Robert Plant et al. 2007, Sherry Finney et al 2007, Ngai et al 2008, Wui-Gee Tan et al.,2009,
Top management support	Top Management Support –commitment Post Implementation Evaluation External and Internal Problems (Issues)	Fiona Mary Sumner 2000, Toni M. Somers et al. 2001, H Akkermans et al.2002, Elisabeth J. Umble et al. 2003, Fui-Hoon Nah et al 2003, Fui- Hoon Nah et al 2003, Liang Zang et al.,2003, Toni M. Somers et al. 2004, T.R. Bhatti 2005, Somers et al. 2004, T.R. Bhatti 2005, Sherry Finney et al 2007, Ngai et al. 2008, Wui-Gee Tan et al., 2009.
Change management	Organizational change Shift from Legacy system to ERP system	R.Appuswamy 2000, Toni M. Somers et al. 2001, Nah et al. (2001), Fiona Fui-Hoon Nah et al 2003, Elisabeth J. Umble et al. 2003, Vinod Kumar et al.,2003, Toni M. Somers et al. 2004, T.R. Bhatti 2005, Zafar U.Ahmed et al. 2006, Robert Plant et al. 2007, Ngai et al 2008,
Technology factors	Customization Data management efficacy IT Infrastructure / IT Project / Phobia to change System testing	Toni M. Somers et al. 2001, Robert Plant et al.2007, Toni M. Somers et al. 2001, Elisabeth J. Umble et al. 2003, Liang Zang et al.,2003, Toni M. Somers et al. 2004, Thomas F. Gattiker et al 2005,Sherry Finney et al 2007, Ngai et al. 2008, Wui-Gee Tan et al.,2009, Fiona Fui-Hoon Nah et al 2003, Vinod Kumar et al.,2003,Sherry Finney et al 2007, Fiona Fui-Hoon Nah et al 2003, Sherry Finney et al 2007,
Cultural factors	Organizational Culture/ National Culture/ Managing cultural change	(Kumar and Bjorn-Anderson, 1990), (Walsham, 2002), Carmel (1997), (Davison, 2002; Soh et al., Al- Mashari et al. (2003), 2000), (Liang et al., 2004), H. Liang, Y. Xue (2004), E.L. Wagner, S. Newell (2004), H.R. Yen, C. Sheu (2004), Guo Chao Peng (2006), Amin Hakim, , Hamid Hakim (2010), S.C.L. Koh et al. (2011)
Human factors	Human Resources Planning (HR Planning) Training Communication	Toni M. Somers et. al.2001,Robert Plant et al. 2007, Appuswamy 2000, Mary Sumner Toni M. Somers et al. 2001,Elisabeth J. Umble et al.2003, Liang Zang et al.,2003, Vinod Kumar et al.,2003, Toni M. Somers et al. 2004, T.R. Bhatti 2005, Sherry Finney et al. 2007, Mary Sumner 2000, Toni M. Somers et al. 2001, H Akkermans et al.2002, Fiona Fui-Hoon Nah et al 2003, Toni M. Somers et al. 2004, Sherry Finney et al. 2007, Ngai et al 2008,

98

TABLE II. CANDIDATE FACTORS IDENTIFIED

S.N.	Candidate factors identified	Abbreviation
1	Project Management	PM
2	Top Management Support	TMS
3	Technology Factors	TFs
4	Human Factors	HFs

A. Motivation for Research

Companies today face the challenge of increasing competition, expanding markets, and rising customer expectations. The business environment is dramatically changing in today's competitive market. Organizations must improve their own business practices and procedures since the business world moves closer to a completely collaborative model and competitors upgrade their capabilities to remain competitive.

Companies should increasingly share with their distributors, suppliers and customer; the critical in-house protected information. Functions should upgrade their capability to generate and communicate timely and accurate information within the company. To achieve these objectives, companies are increasingly turning to enterprise resource planning (ERP) systems. ERP can be used not only in manufacturing industries, but in any industry that wants to enhance competitiveness by most effectively using all its assets, including information. The benefits of ERP systems include coordinating processes and information, reducing carrying costs, decreasing cycle time, and improving responsiveness to customer needs. These things helped to motivate the researcher to go for research study in the area of enterprise resource planning system.

II. RESEARCH METHODOLOGY

The objective of the research methodology is mentioned as under.

