

# IMPACT OF EMERGING TECHNOLOGIES ON ERP SYSTEMS

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**Abstract :** This paper presents impact of emerging technologies on Enterprise resource planning in India. Basic characteristics such as Implementation times, Scalability, Business Cost, Usability are compared after implementation of ERP packages. Also this study presents the relationship among the factors that effects successful ERP implementation and top emerging technologies which mainly influence the coming ERP scenarios.

**IndexTerms** -ERP System, Cloud Computing, Mobile Computing, Critical Success Factor, Decision 2.0, Machine Learning, Internet of Things.

## I. INTRODUCTION

All ERP system has been defined as integrated information system of all business functionalities comprised several modules across the industry which provides services to all the department of industry.

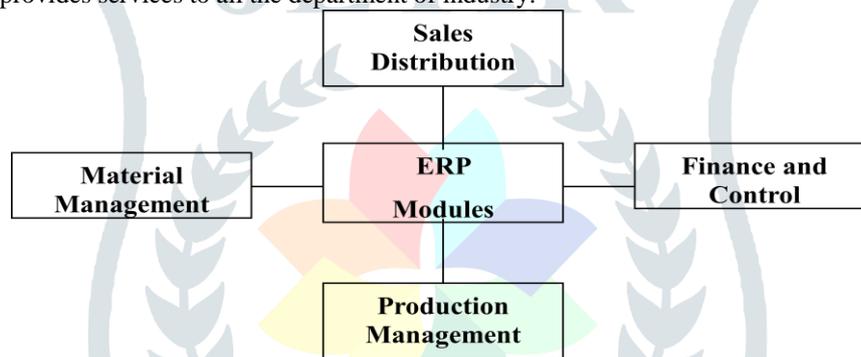


Fig. 1.1: ERP system with different modules [4].

Present competitive environment ERP is (life blood) essential for industry survival. A successful ERP implementation provides improvement in efficiencies by increasing productivity, cycle time reduction and removing ambiguous information. ERP system integrates all modules which result in cost saving [1].

According to Yang and Su for gaining maximum benefit, ERP is a group of application modules which can link back-office operations to front-office operations as well as external and internal supply chains. Companies require to adopt global practices and data format for effective business communication with their suppliers, customers and vendors. The important comprehensive ones being, productivity, quality improvement, and cost reduction, optimum resource management, planning, enhanced decision-making and, organizational empowerment. ERP packages are complex and massive, include substantial investments of money, time and significant industrial change and thus, it requires careful planning and execution for successful implementation [2].

Successful ERP implementation is costly project. The effects of ERP failure would be terrible. In spite of technological development in software, ERP system failure is quite common [3, 4, 5]. There exist various stories regarding failures and success of ERP implementation. Thavapragasam researched that seventy five percent of the ERP systems are failed and not completed on time and in the budget. The past researches of Zhang and Parr reveal that ERP systems failure rate is varying from 40 to 90 %. It is marked in the old research that ninety percent of ERP package implementation was found behind timetable or more than budget whereas the success rate is just about 33 percent. A query about ERP implementation from one hundred seventeen organizations included that twenty five percent ERP system projects were more than budget, twenty percent were stopped before implementation and 40% of the respondents told that ERP system project unsuccessful to accomplish industry targets [8].

Rockart (1979) initiated critical success factors technique in 1979. Since then CSFs are applied to recognize the factors affecting the ERP implementation failure and success. CSFs are “the few important areas of activity in which favorable results are absolutely necessary for a particular manager to reach his goals” [4].

The importance’s of CSFs are not only attractive to managers of industries but also researchers. CSFs are accessible and vital moreover the prioritization and identification of factors that could control implementation success [5].

ERP system failure rate is more and the subsequent influences are so destructive to industry, there is a compelling reason for investigating the factors which may influence the success of ERP implementation in organizations [27, 30]. It is significant for companies to understand from the experiences of others and apply from their practices and affecting factors.

Considering above things in mind the research objectives of the paper are as follows:

- 1 Study the emerging technologies impact on the ERP system implementation.
- 2 Identify the factors that affect the ERP implementation in industries.

This paper is organized as follows. Second Section describes the literature review on factor affecting the ERP implementation. The third section presents research model. The section fourth of the paper represents the methodology adopted for the paper. The section fifth illustrates the data analysis and results. The six sections conclude the result discussion and conclusion.

