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Diagnosing Qualitative & Database Optimization Issues in ERP Implementation

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Abstract: Quality of data is a major issue during the implementation of an enterprise resource planning (ERP) system. Data quality issues may have a vital impact on an organisation's information system. Therefore, it is essential to understand data quality issues to ensure success in implementing ERP systems. This paper discusses the use of database as a decision tool for enterprise resource planning (ERP) systems . Database provides a number of opportunities, which seem to justify its use in this field This paper uses SAP as an example of an ERP system and describes a study, which explores data quality problems with existing systems, and identifies critical success factors that impact data quality. The study resulted in the development of a framework for understanding data quality issues in implementing an ERP, The findings of the study suggest that the importance of data quality needs to be widely understood in implementing an ERP, as well as providing recommendations that may be useful to practitioners.

Keywords: ERP evaluation, data quality, database optimization, ERP functions, data base selection

I. INTRODUCTION

ERP is medium that can integrate information technology & business management. ERP represent large, complex, computerized and integrated systems, ERP can provide a decesion tool in every domain of business. ERP systems provide the grwoth and stability of competitive advantage in the global marketplace through enhanced decision support, reduced asset bases and costs, more accurate and timely information, higher flexibility or increased customer satisfaction (Davenport, 2000; Poston & Grabski, 2000; Rizzi & Zamboni, 1999). But the far-reaching structural changes following an ERP software implementation can also be disastrous as has been shown (Bingi, Sharma, & Godla, 1999; Scott, 1999). This research was motivated by an empirical study of the ERP decision making process in Austrian enterprises (Bernroider & Koch, 2002). It revealed that only 30% of the organizations (when excluding conventional financial evaluation methods) used some sort of formal evaluation techniques. Almost all of these organizations applied methods based on some kind of ranking and scoring technique (Remenyi, Money, Sherwood-Smith, & Irani, 2000), the remaining minority used a real option (Taudes, 1998; Trigeorgis, 1996) or hedonic wage model technique, which was introduced by Sassone (Sassone, 1984, 1987). The ERP system selection is a semi-structured decision problem without an agreed-upon formal procedure (Laudon & Laudon, 1998) and is a very critical task which involves many different views of many different people of many different critical evaluation elements. All this demands for a tool which supports: multi-factor input to output evaluation and objective and consistent group decision capabilities.

In this PAPER we focus on DATA BASE SYSTEM) to support decision making for ERP systems. DATA BASE SYSTEM is a method of comparative efficiency measurement and has been successfully used over many years to measure the performance of any form of decision making units (Athanassopoulos & Thanassoulis, 1995; Boufounou, 1995; Bowlin, 1986; Thanassoulis, 2001). The field of application is vast, we want just mention a few recent articles in different management areas. The DEA method was extensively applied to purchasing decisions (Narasimhan, Talluri, & Mendez, 2001; Papagapiou, Mingers, & Thanassoulis, 1997). In (Yan, Wei, & G., 2002) the DATA BASE SYSTEM model was used for production input/output estimation when some of the original input/output entities are revised in order to be more competitive. DATA BASE SYSTEM was used in decision models for technology selection problems, e.g. in the area of manufacturing technologies (Baker & Talluri, 1997; Khouja, 1995). Other interesting fields of application were to analyse the economic value of IT (Dasgupta, Sarkis, & Talluri, 1999; Shao & Lin, 2002) or the productivity of software engineering projects (Mahmood, Pettingell, & Shaskevich, 1996). All these applications use the DATA BASE SYSTEM method because of some strong features

paired with an appealing simplicity in application, which also apply to the ERP system selection problem. One important advantage is that DATA BASE SYSTEM tries to objectify the benefits of different ERP solutions, even though the measurements of individual aspects of these approaches may originate from subjective and/or diffuse sources. Such a source can be the opinion of practitioners, experts, researchers or even a committee. It can be supposed that especially for the latter one, an objective cumulative decision is complicated to achieve. DATA BASE SYSTEM solves this task by giving each solution approach under evaluation the opportunity to "present" itself at its best.

