

Rule based System for Enterprise Resources Planning Decision

Amol S Kalgaonkar¹ and Dr. Pallavi Chavan²

¹Ph.D. Scholar- Computer Engineering, Ramrao Adik Institute of Technology, D Y Patil Deemed to be University, Nerul, Navi Mumbai, MH, India.

Email: amolkalgaonkar@hotmail.com

²Information Technology, Ramrao Adik Institute of Technology, D Y Patil Deemed to be University, Nerul, Navi Mumbai, MH, India

Email: pallavi.chavan@rait.ac.in

Abstract—Enterprise Resource Planning development and deployment is in many occasions a considerably significant step in the complete transformation road map related to business. A correct selection of an ERP Software is essential. It is also significant to take a decision around the overall need of an ERP itself. Considering this important background, this is an effort to come up with a rule-based expert system for such a decision making. These overall efforts encompass the feature of decision-making method with an attempt to codify the process to achieve benefits of having almost many advisor's knowledge at one's disposal.

Index Terms— Artificial Intelligence, E.R.P., Decision Support System, Challenges with Deployment of E.R.P., Expert Systems.

I. INTRODUCTION

There are multiple advantages for any firm for Implementation of Enterprise Resource Planning (E.R.P.). May of them are tangible or intangible.

Here tangible advantages can be listed as; the overall efficiency improvement, information integrated, as well as more effective decision support and intangible advantages are; Improved overall corporate image, Faster go to market and in turn resulting into better customer satisfaction.

Having said so, During the implementation there are many challenges and situations one comes across which they should overcome. Many a times, the ERP solution is just deployed in a company. There is a difference between implementation and deployment. Placement of such a packaged solution software is a process of recognizing the tasks, picking the package and later on operationalizing that package. Here the word "placement" is used in from the context of "deployment". Placement or Implementation here represents a term which is more widely acknowledged as part the whole method of complete deployment.

The beginning of the effort is obviously by having a conversation about enterprise resources planning (E.R.P.) and the effect of the such a way of working on the organization, challenges with the implementation and the next generation of E.R.P. software. Since, consultants and their knowledge is significant part of this entire work, lot of deliberations have taken plan to conclude the necessity of an advisor or consultant. The role of the consultant is very critical in the overall deployment. Although, in spite having engagement with advisors the deployment may still fail. Such failure does not necessarily rule out the need. There is good scope in this area and therefore

we have also addressed next generation possible aspects of possibilities of further enhancements in this area and inclinations in E.R.P. There are like ERP – II , IRP and current trends within expert systems domain.

This work extensively comprises expansion of an expert system, inclusion of teachings and reflected expert system types and its evolution. We have also discussed particulars of expert system's concepts, structure, categories and types.

When an appropriate product based on concepts of expert system is in use then for a given set of operational regulations the outcome would be more comparable. This will definitely help in the possible integration requirement needs. Further, since we have managed to gather information from around multiple consultants who have actively participated in multiple such programs, the resultant tool will have many advisors with multiple implementation know-how advantage.

It is as certainly an excellent choice to have as many consultants as they can at your service. Based on these facts it is absolutely admissible from the usage perspective to make up the learning along with realization of this expert product for E.R.P. implementation decision. This kind of an expert system based product will surely be a useful addition in decision process. The purpose of such expert systems has been effectively done in related situations in other application areas, so it is felt that the users of such a system will certainly be helped by such an expert system.

In this paper, we plan to discuss the current state of ERP implementation along with the challenges. Then in rule based mechanism section we have outlines objectives, methodology and all the data collection efforts and further steps for development. We have concluded this paper with putting conclusive remarks along with future work opportunities.

II. LITERATURE SURVEY

While discussing and reviewing the successful ERP implementation case studies, we also concentrated on the ERP failures and the reasons for the same.