A. Objectives of the Work

- To investigate or identify the factors or barriers which are used for effective implementation of ERP system in manufacturing Indian Industries through rigorous Literature Survey.
- To investigate or identify the factors or barriers which are used for effective implementation of ERP system in manufacturing Indian Industries through selective firms.
- To compare these above 1 & 2 CSFs, selecting the common ones.
- List out the candidate factors from the two.
- To prepare the survey questionnaire based on the selected (common) factors.
- Go for pilot study from few (selective) industries.
- Restricting the survey for one sector only.
- Come out with pilot study results by SPSS.
- Take the review of Pilot Study Questionnaire stating the required changes in the respective questionnaire for the particular question to be added or deleted or any change(s) is to be incorporated.
- Update the final questionnaire stating the changes envisaged by pilot study.
- Now, send this final questionnaire to a larger samples of the manufacturing industries of large and medium scale thru' Google form.
- Sending reminders' to those who has not responded.
- While sending the Google form questionnaire, codification for the questions to be done.
- Check the total responses for further data analysis.
- Download all the responses and check if any insufficient data or incomplete form is there or not. If it is there, delete those response(s).
- Prepare Excel sheet of the valid responses for further analysis.
- Feed the entire data set in SPSS 25 software for preliminary analysis, Factor analysis.
- Check for factor extraction, validity etc.
- Apply AMOS 25 Software for measurement of the CFA (Confirmatory Factor Analysis) for the selected factors.
- To generate a better model for minimizing the barriers (CSFs).

99

B. The main objective of implementing ERP in Industries

64.7% of the industries have the main objective to be competitive in the market, 17.6% of the industries have the objective to meet customer needs and only 5.9% of the industries want to gain more profits through ERP. 11.8% of the industries have their other objectives for implementing ERP in their organization like better control overstocks and to optimize business processes.

94% of the industries have allocated fixed budget for ERP's implementation and 6% industries responded that they have not assigned any fixed amount to the implementation of ERP in their organization.

94% of the industries have hired consultant for ERP's implementation and 6% industries responded that they have not hired consultant to implement ERP and responded that they have designed their own ERP system which suits the best to their business processes.

Most of the industries i.e. 77% of the industries haven't face problem of over budgeting and 23% of the industries have to spend more money as they initially decided to use up.

94% of the industries have full support from top management till the last phase of ERP implementation. Only 6% of the industries have lost the support from top management in middle way of ERP project.

Maximum industries viz. 53% achieved their expected targets in the range of 80-100%. 17.6% of the companies achieved 60-80% and 23.5% of the industries achieved 40-60% of the expected targets respectively. 5.9% of the industries achieved about 20-40% of their predefined targets with ERP.

The result shows in almost every industry primary users were remained supportive during the whole process of ERP implementation. 82% of the industries have full support from primary users till the last phase of ERP implementation and 18% of the industries have no or little support from primary users, so they have to face problems during the process of ERP implementation.

100% of the industries agreed with the availability of information with ERP. 64.7% percentage of the industries strongly agrees that they get up-to-date information and also on time. The rest 35.3% of the industries agreed that they also get up-to-date information whenever needed.

53% of the industries found difficulties in the implementation (Testing and Go-Live) phase. So, implementation is the most important phase of ERP implementation and it has to be implemented with utmost care.

C. Tools and Techniques used for Analysis of Data

CFA (Confirmatory Factor Analysis) and AMOS model for the study is developed using SPSS 25 & AMOS 25 Version software.

D. SEM (Structural Equation Modeling)

SEM is a second-generation multivariate technique that combines multiple regressions with confirmatory factor analysis to estimate simultaneously a series of interrelationship between the constructs of the hypothesized model. Basically SEM has two components: the measurement model and the structural model. According to Doloiet al. (2011), the measurement model is concerned with relationships between latent variables and observed variables, aims to provide reliability and validity based on these variables. The structural model studies path strength and the direction of the relationships among the latent variables. In other words, the measurement model within the structural equation incorporates estimates of measurement errors of the exogenous variables and their intended latent variable (Green, 1990).

III. RESEARCH HYPOTHESES

- **H1.** More the effective project management used more will be the effective implementation of ERP system in industry.
- **H2.** Better the Top Management support more will be the effective implementation of ERP system in industry.
- **H3.** The correct Change Management strategy will lead to effective implementation of ERP system in industry.
- **H4.** Choosing correct Technology Factors will lead to effective implementation of ERP system in industry.
- **H5.** Proper cultural factors will lead to effective implementation of ERP system in industry.
- **H6.** Right Human factors will lead to effective implementation of ERP system in industry.

All the above six hypotheses are true when the following conditions are fulfilled.

H1. Project management related items are positively affecting the effective implementation of ERP.