THREE STEPS FOR THE *DATA BASE SYSTEM* APPROACH IN ERP SELECTION

We used the DATA BASE SYSTEM model initiated by Charnes, Cooper and Rhodes (1978) (CCR-Model) which is based on the assumption of constant returns to scale and maps a fractional linear measure of efficiency into a linear programming (LP) format. We limit the model's discussion to some basics here and refer of the above mentioned literature for more detail. See also (Thanassoulis, 2001) who collected several approaches based on the CCR and applications of DEA and additionally offers a solver-software for the different models. Next we like to guide through the necessary steps using DEA for an ERP selection.

The first step is to define different criterions C_i which describe the qualities of the ERP alternatives under evaluation (we chose five alternatives, labeled A-E, in this example). In an empirical study of the decision making process concerning investments in ERP software in Austrian organizations (Bernroider & Koch, 2000), 29 different ERP selection criteria were identified through application of the Delphi Method with students, practitioners and researchers. Here we limit the number of considered criteria for the analyzed example to four software specific characteristics, which showed up as most important in the empirical study cited above. These criteria are: C_1=processing times, C_2=software maturity, C_3=interconnectivity and C_4=support quality.

The second step is to measure the selected criterions from step one. These measurements M_i of these criterions for each ERP solution can be objective achievable, like e.g. processing times, or interconnectivity, but they can also originate, as already mentioned, from subjective judgments, normally obtained from experts in the field of subjects (like e.g. the maturity of a software system). It can be recommended to re-scale (if necessary) all measurement for each criterion between e.g. 0 (worst) and 10 (best). These measures for all ERP alternatives can be found in table 1.

Table 1. Measurements of four criterions for 5 ERP system alternatives

ERP Solution	Processing Times	Maturity	Interconnectivity	Support Quality
A	5	7	3	6
B	7	9	6	10
C	8	7	8	8
D	4	8	3	9
E	9	4	4	9

The overall benefit B of each ERP alternative is then measured by a weighted sum of all M_i for each alternative.

$B = \sum_{i=1}^{4} W_i M_i$, where W_i are the weights for each criterion.

One way would be to weight the various characteristics by pre-selected fixed weights as e.g. it is necessary in some kind of ranking and scoring techniques. As already mentioned, this utilization ranking method is employed by nearly every organization that use an evaluation technique other than financial methods in the ERP software selection process. DEA avoids the numerous a priori assumptions involved in fixed weights by deriving the weights directly from the data. The required weights W_i are calculated through the DEA model by optimizing an LP and they are not subjectively assigned by persons. DEA calculates a set of weights for each alternative such that the overall benefit of that alternative is maximized with respect to all others. This means that the alternative itself is free to choose the weights in order to make itself look best. Alternatives, which are not able to achieve the highest benefit under these relaxed conditions, can be seen inferior compared to its competitors and they are therefore rejected. Of course there must be a possibility for the management, for researchers or experts to interact with the system as well, otherwise some ERP alternatives would simple set those weights to zero, where they have large deficits. This would completely eliminate the effect of some criterions.

The third step is responsible for setting bounds for the weights (not setting the weights itself) in order to prevent the situation sketched above. Thus a committee is responsible to agree upon feasible regions where the weights can be chosen from. It should be mentioned that it is much easier for a committee to agree upon a possible range of a weight than to agree upon a single number of that weight. How such a group decision can be carried out is very important and discussed in the next section.

Without this third step (bounding the weights) the ERP solutions B, C and E are 100% efficient and should be treated as equally good. Each of them chooses a different set of weights in order to maximize its benefit among the other alternatives. The ERP solutions A and D have a benefit of 78% and 90% respectively. These alternatives can be seen as inefficient. Because they were free to chose their own weights, it can implied that they do not

even have any key competence among those four criterions. After agreeing, however, on the bounds for the weights, which is discussed in the next section, the ranking of the ERP alternatives is expressed in table 2.

Table 2. DEA Efficiencies together with required scores to be competitive.

ERP Solution	Efficiency	Processing Times	Maturity	Interconnectivity	Support Quality
A	66.88 %	+2	+2	+3	+4
B	100%	-	-	-	-
C	93.98 %	-1	+2	-2	+2
D	80.39 %	+3	+1	+3	+1
E	85.71 %	-2	+5	+2	+1

Table 2 not only shows the total efficiency of the ERP solution. The DEA analysis provides as well scores for each criterion, to show what would be needed for that solution in order to be competitive. ERP solution C, for example, spend too much effort in interconnectivity and performance figures. They should instead spend more recourses in the required maturity of the software and should offer a better support.