**II. LITERATURE REVIEW**

In this section literature review has been presented. In Indian industries, integration of the different business functions is necessary requirement. A numbers of industries in India have previously implemented in the ERP package to develop their businesses. Industries in India seriously faith on ERP system to check inventory, the supply chain, sales and distribution, financial process, overall transparency to the owner across every process and capture consumer requirement to a new height [14, 15].

However, many companies in India are having different isolated modules of computerization which are not interfaced with each other to handle their main business works. This policy can causes less efficiency and effectiveness [11].

Implementation of ERP packages is intricate process which is affected by technical and other factors also. Hence, in order to assure the success of ERP system implementation it becomes crucial for the industries to acquire a deeper insight into the factors which affects the ERP implementation [4, 8].

The research gap in this study can be concluded by statements as “influences of emerging technologies on ERP implementation.”

DeLone and McLean has given framework for factor impact on information system that represented Information Quality (IQ), System Quality (SQ), Individual Impact (II) and Organizational Impact (OI) having significant role for ERP success in organization as shown figure 1.2 [24].



Figure 1.2 DeLone & McLean (1992) IS success model [24].

Saunders and Jone presented a model simply concerned with organizational factors, performance dimensions and its measurement. Myers et al. (1997) has given IS assessment framework considering quality and productivity of Saunders and Jones IS model. Gable et al (2003) presented the most comprehensive ERP systems impact and measurement model that was good contribution to knowledge in this area of ERP research [26, 27].

Gable et al included vendor and consultant quality in the Extended ERP systems impact and measurement model as shown figure 1.3 [25].

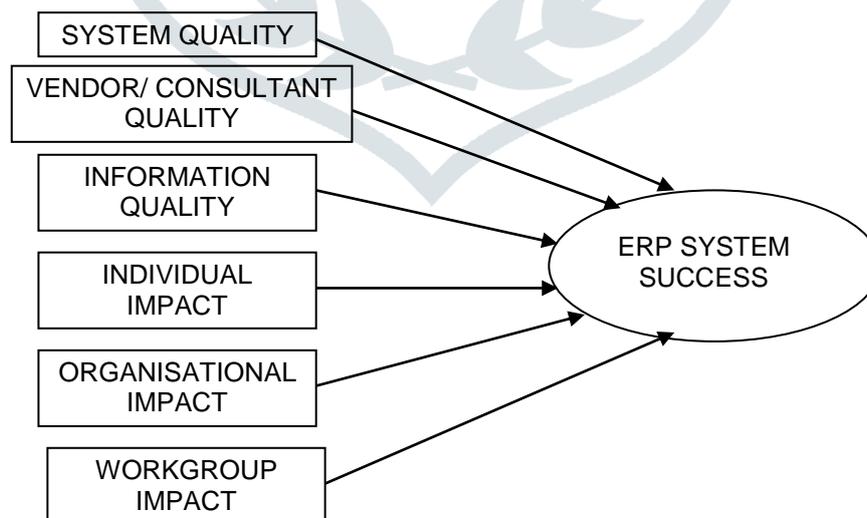


Figure 1.3 Extended ERP systems impact and success measurement model by Gable et al. [25].

The future technologies, Cloud Computing (CC), Software as a Service (SaaS), Internet of things (IOT) and Machine learning, could considerably alter the present ERP system working and happen to a primary part of ERP packages of the future [11, 12, 13, 14].

Cloud Computing have been provided computing as a service rather than product as a utility over the internet is a technological shift that is sweeping across the IT landscape [7].

ROI means return on investment. It is important parameter for measuring ERP success in industries. User satisfaction is also a parameter for ERP continuous use and adaptation in organizations.

Measuring parameters are ROI, user satisfaction and more market share etc. After reviewing the literature, we chose to utilize seven theoretically important CSFs in this study Factor: Business Cost, Accessibility, Implementation Time, Mobility, Scalability, Upgradeability, and Usability [25].

Emerging Technology includes Cloud Computing, SaaS, Mobile computing, Web 2, Social Networks, Decision 2.0, Internet of Things, Big data etc

**III. RESEARCH MODEL**

Main influencing factors have been recognized from literature than the following research framework was presented which was illustrated in Figure 1.4.

