International Journal of Applied Engineering Research ISSN 0973-4562 Volume 10, Number 17 (2015) pp 37592-37594

Cluster based quantification to identify significant ERP critical failure factors.

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Abstract
Now a days ERP implementation is on a verge of progress. With ERP many organizational decisions can be taken with less time and cost. ERP implementation is tedious task and it involves various hurdles and those hurdles are known as challenges and when the challenges with the utmost priority are targeted then the ERP implementation can be done successfully.
The challenges are termed as the critical success factors (CSF).These is the managerial activities which a business needs to perform in order to achieve success in business. To identify CSFs a business needs to conduct a detailed study in its business processes. In organization it is very important to get the employees involved from all the different divisions of the organisation as they are the one who knows critical problem accurately.
The research paper focuses to quantify the significant challenges which are reoccurring in the organisation while implementing The challenges are identified from several research papers indexed in IEEE, ACM, Springer etc.
Clustering based technique is proposed which extracts major failure factors amongst several by forward feature selection and experts' knowledge. It reduces time, efforts and resources. Outcomes of cluster quality is used as decision support for attacking on the topmost failure factors of ERP implementation and clustering on complete data set for effective decision support. The data set used is related to top 12 research papers focusing on barriers of ERP implementation.

Keywords: Challenges, scale, optimal, entropy, purity, clustering

Introduction

Successful implementation of ERP will help the organization to achieve its goals and objectives with less time and cost. It helps in better analysis and planning capabilities which means when the inputs are provided to ERP software, it gives output which is useful for managers to take managerial decisions which will help organizational growth. With ERP, suppliers and customers can communicate online and discuss quotations and can receive feedback from customers also if there is an upgrade in technology then ERP can easily adapt to those changes.
ERP offers integration of modules by combining all the modules or departments as the departments are separate, so ERP offers IT based solution in form of merging, making it efficient and simple, and bringing it under control.
But most of the organization today is not so prone to install ERP software in their organization because it includes various pitfalls. It is very necessary to focus on the challenges so that ERP implementation can be done accurately as when the priority challenges are targeted which will lead to successful implementation of ERP. and if companies install ERP their all the data will be stored in a single repository which will help all other departments to access the data without any hurdles.
To get topmost barriers to have successful ERP implementation, a clustering based approach is proposed in which cluster accuracy is used as an indicator to select the set of features. K-means and hierarchical algorithm are selected toconfirm optimal factors. The selection criteria are entropy, purity and Sum of Mean Square Error (SMSE).
Considering critical failure points, top 30 research papers are analyzed out with respect to challenges they are focusing [1]
We have designed a questionnaire which contains 44 questions representing challenges in the research paper and a measure is allocated for each of the question
So Question weight is calculated according to the challenges focused in the research paper. Each research paper is evaluated based on challenges and distance matrix is formed.
Research paper represents rows and challenges represents a column.Hierarchical and K-means algorithms are applied for different combination of challenges known as features by considering expert's advice and forward feature selection method [7, 12]. The selection criteria are based upon minimum entropy, maximum purity, minimum SMSE is selected. Finally 15 challenges were selected from 44.

Background

The authors focus on the various problems and barriers that occur while implementing ERP (Enterprise Research Planning). In the survey 200 literature papers were taken into consideration and 51 papers were studied in depth to have proper knowledge of the barriers.
The methodology that is being used to find out challenges in ERP implantation is APH (Analytical Hierarchy Process), through this they have found weights and consistency to have consistency ration (C.R)

Various challenges that are found are as follows:

- huge amount of funds are required
- strategic goals are not communicated properly
- planning is not done properly
- lack of good vendor
- implementation team is not selected properly
- adequate training is not given to employees
- failure in technical support

- effective approach
- upcoming challenges not taken into consideration
- Management support is not there.

Hence it is concluded that if a company focuses on the major challenges then the other small challenges would also be fixed, and ERP implementation can be done successfully. And company can earn profit with ERP outputs. [20]
In this paper interview and field work was taken on issues and challenges of ERP implementation on SME's (Small Medium Enterprises). Under this both personal interview and observation methods are used.
From the paper it is found that re-engineering, top management support, funds requirement, improper training to employees, time of implementation are the critical issues that occur while implementing ERP. An interview was conducted and that was for about 2 hours and results were found that while implementing new phase in organisation it is difficult to transfer data from old system.