As indicated and discussed by Richard Barker in his discussion the author has indicated that, there are and would be some people in any organizational departments who will always have a difficulty in understanding the overall difficulty in any E.R.P. implementation, not only that, but also how a few some critical elements which are important can be the of a make a great difference which will decide a success or a failure of any E.R.P. implementation. The author also has listed some of the common mistakes as indicated below.

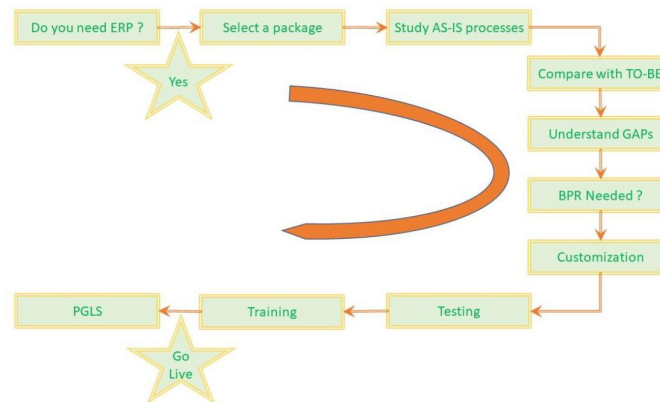
- Inappropriate software fitment or Unclear requirements
- Top leadership is not paying enough attention or importance to the E.R.P. implementation
- Missing resource commitment
- No accountability in making exceptional real important decisions at the right time.
- No importance given to the change management and not providing adequate investment for the same
- No training or post Go-live support
- Missing funds
- No importance given to Master data management and data cleansing
- Lack of foresight for BPR
- No time or resources for the testing

But important point which is not considered as part of the paper discussions is even the step before going for an ERP implementation. Based on the interactions with multiple consultants and consulting organizations overall ERP implementation process can be shows as in figure below.

While the entire process is well defined and can be articulated as shown the whole problem is with the first step. The resolution of this step is many times biased on multiple factors and it is many times not evaluated critically.

The importance of the TCO which is total cost of ownership is discussed in Enterprise Resource Planning Fundamentals of Design and Implementation [5] by Springer publication and it also have illustrated how the right first step towards the overall implementation impacts positively on the TCO.

Since the circumstances are changing resulting into a large demand in customization. Even if there is a substantial customization need the speed of it's implementation is important as well as the total operational cost. This typical situation demands a reduction in operational cost YoY which can be achieved by the operational efficiency and the automation culture. The level of automation in any organization is a key to achieve this scenario. The automation can be within a certain business process or it can also encompass across multiple processes or departments. This sort of automation is a organization-wide initiative and works at the enterprise level. Blue prism, HubSpot or Userfox are to name a few. These enterprise level automation initiatives have been



historically seen during the era or MRP, then later during MRP II, ERP situations and then finally during open-source ERP culture where these initiatives have taken significant space in the overall program.

In this entire evolution chain importance of basic hypothesis of root level knowledge about the complete business acumen and it turn apply the same to E.R.P. which will result in meeting outcome demands haven't altered. However, the key concept like organization change management or OCM has got introduced to facilitate the understanding of E.R.P. usage for monitoring and controlling these processes and also to come up with a reasonably acceptable practical oriented solutions to the overall strategy and execution of the E.R.P.

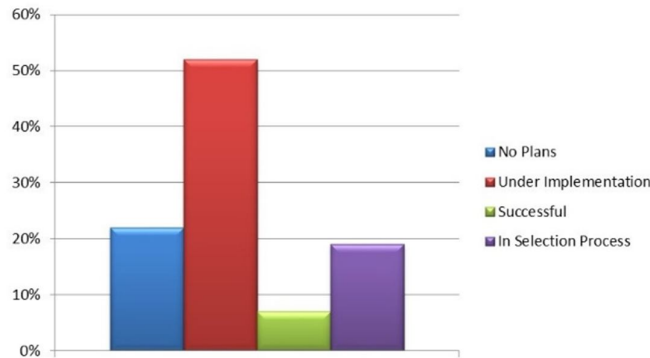
The journey finally finishes with a comparison which helps an enterprise to choose the product which is most near to the needs and can be deployed without much OCM throughout the organization. Enterprise Resource Planning: Fundamentals of Design and Implementation^[5] climaxes these ideas while pointing out various best practices to carve out and deploy E.R.P. Having said this, the particular book as well refers to the crucialness of the basic want aspect. Does your organization really need ERP ? Is the vital question which needs to be addressed ? This research work is exactly an attempt to solve challenges in the same topic.

