Critical Issues, Challenges in ERP Implementation and Proposed Solutions

Divya Asrani
B.N. College of Engineering and Technology, divyaasranimailbox@gmail.com
Deepak Asrani
B.N. College of Engineering and Technology, deepakasrani_in@yahoo.com

Abstract.

In today's world almost all the small, medium and large size organizations depend upon the ERP systems for managing their business and yet it would be wrong to say that ERP systems are foolproof. This research seeks to identify and summarize the issues and challenges that could be responsible for ERP failures in various organizations and propose a model as a solution for implementing the ERP in the right manner. After rigorous literature review done on the ERP issues and challenges stated in other research papers, it can be concluded that there are lot of research papers that describe the social and managerial issues in depth but there is a dearth of research which highlights the technical issues. This paper has been written with the intention to extract all the notable issues in an orderly manner that actually hamper the success of any ERP software and propose a solution to tackle the same. Till date, a practical working model for the right ERP implementation in technical aspects has not been proposed and therefore, would be a wonderful addition to the knowledge base in the ERP domain.

Keywords. ERP Issues, Techno-managerial, social issues, organizational issues, CSFs

1. INTRODUCTION

Enterprise resource planning (ERP) systems prove to be an off the shelf solution for replacement of the age old legacy systems for organizations by reducing costs, sharing information, and enhancing the management of business processes by real seamless integration and coordination of business processes. In the 21st century when everyone is in a rat race of being the best, time and efficiency have become the utmost concerns of all the organizations. There is no ERP system that is flawlessly implemented and functioning because till date, there is a dearth of knowledge in the issues related to ERP systems.

The only way to solve any problem is to first know what the issue is. With this motivation, the study below formulates a research in ERP domain for determining the ERP challenges and also proposes a valuable solution to address the issues at various levels.

Fig 1: Potential ERP modules

2. RESEARCH METHODOLOGY

In this article we have first used the SLR i.e. Systematic literature review method to summarize the findings of different research papers. We have also drawn out some techno-managerial problems from survey conducted in multinational software companies having well established business in ERP domain to identify the problems and then propose a solution to address these problems. Various research papers were read and surveyed properly to find the gaps. A survey was conducted to deduce the issues in ERP domain and then carefully understand the ERP issues faced in IT industry.

3. LITERATURE REVIEW

[1] According to a research done in steel industries, some of the crucial issues that have been identified are: clear scope of implementation, commitment of the top management, proper strategy for implementation, vendor selection and end user involvement [2], [3] The other major issues that got highlighted in some studies were as follows: organizational changes and adapting to new ERP system, high subscription costs, business complexities and customizations, network dependencies, issues in security and problems in integration, design and architecture. [4], [5], [6], [7] Some studies also suggest that system quality, information quality, lack of skilled technical staff, change management, not knowing the reason behind implementation and huge funds required are determinants of ERP success and if not integrated appropriately can prove to be one of the biggest reasons of ERP failure. [8], [9], [10], [11] Other knocking issues highlighted are: improper system implementation, unclear scope of the procedure used for implementation, improper project planning and humongous customization needs, change management, gaps between the organizational information and reality, customization issues,[12] improper project planning and [13] the issue of dealing with the formation of IT department in public sectors. In post implementation of the ERP, one pressing ERP issue is deciding whether to outsource the maintenance of ERP or form a self IT department. [14] More experienced, educated and younger generation people are inclined and satisfied with ERP systems. [15] Other issues highlighted in the ERP are: inadequate user training, need to modify the standard ERP codes to suit the business requirements which can be really expensive, no after support from the vendor, user resistance, change management, wrong team selection, update costs [16], [17] business process re-engineering, slow site issues [18], [19] . Data conversion issues [20] and organizational culture issues [21] have also been highlighted in some studies. Improper testing, time-zone limitations and ambiguity of roles also form some potential ERP challenges [22], [23].

This literature review shows that the technical aspects of the ERP issues have not yet been properly explored and therefore, a combination of techno-managerial issues has not yet been summarized.