As you might expect, there is not always a clear-cut ranking as in this example. There might be more than one efficient solution. This is especially true when using more criterions which add more amount of freedom to the system. The (ranking) RCCR model proposed by (Anderson & Peterson, 1993) is a simply variation of the CCR model and very helpful for ranking the various alternatives. The new formulation (respectively modification of the LP constraints) allows technically efficient scores to be greater than 1 resulting in a more discriminating set of scores suitable for ranking purposes. (Adler & Sinuany-Stern, 2002) give a review of possible ranking methods in the context of DEA.

GROUP DECISIONS

As emphasized above, the third step of the DEA process is a very important one and normally implies any kind of group decision. In Austria the majority of the organizations employ participative decision making for ERP systems (Bernroider & Koch, 2000), i.e. group decisions including diverse stake-holders within the organization. As has been argued (Appleton, 1997; Davenport, 1993; Hammer & Champy, 1993; Willcocks & Sykes, 2000), the participation of the people affected by the system and knowing the business processes leads to better decisions and a higher rate of acceptance later on (Guha, Grover, Kettinger, & Teng, 1997). In (Tayler, 1998) possible benefits arising from a participative type of team structure include the motivational improvement of local participation and attention to individual quality of working life, as well as the necessary attention to strategic purpose and to reciprocal and coordinative social roles.

In our example five different evaluators representing diverse stake-holders within the organization and a consulting organization have estimated their importance on each criterion using their subjective judgments (see table 3). There are a total of 100 points for weighting the importance of the four criterions. So e.g. the IT consulter assumes “Software Maturity” and “Support Quality” equally important where “Processing Times” and “Interconnectivity” should observe only half the attention. Up to this point all estimations originate from the subjective opinion of the group members.

Table 3. Weight estimations of the 5 evaluators (100 points)

ERP Solution	Processing Times	Maturity	Interconnectivity	Support Quality
IT consulter	16.7	33.3	16.7	33.3
Top Management	25.0	18.8	18.8	37.5
IT department	20.0	20.0	20.0	40.0
Operating department 1	21.1	31.6	15.8	31.6
Operating department 2	24.0	19.0	19.0	38.0

After that step the feasible region of the weights which plays the key role in DEA must be constrained into a region acceptable for the voting committee. (Cooper, Seiford, & Tone, 2000) propose that for each criterion out of table 3 a lower and upper bound for the weights can be extracted and can be coded as additional constraints into the DEA model. This means that the group implicitly decides about the upper and lower bounds, especially if they do not know the choice of the others. The idea can be improved because it is known from psychology that it is easier to compare two items than three and more at the same time. Thus the ratio between pair-wise weights W_i/W_j should be considered instead of the absolute weight value W_i itself. E.g. the IT Consulter finds “Software Maturity” twice as important as “Processing Times” or “Interconnectivity”. This leads to a ratio $R_1=W_2/W_1=2/1=2$. The upper and lower bound of this value R_1 among all evaluators is then to be considered as feasible region. This fact makes it also possible for the measurements M_i to be scale invariant. Analogue to that constraints for all other pair-wise weights are added to the DEA model. There you can find e.g. the lower bound for W_2/W_1 to be 0.75 (as suggested by the top management) and the upper bound for W_2/W_1 to be 2 (as suggested by the IT consulter).

Within this model the optimization process of the weights take place. Its advantages are obvious. Non of the evaluators are set better, because they only assign the boundaries for the model. Again the data (the ERP alternative) itself optimizes the weights to "present" itself at its best. The committee only agrees upon the flexibility of "presentation".

MANAGERIAL IMPLICATIONS FOR DECISION SUPPORT

For the management needful information is revealed after the analysis. This is firstly the ranking of the ERP solutions. Additional a product shape of the non-optimal solutions is presented to the management. This means the management can observe where the shape differs from e.g. the second best to the first one. As seen in table 2, ERP solution C is a wonderful solution, but it seems, that the shape of this product does not fit the companies requirements. On the other hand the company can think again about their constraints in weights and maybe shift their requirements towards an offered product in a second group evaluation/discussion. It can be the case that the management or the company prefers a specific ERP solution. With the DEA the management is able to tell provider of that ERP solution where are their weaknesses and they can negotiate a different and better contract. It becomes clear that the DEA analysis is even a very powerful tool in self-evaluation of ERP solutions.