III. RULE BASED MECHANISM

The motivation to take up this research was the definite need to structure and elaborate the process required in an E.R.P. implementation decision. The word implementation specified here clearly means, beginning with the decision process that involves finalizing if an organization is in a need of an ERP too, to actually selecting ERP product; as well as from complete implementation to the post Go-live support. In short, implementation here refers to placement of ERP in an work environment. It is very pragmatic that the entire process is very serious with the perspective of business outcome and success. In the current world, many organizations are unable to use a step-by-step method to take such a decision. This decision is a honestly very agile process and changes from enterprise to enterprise; therefore finalizing these impacting parameters, their interconnections and deriving their depiction for expert system, is a work of different advisors. While it happens, it's observed, the currently acknowledged benefits of any such expert system can surely be received with the use of the said expert system also, especially to find out the need for E.R.P. implementation for any of the organizational setup. Therefore, this work could be considered from the point of view of productizing which can be managed in the decision making in any such practical situation.

Though, the possibility of this research is planned to be limited to the determining method of such E.R.P. implementation. Obviously, the efficacy of decision for realization of E.R.P. is very important from the enterprise's viewpoint.

In general, these are multiple rational for the rapid raise with reference to the penetration of ERP implementation setups. Beginning with determining necessity to implement an ERP to the post-Go-live maintenance and enhancing at many geographies, these conclusions are very advisor specific. Therefore, for any group that has implementations at many locations simultaneously or for a business units with multiple manufacturing factories situated at various locations, the scenarios after the implementation can be completely different, depending on the judgement of the respective site manager. Considering such a situation, many organizations need to spend many efforts and resources if the necessity for integrating all sites' ERP solution becomes inevitable after individual location implementations.



For example we can consider a situation where in a manufacturing setup has a plant at Pune as well as at Mumbai. The implementation for both these plants may have progressed differently but when the need for integrating these two sites comes in near future, many configurations at some plants may need to be transformed to suit the other.

If we take any suitable expert system which is available, then for a specific set of business configurations and rules the results could be similar. This situation will definitely help in analyzing the probable prerequisite for integration. Moreover, since we have collected the information from various consultants who have worked on different projects, the product will have may-consultant, many-implementation knowledge.

It would be a wonderful scenario as good as having those all consultants at your desktop with all of their wisdom. From all and many such pointers it is admissible from the usage point of view to take up this research and expansion of such an expert system for ERP application decision. An expert system like this will definitely an useful product in this decision making. The application of an expert systems has proven to be successful in multiple other circumstances in various fields, so we feel that organizations will positively be helped by this kind of a product.

IV. OBJECTIVES

The important objective of this study is to frame and create a rule-based system which will try to codify this knowledge and step by step decision making process of an expert advisors in the form of rules who are in the area of E.R.P. consulting by discussing their believed processes. The sympathetic of the thinking methodology was attained through communicating to a group of consultants through structured interview questions as well as one-to-one interviews. This data then tabulated and carefully validated for tracking similarities.

- To study the applicability of Expert System in ERP's implementation decision.
- To study the thought processes and functionality of human consultants who are involved in ERP implementation
- To design an intelligent decision support system for ERP implementation.
- To implement the intelligent decision support system at selected simulated organizational setups for sample-run and study the performance of the same.
- To study the cost effectiveness of the this system as compared to the existing practice of hiring consultants.