4. FINDINGS AND DISCUSSION

The table below summarizes top 15 issues found in ERP from rigorous literature review:

	ERP Issue	Relevance/Frequency
2	user training	12
3	BPR	10
4	top management approach	9
5	vendor selection	8
6	Project mnagement	8
7	change management	8
8	High cost	8
9	Integration	5
10	Undefined scope of implementation procedure	4
11	IT infrastructure	4
12	Internal conflicts	4
13	Security	4
14	Business complexities and customizations	4
15	Ineffective communication	3

Table 1: ERP issues

The above work suggests that ERP systems can turn into the biggest failures in design and implementation phases if not handled carefully and also believes technical issues have not yet been studied. With this motivation the research work below highlights top 10 techno-managerial issues that arise in organizations that have implemented ERP solutions and a proposed framework/model to address these issues.

Implementation Issues

1. **Data Migration:** Data migration is a two way process. While importing the data from a legacy system to an ERP system, a major issue arises when data is either not refined or in bulk. The one time job of importing the data consumes a lot of time in refining and importing bulk data and also takes several days which hampers other ongoing operations.
   While exporting the data from ERP systems to excel file, sometimes the data might look tampered. E.g.: 00001 in number format is considered as 1.
   - Solution: To mitigate this, the data must be refined using different refining algorithms at a middleware and then be made ready for importing. In case of bulk data SQL server management can be used to write one time SQL queries that can directly import data into ERP tables as SQL queries have proved to be a time-efficient approach for insertion and updation.
   - While exporting the data, the excel format must either be set to text via the export class code or the data must always start by a letter to avoid the tampering of data (00001 in text format is also 00001).
2. **Third Party Integration:** In case of third party Integration with the ERP systems, usually enumerators are used to define gender, sales order types etc. These enums are manually maintained in both the integrated systems and bulk updation becomes a tedious task at any point in time.
   - Solution: Master tables must be maintained as much as possible. In both the integrated systems the master data must then be shared regularly by using the APIs scheduled in batch processes.
3. **Multi-company ERP:** In case more than one ERP team is working on the same ERP software, tracking, whose implementation has caused the errors to arise, becomes very difficult.
   - Solution: The classes and tables on which some extra customization is done should be added to version control so that the changes can always be rolled back to the previous versions. This will also help in tracking down the error caused by a specific team or a person.
4. **Simultaneous development and integration:** In any MNC, more than a single project gets implemented at a time and then integration takes place to merge the changes at a single level. While integrating, the labels used in one development

environment can get overridden by the other if the label numbers are same coincidently.

- Solution: The developers must coordinate and select a number series prior to starting the development to avoid any such clashes.
- If there is no option for selecting the label series, then the labels must be made at the end after integrating the projects in a single environment. This will help in not hampering the simultaneous development as well as the label numbering.

5. **ERP Software migration:** Migrating the current code from one ERP solution to another can be a tedious and time taking process and yet, with advancement of ERP software, it actually becomes an unavoidable task. The companies often lose their clients when the migration process takes place because it is not a one day task.
   - Solution: This problem can never be fully mitigated but can be considerably reduced if developers try to keep their code as much secluded as possible from the standard code. Migrating the standard code is a difficult task and needs a lot of care. So, developers must keep their customizations localized.