II. OBJECTIVE OF THE STUDY

Any ERP system basically needs to fulfill the following functional requirements.

- It must be a unified system, with easy-to-use applications and interfaces, that works seamlessly across multiple departments with the necessary controlled access
- A common database (or multiple but shared databases) accessible through different applications
- Search and reporting utilities to generate reports based on various parameters (like "all unshipped orders as of yesterday in the 'toys' category")
- Scalability, customization and easy integration of ad hoc modules, as needed

The tools fulfilling the ERP requirements:

To meet the needs of the above mentioned functional requirements, the following tools and applications are mandatorily integrated into the ERP system.

-Database Management / Data Warehouse / Information Management Tools:

Data storage and information management with established workflow across different departments and functions are the backbone of any ERP system. Multiple solutions and tools are available for data storage, which include relational databases from companies like Oracle, Sybase, DB2 and open source free offerings like Microsoft MySQL, PostgreSQL, Apache Derby, etc. Other information management tools may include Content Management Systems (CMS) and repository applications.

Depending upon the industry and required functions, an appropriate one needs to be selected. A manufacturer may find a transactional database like Oracle or MySQL to be more relevant as transaction-based data moves through different statuses (from manufacturing to inventory to order capture to sale to supply status). On the other hand, an online content writing company may find a CMS repository system with version control a better fit for their needs.

The database or repository can be either a single centralized one, or multiple with automatic data flow from one database to the other. The defined workflow ensures seamless data movement. Databases can be hosted locally or remotely, or even in the cloud.

This ERP Comparison database provides high-level information that shows ERP software offerings that have a track record of use in a particular type of company.

This data is not designed for use in making final decisions on the suitability of particular software packages for a specific company seeking ERP. The only way to understand true suitability of candidate software solutions is to carefully and consistently measure them against your organization's most important functional and non-functional priorities.

ERP Database Usage Terms: This online enterprise software database is the copyrighted and intellectual property of Engleman Associates, Inc., and can only be used for enterprise software projects for which you are directly involved. Users cannot repackage or resell this data for other purposes.

Why This ERP Database is Made Available: This ERP directory is a summary version of SoftSelect's total ERP software data and insight. The SoftSelect business unit of Engleman Associates, Inc. makes this summary ERP software data available to create awareness of its broader business software research, software selection, and implementation readiness process. This ERP comparison database has been available since 2001 and includes links to all listed ERP software vendors from North America.

III. LITERATURE REVIEW

A Systematic View Can Help Solve the Problems Managerial problems persist because managers continue to believe that there are such things as unilateral causation, independent and dependent variables, origins, and termination [3]. On the other hand, managerial system contains as many as 100 or more variables that are relevant and believed to be related to one another in various nonlinear fashions. The behavior of such a system is complex far beyond the capacity of intuition.

Computer simulation is one of the most effective means available for supplementing the correcting human intuition [4]. The feedback structures of real problems are often so complex that the behavior they generate over time can usually be traced only by simulation [5]. Using Systems Thinking to Teach ERP Project Implementation (TERPPJ) Carin Chuang and Kuan-Chou Chen International Journal of Information and Education Technology, Vol. 3, No. 3, June 2013 DOI: 10.7763/IJIET.2013.V3.308 405 Controlled experiments are costly and time consuming. The isolation of the effect and the evaluation of impact of any given practice within a large, complex and dynamic project environment can be exceeding difficult [6]. In systems thinking model, the effects of different assumptions and environmental factors can be tested. Unlike real systems, the effect of changing one factor can be observed while all other factors are held unchanged. Internally, the model provides complete control of the system organizational structure, its policies, and its sensitivities to various events. Externally, a wider range of circumstances can be generated than are apt to be observable in real life.