V. METHODOLOGY

This is an observational study in which the thought processes of consultants will be recorded through a structured questionnaire and will be analysed for patterns. These patterns will yield the rules for decision making and will be incorporated in the expert system.

This exercise involves a study of the various aspects of the operational modules in the organization and functions of various decision makers there. Hence, we are planning to adapt the methodology and follow with reference to the objectives.

The study comprises firstly, a study of existing processes of various consultants in taking decisions on the determination of ERP requirement system with reference to various operations, procedures, organization structure and different Government regulations and policies.

Secondly, the aim was to develop an expert system for the supporting decision-making for implementation of ERP in such an organization. This part chiefly comprises knowledge engineering, which in our case, is to find out experts and experienced senior officials and end users of the organization taking different decisions and performing their duties. In short how knowledge is used to take decisions.

The development of expert system for effective ERP implementation decision is an attempt built on the procedure that has been accepted from numerous current procedures for different claims in the field of computer science and software engineering.

Below five are important milestones on the way of the overall approach:

A. Research and Review

Right from the beginning rather even before implanting the idea of developing expert system-based tool like this we have done certain investigation about the earlier and contemporary technological trends in expert system itself. This academic research has started right from studying and reviewing the literature of ideas behind the expansion of such expert systems. The outcome of this research as well as evaluations which we carried out has shown us lot of insider information in the actual realization phase of this expert system and product.

B. Conceptualization

After agreeing and deciding the product outcome as part of this research, the fundamental framework of this expert system is crafted. In this step, where in we want to recognize all the basic principles of an expert system and include all the critical components required for the realization of the needed technology as well as , compatibility of the reliability of platform and landscape. In short, in this step realization of the concept is worked out.

C. Problem Assessment

Taking reference from the concepts discussed and described in earlier process step of expert system development, knowledge gained at the conceptualization stage, referring to the sphere for the realization of the system finalized. In this segment, the suitability with regards to the problem was the important point which is taken into consideration since we needed to be sure that the problem is appropriate to be resolved by the productize approach using an expert system. While we detailed out the problem to evaluate the viability and reasoning of the problem, which included defining the complete goals for this product.

D. Knowledge collection and analysis

Very basic meaning of Expert system is everything related to applying humanoid knowhow into a machine code, this is based mainly on the incorporation of people intelligence with the system. The acquaintance gathering is the essence of any such expert systems. Once the problem area is selected, which we have done in the earlier phase, the knowledge as much possible information related to this problem area was collected. Here it is noteworthy that, the knowledge was gathered through multiple discussions with the consultants who are in the field of E.R.P. implementation and these interview are followed by sending them structured questionnaires, as shown.

E. Blue printing and Realization

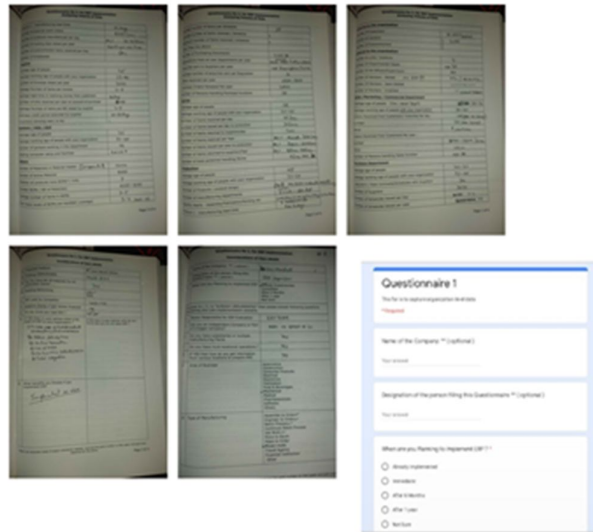
The analysis of the learnings during the knowledge collection phase will result in the overall design of this system that comprises of complete skeleton of the acquired system's knowledge, the development and realization part and the final user experience part. This will get designed after a complete understanding we will gain from the earlier phase on the best known method for depicting expert's knowledge and brainstorming methods in an expert system. The overall process which will be considered to process system's knowledge will also help us in outlining in the same phase, where forward-chaining rule-based expert system will be used and finalized as an interface locomotive. After every part of the rudiments were finalized, the realization phase will begun for programming and user experience.