Post Implementation Issues

1. **Update conflicts:** Update conflicts occur whenever some user modifies a table column and simultaneously a scheduled batch process modifies some other column in the same table. Due to this the system enters a deadlock.
   - Solution: The batch jobs which access busy tables (e.g.: transactional tables) must be scheduled in non-working hours so that fields only get modified by the batch jobs during non-working hours without any other user interference.
2. **Requirement gathering and brain-storming sessions:** Requirement gathering and brain storming sessions with the client often contain a lot of information that is discussed in one particular session. Many different test cases may also be discussed. If not noted down properly, this can create a problem in projects.
   - Solution: Noting down the requirements is a tedious and unreliable task as the client's intention might get distorted as noted by some other person. The best possible way is to record the sessions so that the developer can at least have the access to the client's requirements while developing. Each project must start after preparing the requirement documents that clearly state the requirements.
3. **Service request load:** Any solution provider is expected to provide after development support to the client if any errors arise in the development. This often increases the load of non-chargeable efforts, thereby reducing the load of new chargeable requirements.
   - Solution: Developers must be trained to monitor the minute defects and must unit test their code correctly. The rare test cases that might get ignored while tester's testing should also be tested to deliver fool-proof solution. It has also been noted that there is a difference between the data present on production environment and development environment. This reduces the testing quality as testing must always be done on the real-life data. DB store process from the production environment to the core development environment must be done frequently to avoid such issues.
4. **Importing issues:** Whenever some data is imported into the ERP systems, it usually enters the staging table first. After entering the staging table, the data

undergoes some validations and enters into the main backend tables. However, it has sometimes been observed that the data gets validated but does not get imported into the ERP system tables. The status of the data in the staging gets changed to 'validated'. Developers or users get confused and think that the validated record is not getting imported as it should actually be imported after getting validated by the process written. However, in reality, the record is not validated properly and therefore does not get imported.

- Solution: Since ERP systems have an ocean of pre-implemented code within the ERP's standard functionality, so many internal validations are also applied for various processes like: sales orders, purchase orders, etc. So, in order to avoid any such validation issues and problems, all the validations that system applies to any record must be pre-added in the code that validates the staging data. In this manner, the data will be blocked/marked as error at staging table level itself and won't be subjected to the validation of the standard system.

5. **Empty header import:** Many times there strikes a need to import data which has a single header and associated lines (eg: purchase order). In such cases, if no line gets imported, the header import must also be rolled back. However, this does not always happen and many users complain about seeing an empty header without any line.
   - Solution: Proper try catch implementation can be used and entire record (header and line included) must be imported using the transaction control block. Rather than doing the entire work in two separate transactions, a single transaction must be used for the entire process of importing a single record (header and line included).

After considering all the issues and suggested solutions, we can create a named model that acts as a basis for better understanding of the ERP issues that are techno-managerial in nature. The model below: TRIUMSEEDS MODEL, summarizes and provides a clear understanding for the ERP issues for which, the discussion and proposed solutions have already been mentioned in the above text.

TRIUMSEEDS MODEL

Triumseeds model is formulated in a way that it will provide a deep insight into identifying the issues in the ERP systems and can be considered before ERP implementation in any industry. Each letter of the model corresponds to a potential issue that can arise in ERP.

T	• Third party integration
R	• Requirement gathering and brainstorming
I	• Importing issues

U	• Update conflicts
M	• Migration issues
S	• Service request load
E	• Empty header import
E	• ERP software migration
D	• Data migration
S	• Simultaneous development and integration

5. CONCLUSION

For research, this work can help budding researchers in considering the topics, gaps and findings in the ERP implementation process. The working model suggested for the right ERP development will definitely be a resourceful tool for implementing the ERP correctly and will also reduce the possibility of the technical issues in the ERP system. It can be concluded that, to implement the ERP solution correctly it is really important to strike a balance between technical, managerial and social aspects of the issues that can occur and then proceed accordingly. If the possible issues and their solutions are pre-noted before implementing the ERP system then the possibility of its failure is bare minimum.

6. FUTURE RESEARCH AVENUES

Although the research has summarized most of the critical issues in the ERP domain, this research also concludes that the technical and managerial issues go hand in hand and are yet not fully explored with reference to the ERP domain. Moreover, ERP success and the use of data analytics and machine learning with integration in ERP would be very interesting research topics in the near future. The advanced technologies when combined with an ERP system will prove to be a boon to the IT industries and therefore, research work can be carried out in this field in the future.

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Biographies

Divya Asrani received her bachelor's degree in Computer science engineering in 2020 and is currently pursuing her Master’s degree in computer science.

Dr. Deepak Asrani has completed his PhD from Teerthankar Mahaveer University and is currently working as a Professor in computer science department.