And to overcome these issues 3 strategies were implemented:

- pre-implementation
- implementation
- post-implementation

It is concluded that employees on interview recalled their past experience and it six challenges were found and for that 3 strategies were found which would help to implement ERP successfully. [21]
The authors discuss about the use of SAP/ERP/CRM/LMS (System Application program/Enterprise Resource Planning/Customer Relation Management/Learning Management System) utilities for large and small business and their implementation issues. Further the paper is describing about the role of ERP-CRM in respect to the traditional business for overcoming of the existing challenges. Implementing ERP and CRM in an organization is one of the challenging tasks and for that one need expert people, and resources, and for this a well-trained expert is required to work in this domain. While implementing ERP they face many challenges they are as follow.

1. Non availability of resources
2. Resistant staff
3. ERP expertise are not much/ less business knowledge
4. Limited project resources
5. Limitation over costing
6. Less support from the executives
7. Difficult to change
8. Difficult to find experts in the same domain

Hence the paper has looked upon all the challenges and also how to overcome them for the implementation of ERP and CRM in traditional business environment. It shows these types of software are so important for any organization because CRM is used widely for automation and computerization which is far better than the manual work. So in the last it has concluded that as ERP system is new no one is prone to this new system so for the benefit of the organization one should look upon how to reduce the existing challenges and for that efficient experts should be given to the employees of the organization and training should be given for the same. [22]
Generally collected data contains irrelevant or redundant attributes. Classification and clustering do not give accurate result if there are interdependent attributes. Correct feature selection is a fundamental data pre-processing step in data mining. Feature Mine algorithm contains sequence mining and classification algorithms which efficiently handles very large data sets with thousands of items and millions of records.[4] Edie Rasmussen states Cluster analysis is a technique which assigns items to groups based on a calculation of the degree of association between items and groups. Cluster analysis can be used for hierarchical algorithm. Nested data set is produced in which pairs of items or clusters are connected successively. However, the hierarchical methods are better information retrieval. The commonly used hierarchical methods, such as single link, complete link, group average link, and Ward's method, have high space and time requirements. In order to cluster the large data sets with high dimensionality there is need to have a better algorithm Examples are the minimal spanning tree algorithms for the single link method, the Voorhees algorithm for group average link, and the reciprocal nearest neighbour algorithm for Ward's method. Edie listed steps of clustering including Selecting of the attributes on which items are to be clustered, selecting appropriate clustering method, Creating the clusters or cluster hierarchies, interpreting clusters and validating the results etc.[5]They have focused on feature selection algorithms for classification(knowing class label) and clustering (unsupervised feature selection) where data is unlabeled. Feature selection algorithms designed with different evaluation criteria broadly fall into three categories: the filter model, the wrapper model and the hybrid model. [6]

Data Collection

Data is collected from 30 research papers. Each Challenge has a measure associated with it K-means [5] plot was obtained for above matrix. Cost represents X-axis and time represents Y axis. Hierarchical algorithm [5] was applied on entire data and dendrogram was obtained.

Selection of Optimal factors

K-means and hierarchical algorithms are applied on domain specific enhanced factors by forward Feature selection. Approach. [7]. Graph A, B represents dendrogram produced by hierarchical algorithm using Euclidean distance for research papersGraph C, D represents k- means plot for research paperswith cost and time respectively.
We can easily detect optimal factors from Table A, having minimum SMSE and entropy also with maximum purity. From 44 challenges 13 are selected.

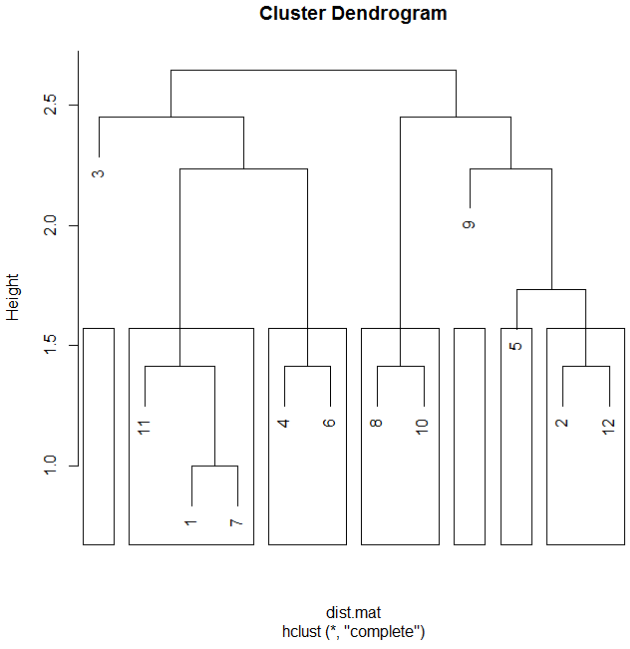
Table A: Optimal challenges

Number of challenges	SMSE (sum mean square error)	entropy	purity
5	37.5	0.53421	0.69874
7	41.1	0.68761	0.54311
15	**10.1**	**0.15412**	**0.75132**
25	25.4	0.56731	0.52311
31	>40	0.75431	0.21348