B. Characteristics of Systematic View System dynamics is based on four premises [7]. The behavior of an organizational entity is principally caused by its structure. The structure includes not only the physical aspects, but more importantly the policies and procedures, both tangible and intangible, that dominate decision making in the organizational entity. Managerial decision making takes place in a framework that belongs to the general class known as information feedback systems. Our intuitive judgment is unreliable about how these systems will change with time, even when we have good knowledge of the individual parts of the system. Thorough model experimentation is possible to fill the gap where our judgment and knowledge are weakest, by showing the way in which the known separate system parts can interact to produce unexpected and troublesome overall system results. C. Systematic View of ERP Project Management Project management is one of the most important areas of management. However it is also an area that is not well understood. Delays and cost overruns are common for projects in construction, defense, software, and other industries. Many projects suffer from the "90% syndrome". It describes a project that reaches about 90% completion according to the original project schedule but then stalls, finally finishing after about twice the original duration has elapsed [8]. Software development often suffers from Brook's Law, which says adding manpower to a late software project makes it later [9]. Most of projects are very complex and contain multiple interacting feedback loops. Feedback refers to self-correcting and self-reinforcing side effects of decisions. For example, managers often use overtime to bring a late project back on schedule. However, if overtime remains high for an extended period, workers may become burned out which leads to lower productivity, a higher rate of errors, and increased employee turnover [10]. Thus a business decision that is expected to solve a problem actually escalates the problem. In addition, feedback loops in a complex system often interact with one another. Overtime also causes cost overrun, which may increase the pressure to reduce the project scope or to drop planned tasks just to rein in the spending. Therefore, it is fundamental to understand the dynamics of project management to improve the performance. Traditional cost and scheduling tools such as critical path methods do not adequately account for feedback effects [10]. Human are normally error prone to feedback, nonlinearity and causality, and in controlled experiments have repeatedly shown to misperceive the feedback structure of systems much simpler than a large engineering or construction project. Though very helpful to schedule the sequence of activities in a project, tools such as Gantt charts, PERT, and critical path methods do not solve the problem. Because neither do these traditional tools account for the feedback of variables, nor do they trace dynamics intrinsically in project management. Process such as hiring and training unfold over time. There are multiple time delays in carrying out programs, in discovering and correcting errors, and in responding to unexpected changes in project scope or specifications. Thus, hiring additional workers adds to the capability of an organization in the long run. But in the short run, productivity is reduced because experienced workers must divert time from their work to train the recruits and more time is spent on communication within the organization. Only system dynamics can model such dynamic behaviors.

D. ERP Projects Related to Project Management Control An ERP project is one that implements ERP software system as an organizational management information system. As any project, it has three dimensions, cost, time, and scope. The principal reason for failure is often associated with poor management of the implementation process [11]. Thus in-depth knowledge of project management will help a successful implementation of ERP system. Though ERP system promises great advantage, it faces far more risks than a normal project. Organization and business process must be changed to adopt the new system and process. Software of all lines of business must be modified to be able to communicate with ERP system. Extensive user involvement and training are required for ERP system to be accepted by end users [12]. For a global company, it must also consider culture difference when ERP system is implemented in multiple sites. And quite often, companies do not have an in-house skill to implement an ERP system. Specialists must be hired. These risk factors

that are unique to an ERP project present tremendous challenges to project managers.

III. AN ERP IMPLEMENTATION SYSTEM MODEL

The literature provides some guideline for a generic course development model of a Web security model. Web security features that are commonly listed under part of information security include operations systems, legal and ethical issues, network security, risk management, and technical disciplines. Some of these features are necessary for or related with other courses. For example, risk management needs to have legal and ethical discipline up front.

Based on our review of the literature and our examination of current ERP implementation problems, we propose an ERP implementation system model for qualitative and database optimization issues in ERP implementation. It consists of Seven steps

IV. RESEARCH OBJECTIVES

Qualitaive issues occur in all stategе of ERP implemenation: pre-implemenation, implemantion and post-implemenation. However, few studies have addressed Qualitative issues of ERP system in different stages of implementation. The objectives of the study are:

1) To Diagnosing Qualitative & Database Optimization Issues in pre-implementation phase of ERP System
2) To Diagnosing Qualitative & Database Optimization Issues at the stage of implementation of ERP System
3) To Diagnosing Qualitative & Database Optimization Issues in post-implementation phase of ERP System
4) To Diagnosing Qualitative & Database Optimization Issues in different phases of ERP implementation
5) 5.To Ensure All Systems and Processes Are Deconflicted and Validated before Launch
6) To Ensuring ERP Data Security
7) To give general recommendations to organizations and ERP consultants for the successful implementation of ERP system

V. METHODOLOGY

This study employed case study approach guidelines of Yin (2009). Case study approach is a famous qualitative research strategy for the in-depth analysis of a case.