VI. DATA COLLECTION

Our aim was to reach out to maximum consultants and consulting organizations who are in the field of ERP implementation process. This was our primary target or primary data set. Since we wanted to understand the thought processes behind their decision, we prepared structured questionnaires, so there would be consistency in the answers given by consultants. To prepare these questionnaires we took help from various information sources and self-experience in the field of ERP implementation. We divided our questions into two classes; first

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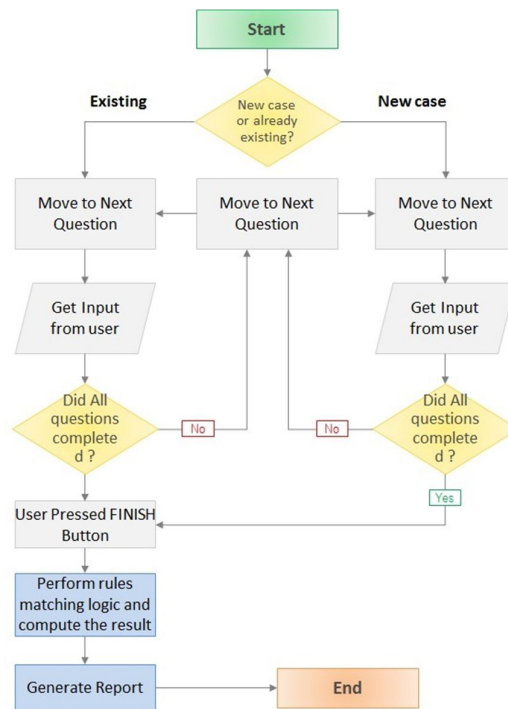
The entire data received is sanitized and then further tabulated. Each question was defined with an identifier so it can be used in further rule generation.

Question Number / Questionnaire set #	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	28	29	30
1	2	1	1	2	2	4	4	8	4	5	3	6	4	4	1	4	1	3	4	5	1	6	3	3	2	1	1	1	6
2	2	1	1	1	1	4	3	6	5	5	0	6	4	2	1	4	1	2	4	4	1	7	3	3	2	1	1	1	4
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6	2	1	1	1	1	2	8	8	4	5	0	5	3	1	1	4	2	4	4	4	1	7	3	3	2	1	1	1	6
7	1	0	2	2	2	0	8	8	1	4	2	5	3	1	1	4	1	5	4	6	1	0	3	5	2	2	1	1	3
8	2	1	1	2	2	2	1	11	3	5	0	5	4	2	1	4	1	4	4	5	1	7	2	4	1	1	0	0	5
9	1	1	1	2	2	4	15	3	4	5	1	6	0	1	1	5	1	3	4	5	0	8	3	7	2	0	1	1	0
10	1	0	2	2	2	0	10	3	1	3	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	2	2	0
11	1	0	2	2	2	0	10	5	2	2	0	6	4	2	1	4	2	4	4	5	1	0	0	3	2	1	0	0	3
12	1	0	1	2	2	4	9	1	1	5	1	6	4	1	1	4	2	2	3	6	1	7	2	4	0	1	0	0	6
13	1	1	2	2	2	0	1	7	2	5	0	6	4	1	1	4	2	4	1	6	1	7	3	3	1	1	0	0	6
14	1	1	2	2	2	0	14	7	1	2	0	0	2	1	2	3	2	4	0	4	1	3	1	2	1	1	0	0	0
15	2	0	2	2	2	0	4	7	2	5	2	6	4	1	1	4	1	4	2	6	1	7	2	3	2	1	1	1	4
16	1	0	2	2	2	0	5	8	1	3	0	6	4	1	2	3	2	5	2	4	2	0	1	2	0	1	0	0	2
17	1	0	0	0	0	0	13	8	1	4	1	6	0	2	1	5	1	5	0	6	1	2	0	0	0	1	0	0	0
18	0	1	1	2	2	2	12	4	5	4	1	2	2	1	1	2	2	0	5	5	2	6	2	4	1	0	0	0	1