H2. Top management commitment related items are positively affecting the effective implementation of ERP system. **H3**. Change management related items are positively affecting the effective implementation of ERP. **H4**. Technology factors related items are positively affecting the effective implementation of ERP. **H5**. Cultural factors related items are positively affecting the effective implementation of ERP system. **H6**. Human factors related items are positively affecting the effective implementation of ERPsystem.

These hypotheses are checked empirically based on data collection from manufacturing industries like project sponsors, project managers, implementation consultants, team members, Vice President and General Manager who were involved in ERP implementation in manufacturing sector.
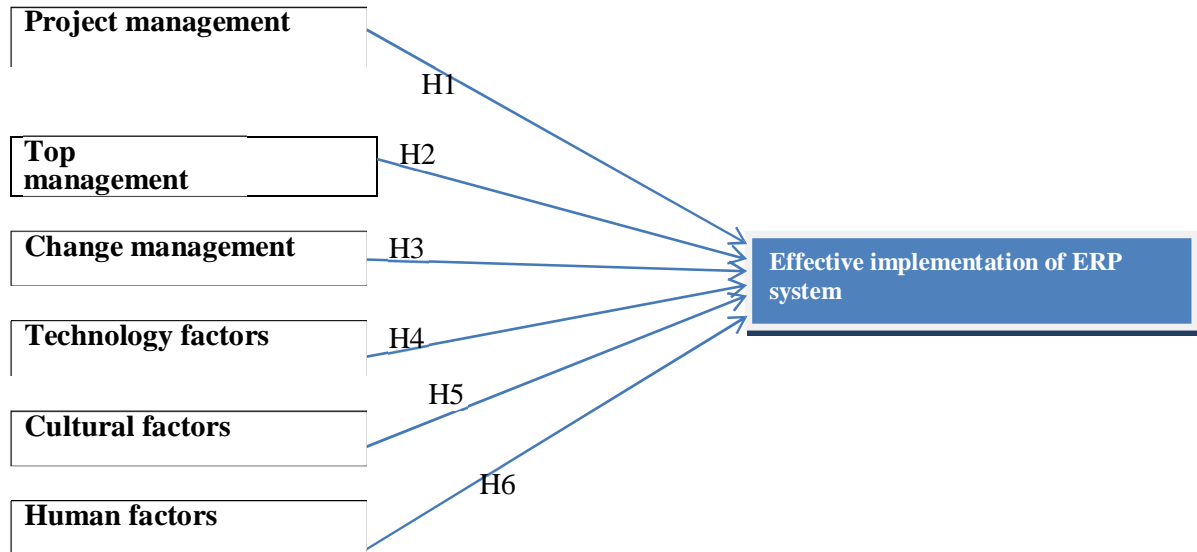

Figure 1: Conceptual Model

IV. RESULTS AND ANALYSIS

TABLE III. RELIABILITY AND VALIDITY STATISTICS FOR THE QUESTIONNAIRE ITEMS

Factors	Average Variance Extracted (AVE)	Composite Reliability	Cronbach's Alpha
Project management	.872	O.874	0.895
Top management support	.860	O.876	0.896
Change management	.938	O.875	0.894
Technology factors	.732	O.877	0.892
Cultural factors	.733	O.878	0.893
Human factors	.835	O.879	0.896