Background of the Case Study

A Government owned electric supply company in Pakistan has been selected where ERP system has been successfully implemented. The company is producing electrify supply to different industrial and domestic customers in a specific regions in Pakistan.

Data Collection

Fifteen face to face interviews of ER end users and consultants have been conducted (including six video recordings of 30-45 minutes. Different semi-structured and sometimes unstructured questions were asked to respondents.

A convenience sampling technique was used because of the nature of the study. Convenience sampling is the most appropriate method in qualitative research to dig out the realities after the in-depth analysis. ERP end users and some of the member of ERP consultant team participated for the interviews. These respondents were the permanent employees and contractual consultant of ERP system. Figure 3 shows Pie Chart of employment status of respondents: 20% from contractual consultant, 40% from middle level management, 20% from lower level management, and 20% from top level management.

Data Analysis Procedure

Case study strategy has been used for the in-depth analysis of the company where ERP system has been implemented. Using NVvio 10 software different techniques have been used for the qualitative data analysis such as coding & thematic analysis, word tag clouds, word tree and tree map. NVivo is strong and very helpful for qualitative data analysis (Ozkan, 2004). However, the methodology for applying different techniques using NVivo depends on the researchers who are applying different techniques.

Many techniques have been used for the validation of different themes of the study such as Coding Nodes, Word Tree, Word Tag Clouds and Tree Map. Data has been analyzed in different phases: first of all recorded data has been transcribed into textual form, then different themes have been identified from the textual data, after that all related textual data has been coded into different related themes. This study also used “word tree map” and “world tag clouds” for collecting more evidences for the strength and validity of different themes. After applying all these techniques, the study also used “Tree Map” to check the significance of each critical success factors in different phases of ERP system implementation.

VI. FINDINGS OF THE STUDY

Word Tag Clouds

Figure 4 shows “Word Tag Clouds” which shows the size of different words according to their frequencies of repetition in textual data. Words having more frequency show their big size. This study applied Word Tag Clouds into two phases of analysis: before funneling approach and after funneling approach. In figure 4, Word Tag Clouds shows different unrelated words such as 2011, an, can, cell, com, different, during, email, end, every, failure, first, how, iqbal, made, more, mr, much, need, new, now, number, side, so, them, thing, think, two, us,

were what and you. These words are not the themes of the study.

In the second phase of word tag clouds these unrelated words have been added into "stop word list" and then words tag clouds technique has been applied and in figure 5, Word Tag Clouds shows different themes of the study such as activities, assets, automatically, change, consultant, control, critical, data, department, efforts, erp, finance, financial, implementation, information, level, long, management, manager, monitor, network, newsletter, oracle, organization, people, process, success, successful, support, synergy, system, team, training and vendor.

Word Tree Analysis

Implementation word is the key word for this study. Therefore, using text search query a word tree has been explored for the word: "implementation". the word tree of "implementation" shows the different pattern of talks of respondents of the study. By reading line by line data where the word "implementation" has been used, the study observed the meaning of ERP implementation and CSFs of ERP implementation in this study.

ERP Pre-Implementation Phase and Critical Success Factors

Stacked Bar shows CSFs in pre-implementation phase of ERP System. In this phase, the study found that clear objectives and scope, complete awareness, organizational analysis, right product selection, team composition for product selection and study of organizational culture are the CSFs of ERP System.

ERP Implementation Phase and Critical Success Factors

Stacked Bar (figure 8) shows CSFs in the phase of ERP system implementation. The study identified Business Process Reengineering, change management, effective communication, effective training, infrastructure, inter-team cooperation leadership, management involvement, rewards and recognitions, standardized implementation sequence, team composition and top management commitment as the CSFs during the phase of ERP system implementation.

ERP Post-Implementation Phase and Critical Success Factors

Stacked Bar (figure 9) shows CSFs in ERP post-implementation phase. Employee motivation, end user satisfaction, organizational productivity, professional development services, software reliability, support and maintenance have been identified as CSFs in post-implementation stage of ERP System.