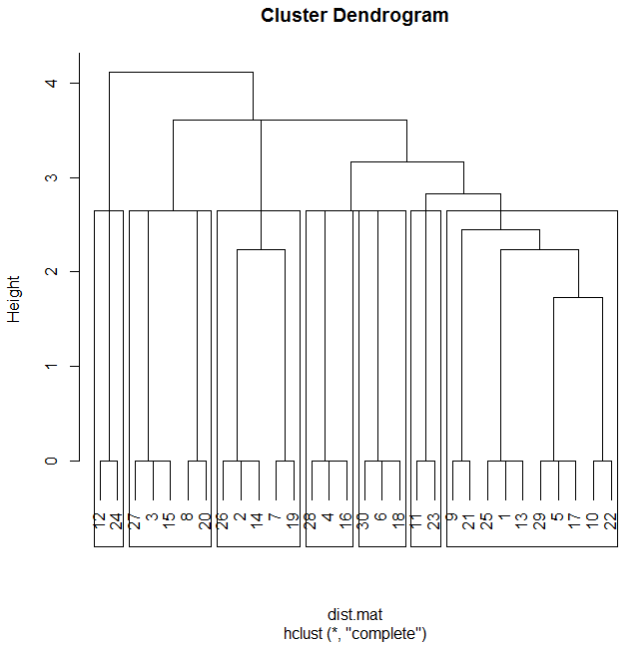
Table B represents the selected challenges.

Table B:

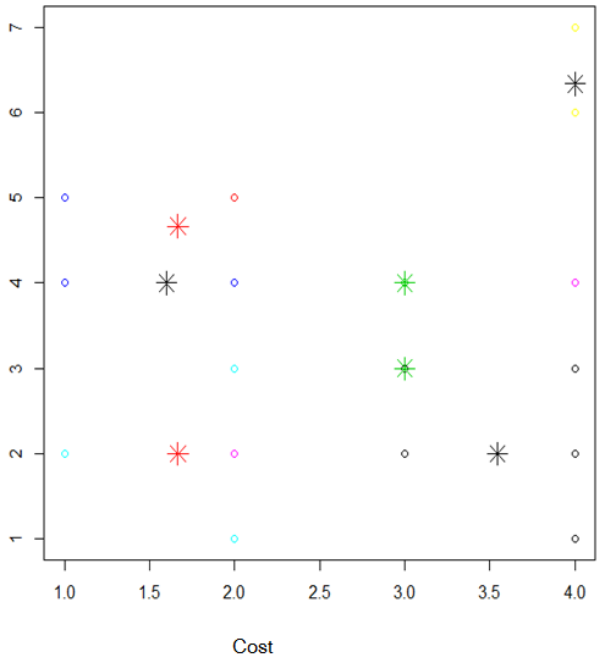
1.	Hardware
2.	Resistant staff / employees buy in
3.	Integration
4.	Lack of software acquisition processed complexities
5.	lack of good vendor
6.	adequate training is not given
7.	time consuming
8.	allocation of resources
9.	strategic planning
10.	Huge amount of funds are required
11.	Data collection
12.	Organizational Culture
13.	Proper approach is not done toward implementation



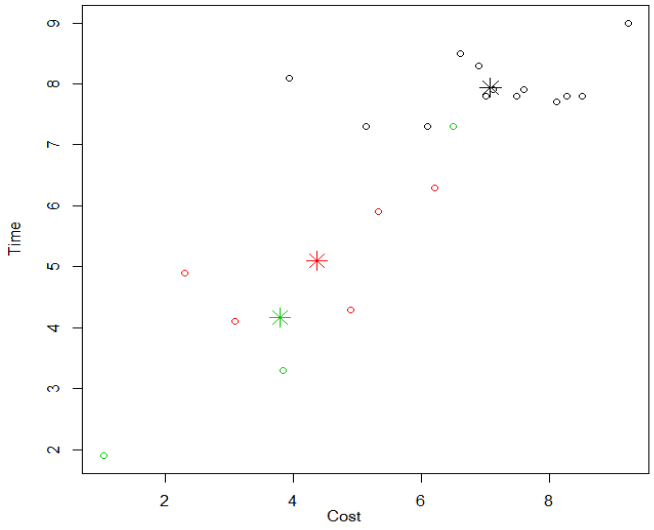
Graph A: Dendrogram for 12 research papers



GraphB: Dendrogram for 20 research papers



Graph C: Kmeans plot 12 X10



Graph D:Kmeans for 20 X1 15:

Conclusion:

Successful ERP implementation is steep chased by challenges. The proposed approach quantifies the challenges according to the weightage given to them in research papers. It aims at attacking on few topmost challenges amongst large. Thus It reduces time and cost. Moreover, the research papers gets categorised according to the challenges that they focus.