TABLE IV. SUMMARY OF THE RESULTS

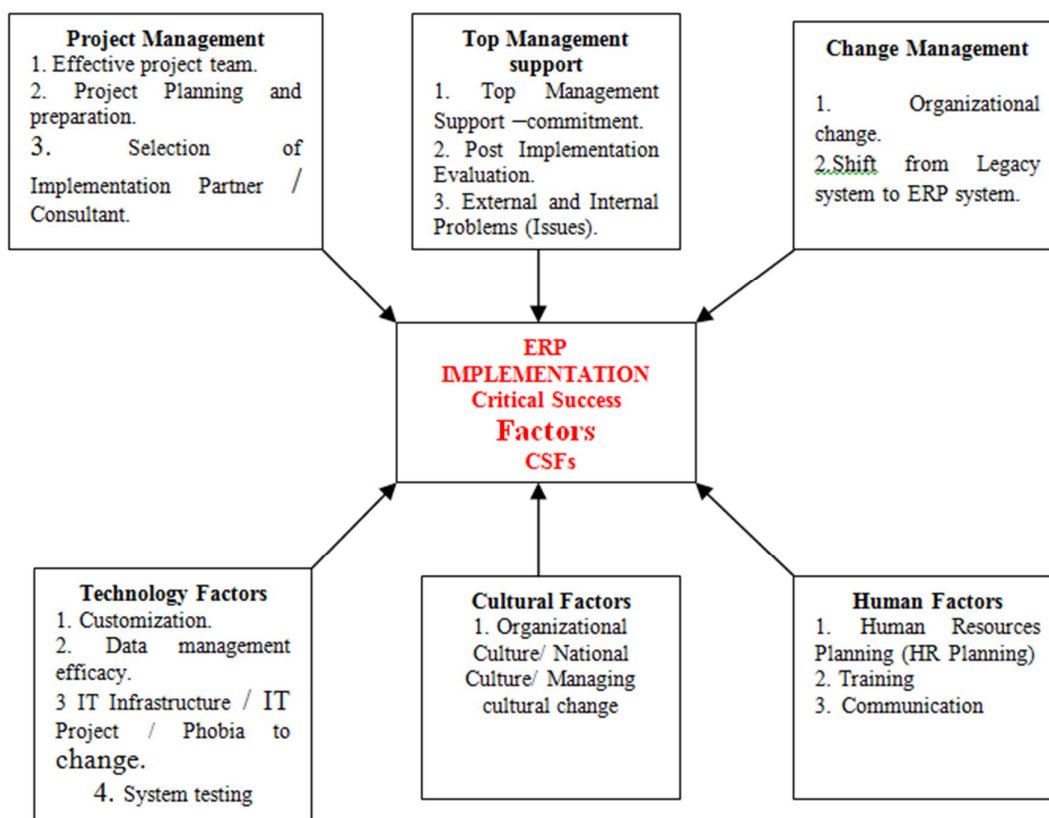| Hypotheses	Causal path	Path Coefficient	t-value (T)	Remarks
H1	1 2	.822	.932	Supported
H2	2 3	.825	.952	Supported
H3	3 4	.753	.169	**Not Supported**
H4	4 5	.858	.613	Supported
H5	5 6	.797	.613	Supported
H6	6 1	.817	1.812	**Not Supported**

101

Figure 2: Research Model

V. DATA ANALYSIS

There are total 208 samples taken respondents' wise, out of 350 manufacturing industries approached. Thus, the response rate is 59.42 %. The data analysis or the results by SPSS of the following four factors is shown in the tabular form as below. The analysis indicates that the two factors viz. Change management and Human factors are minimized because of its 't' results in the previous table.

Particulars	PM	TMS	TFs	CFs
Cronbach's Alpha	0.895	0.896	0.892	0.893
Mean	1.71	1.95	1.96	2.27
Median	1.00	2.00	2.00	2.00
Mode	1	2	2	2
Standard Deviation	.934	.927	.856	.856
Variance	.872	.860	.732	.733
R	.822	.825	.858	.797
R Square	.676	.680	.736	.635
F Test	27.957	37.594	9.486	17.981
ANOVA	SS 75.640	SS 82.949	SS 63.992	SS 54.257
Eigen Value	.705	.692	.430	.348
Chi-Square	94.752[a]	86.175[b]	84.991[d]	90.306[d]
t (T)	.932	.952	.613	.613

102

From the above given table, the Change Management (CM) and Human Factors (HFs) these two factors are omitted owing to their minimal results. Thus, we have above statistics.

VI. CONCLUSIONS AND LIMITATIONS

This study has intended to examine the factors that affect the success of ERP implementation in Indian manufacturing industries. This paper also analyzes the interrelationship between the factor and their impact on the successful implementation of ERP using the SEM approach. This research presents several interesting findings. First of all, this study has contributed to academic research by producing the empirical evidence to support the theories of affecting factor and ERP implementation success. The research has empirically verified that project management, top management support, change management, technology factors, cultural factors and human factors are positively affecting the success of ERP implementation. Second, the results are largely consistent with prior studies conducted in other developed countries.

Limitations

- Despite the useful findings of this empirical study, it has some limitations that need to be studied:
- The study is using perceptual data provided by like project sponsors, project managers, implementation consultants, team members, General Manager and Vice President who were involved in ERP implementation in manufacturing sector, which may not provide clear measures of performance. However, this can be overcome using multiple methods to collect data in future studies.
- The finding of this study may not be generalized for other geographical areas.
- Although one has already considered widely accepted factors taken from literature which may affect the ERP implementation in Indian context, there may be possibility that there are some more factors which are less important were not included in this research.

FUTURE SCOPE

There is always a great scope ahead for the further work to be carried out in other sectors' of the industries in India and abroad as far as this role of Enterprise Resource Planning in IT Issues and its challenges is concerned.

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