We have plans to consider such situations by using techniques such as Fuzzy reasoning and certainty factors. Although, this product is predictable to give us the indicative direction for E.R.P. implementation positively or otherwise, the further development plan is also to come up with a very elaborative analytical draft that will give a justification and the entire path traversed for arriving at this decision.

Further the plan is also to produce an output in such a format which will be easily be interpreted, and it will not be a puzzling stanzas like technical programming language. The focus is to include business framework context in the complete report that will make the report more usable for decisions and for analysis as well.

Later we will check the possibility of utilization of the report generated as an output of this product to take further business and other critical decisions simulation.



VII. CONCLUSION

Such type of decisions where Enterprise Resource Planning Implementation related parameters have an - extensive and permanent impacts to the ventures are lifelong. This makes these decisions even more crucial that organizations take a well evaluated risks and choices.

Based on the complete literature analysis and scrutiny it looks that such kind of an expert system based product could be beneficial for actually deciding about E.R.P. implementation. This may perhaps prove as good as having acumen of many advisors at ones fingertips and we simply draw help from them.

The scope of this research is confined to the decision regarding the implementation of the Enterprise Resource Planning solution for any enterprise. Further we are also hoping that, this product can be further upgraded to capture and articulate the expected outcome v/s predictable outcome of the said E.R.P. implementation resulting in capturing actual benefits realized. This kind of analysis will solidify the success of the solution and the utility potential can also be found out.

As a next step, some organization which has implemented ERP can compute some quantifiable which can be used as E.R.P. project success factor index, which will recognize the level of maturity of ERP implementation at a particular organization. Such index can be called as ERP maturity index.

REFERENCES

- [1] Expert systems and it's Applications in an Integrated Network Management written By Eric Ericson and LT Ericson, D Minoli in 1989 and published by Artech House Publication
- [2] Why ERP ? : A Primer on SAP Implementation By F. Rebert Jacobs 2000, McGraw Hill Publication
- [3] Enterprise Resource Planning : The Dynamics of Operations Management By Avraham Shtub 1999 - Kluwer Academic Publishers Norwell, MA, USA
- [4] A New Approach to E.R.P. Customization By Mr. Avshalom Aderet, Ph.D. from Eshbel Technologies
- [5] E.R.P. Tool, Technique and it's Application for Integrating of the SCM By Caarol A Patak 1999, Saint Lucie U.S.A. Press
- [6] Expert knowledge module written By Mr. Gary Berg-Cross
- [7] Integrated Business Processes with ERP Systems, 1st Edition by Simha R. Magal, Jeffrey Word
- [8] Do the CIOs need an E.R.P. ? Written By Mr. Geissler Golding
- [9] E.R.P. Systems By Mr. Rajiv Baankar

- [10] www.erpfans.com ERP related news, chat groups and discussion forums. This page was referred to seek opinions about the questionnaires and refine them.
- [11] www.erpevaluation.com This is ERP vendor evaluation site. Here some techniques are discussed for the overall evaluation process. This page was visited initially when evaluation parameters were getting formulated.
- [12] www.sapfans.com All the SAP fans discuss here various interest topics with the help of chat groups and discussions forums.
- [13] www.baanfans.com Chat groups, discussion forums for BAAN users
- [14] <http://www.intuitivemfg.com/products> This is typically for a mid-market manufacturing enterprises which intuitively offers ERP software solutions.
- [15] <https://www.biz-pi.com> A base Page related to different improvement programs discussions and consultancy.