References

1. Prafulla Bafna, Shailaja Shirwaikar, Human Computer Interaction-paradigms, process, practices, Advances in computer vision and information technology, part 20, pg 989-998, 2009.
2. Sanjeet Singh, Gagan Deep Sharma, Harman Deep Chima A Study of Effect of Performance Appraisal Organization and the Employe**e**
3. Lesh, N. MERL, Zaki, M. J., Scalable feature mining for sequential data, Intelligent Systems and their Applications, IEEE (Volume:15, Issue: 2), 2000
4. CHAPTER 16: CLUSTERING ALGORITHMS, Edie Rasmussen, University of Pittsburgh
5. Huan Liu and Lei Yu, Toward Integrating Feature Selection Algorithms for Classification and Clustering, IEEE Transactions on Knowledge and Data Engineering, v.5 n.6, p.914-925, 2004
6. Prafulla Bafna[1], Pravin Metkewar[2*] and Shailaja Shirwaikar[3#,,] Novel Clustering approach for Feature Selection, American International Journal of Research in Science, Technology, Engineering & Mathematics" (ISSN (Print): 2328-3491, ISSN (Online): 2328-3580, ISSN (CD-ROM): 2328-362) September-November 2014 issue 8 volume
7. PrafullaBafna et al, COMPARATIVE ANALYSIS OF APRIORI AND IMPROVED APRIORI ALGORITHM, International Journal of Emerging Technologies in Computational, and Applied Sciences (IJETCAS), Issue 7 Volume 2, 135-143, 2014
8. Alan Jenkins, Performance Appraisal Research: A Critical Review of Work on "The Social Context and Politics of Appraisal", ESSEC, March 2005.
9. Dr Kanchan Bhatia, Prashant Jain A study of performance appraisal and organizational effectiveness in terms of individual and organizational basis. A comparative study of BSNL and AIRTEL, International Journal on Arts, Management and Humanities, pp-63-72, 2012
10. PrafullaBafna, HemaGaikwad, A hybrid approach to measure design improvement factor of website., American International Journal of Research in Science, Technology, Engineering & Mathematics" (ISSN (Print): 2328-3491, ISSN (Online): 2328-3580, ISSN (CD-ROM): 2328-362) December-2014 to February-2015.
11. A novel clustering approach to select optimal usability principles for educational websites, PrafullaBafna, International Journal of Software and Web Sciences, ISSN (Print): 2279-0063, ISSN (Online): 2279-0071, Issue 11, December-2014 to February-2015 Sciences(IJSWS).
12. PrafullaBafna, Measurement of The Performance Factor: A Forward Feature Selection Approach, International Journal of applied Engineering Research, 2015.
13. Fub, Gmeiner, Schiereck, &Strahringer,, business information system, 2007
14. Xue, Yajiong& Liang Fulla, Journal Of Information Technology, Vol. 97 July 31 2004
15. Ashish Kr. Dixit and Om Prakash, Journal of Arts, Science & Commerce ■ E-ISSN 2229-4686 ■ ISSN 2231-4172
16. R. Addo-Tenkorang and P. Helo, Proceedings of the World Congress on Engineering and Computer Science 2011 Vol II WCECS 2011, October 19-21, 2011, San Francisco, USA
17. Prasad Bingi; Maneesh K. Sharma and Jayanth K. Godla, Information Systems Management, Summer99, Vol. 16 Issue 3, p7, 8p. Item Number: 1907155
18. Porter, M.E., Journal of business review, Harvard Business Review, Jan 2008
19. MARY SUMNER, Journal of Information Technology 111, 317-332, (2000)
20. Vijay M. Khaparde Mechanical Engineering, Journal of Mechanical and Civil Engineering (IOSR-JMCE) ISSN: 2278-1684 Volume 3, Issue 6 (Nov. - Dec. 2012), PP 49-91
21. Norani Nordin, OjeniyiAdegoke, Journal of technology (Sciences & Engineering) vol-3, 74:1 (2015)
22. Mrs. Ruaa Ali Khamees, IRACST- International Journal of Research in Management & Technology (IJRMT), ISSN: 2249-9563 Vol. 3, No.1, (2013)