Tree Map Analysis of ERP Critical Success Factors

Tree Map shows the significance and the worth of each theme of the study. Tree map (figure 10) shows CSFs of ERP System in different phases of implementation. In implementation phase of ERP system: Team Composition, Management involvement, Standardized Implementation Sequence, Effective Training and Inter-team cooperation have been found as more critical success factors while business process reengineering, effective communication, leadership, change management, infrastructure, rewards and recognition and top level management commitment have been found as less critical factors in the phase of implementation. Similarly, Support and Maintenance, End user satisfaction have been found as more critical success factors while organizational productivity, professional development, employee motivation and software reliability have been found as less critical success factors in the post-implementation stage of ERP system. In pre-implementation stage of ERP system implementation Clear Objectives and Scope and Complete Awareness have been found as more critical success factors while organizational analysis, team composition for product selection, study of organizational culture and right product selection have been found as less critical success factors in pre-implementation stage of EPR system. Those critical success factors in the big regions are more critical as compare to those factors which are falling in the small region of the tree map.

VII. FINDINGS & SUGGESTIONS

This study presents different recommendations to those companies where ERP system is being implemented or they are planning to implement ERP system. Moreover, these recommendations are also useful for ERP consultants:

- Organization should conduct business process reengineering to make fit the organization as per different requirements of ERP system.
- Organization should mange the change at individual, workgroup and organizational levels.
- Organization should make an effective communication system among employees, top level management and ERP consultants to avoid the discrepancies.
- Organization should arrange Live training for the end users of ERP system. Consistent training may solve many problems even in the post-implementation of ERP system.
- Company should develop a sufficient infrastructure to fulfill all requirements of ERP system. Effective network system, hardware and other technologies also lead to the successful implementation of ERP system.
- Inter-team and inter-departmental coordination is alsoanalyse during the phase of ERP implementation. Therefore companies should make an environment in which all teams can share their expertise and work with coordination.
- All top level and middle level management should involve in each phase of ERP implementation. They should show their devotion and ownership.

- Organization should follow a standardized sequence for the implementation of ERP system.
- Team composition is most critical factor found during the phase of ERP implementation. Therefore, company should develop internal team and they should work with the cooperation of ERP consultant team members.
- Top level management should show their commitment to complete the task in time and they should supervise all activities in different phases of ERP system implementation.
- Company should develop a team for the selection of ERP system that can fulfill the need of the company. An effective decision for the selection of right product leads toward the successful implementation and use of ERP system.
- Company should conduct a need analysis before selection of ERP system.
- Top level management should understand organizational culture and should make policies how to tackle expected problems
- Organization should make clear objectives, vision and target dates in pre-implementation stage to plan each and everything relating to cost, resources and time.

VIII. CONCLUSION

Using a traditional method of case study research this study was aimed to identify Diagnosing Qualitative & Database Optimization Issues in ERP implementation, pre-implementation and post-implementation phases. A government owned organization which is engaged has been selected for the in-depth exploration of Diagnosing Qualitative & Database Optimization Issues for the collection of data, prior time appointments were taken for the smooth conduct of interviews with ERP end users (employees) and ERP consultant team members.
Top Five ERP like SAP, Oracle, Peoplesoft, Baan, Microsoft Dyanamis.Are analysed for diagnosing qualiatative & database related issues. All qualitative data has been analyzed using the famous software; “ERP Lab” An Open souce MATLAB package for analyzing ERP Data. study of organizational culture and team composition for product selection have been identified as Diagnosing Qualitative & Database Optimization Issues in Pre-implementation stage of ERP System. The study identified Business Process Reengineering, change management, effective communication, effective training, infrastructure, inter-team cooperation leadership, management involvement, rewards and recognitions, standardized implementation sequence, team composition and top management commitment during the phase of ERP system implementation. Different Qualitative & Database Optimization Issues have been identified in post-implementation stage such as end user satisfaction, employee motivation, organizational productivity, software reliability, professional development services and support & maintenance.
In Pre-implementation stage of ERP System study found different issues such as Clear objectives and scope, complete awareness, organizational analysis, right product selection, study of organizational culture and team composition.

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