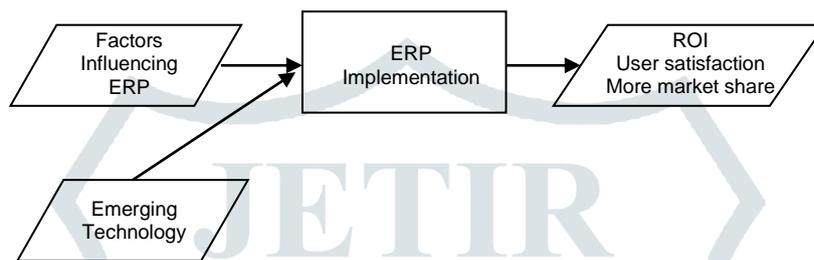


Figure 1.4. Input / Output diagram of ERP system considering emerging technologies

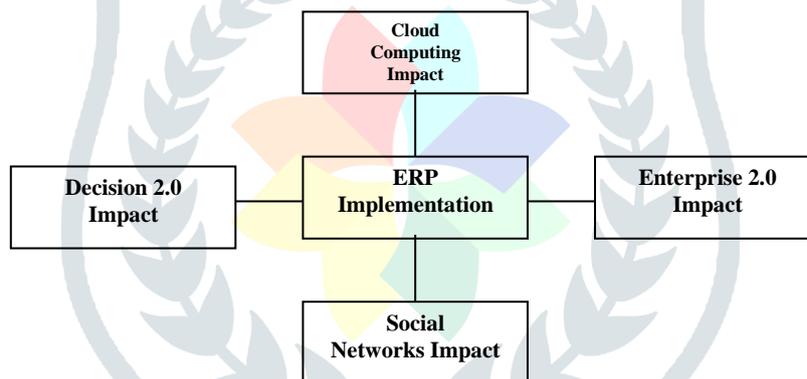


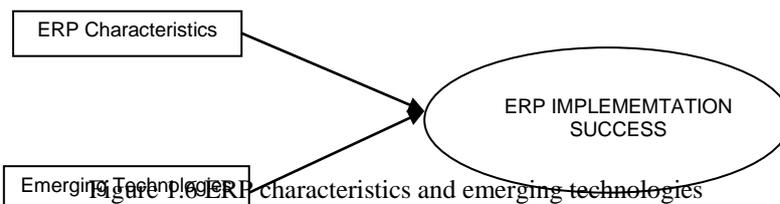
Figure 1.5 Impact of different future technologies on ERP system

Figure 1.5 represents the impact of different emerging technologies on ERP system.

**IV. RESEARCH METHODOLOGY**

Different methods in this research used to gather data about emerging technologies used in the architecture of ERP Systems. To expand on the present research, available in the literature, an organizational survey was conducted that presented questions to industry professionals. The survey used the literature survey as a reference when suggesting questions for the industry survey. Industry professionals were asked questions about each of the ERP Systems they had worked with it. Every respondent was asked forty one questions plus some of extra questions depending on their responses. Questions focused on information about the industry professional’s company, characteristics they found important in ERP Systems, their company’s current and prior ERP Systems, and their opinion on ERP emerging technologies.

Any details about each individual user were kept strictly confidential and the respondent was informed of this confidentiality before participating in the survey. These respondents had a range in backgrounds having worked with various ERP packages, for different industry types and for different sized companies. Their responses were a variety of Traditional Legacy ERP packages and Cloud ERP system. For example 19 ERP users answered about SAP ERP system and four users answered about Oracle ERP system. In total, data was collected about 35 ERP Systems. As the analysis will show, this sample size provides meaningful statistical results.



The analysis method is based on the data collected in the organizational survey. Organizational professionals, which are also ERP users by practice, were asked to recognize which characteristics of ERP Systems are important to them and their company. The characteristics that were identified as important were then used to rate how the ERP users felt about their company's ERP Systems. These ratings are critical for the analysis since a comparison can be made based on the satisfaction ERP users had with Emerging Cloud ERP Systems compared to Traditional Legacy ERP Systems. This data was analyzed to the backgrounds for each of these users.

**V. DATA ANALYSIS AND RESULTS**

Five point Likerta scale is used for taking feed from ERP respondents. ERP respondents are ERP mangers, ERP Core team members, consultants etc.

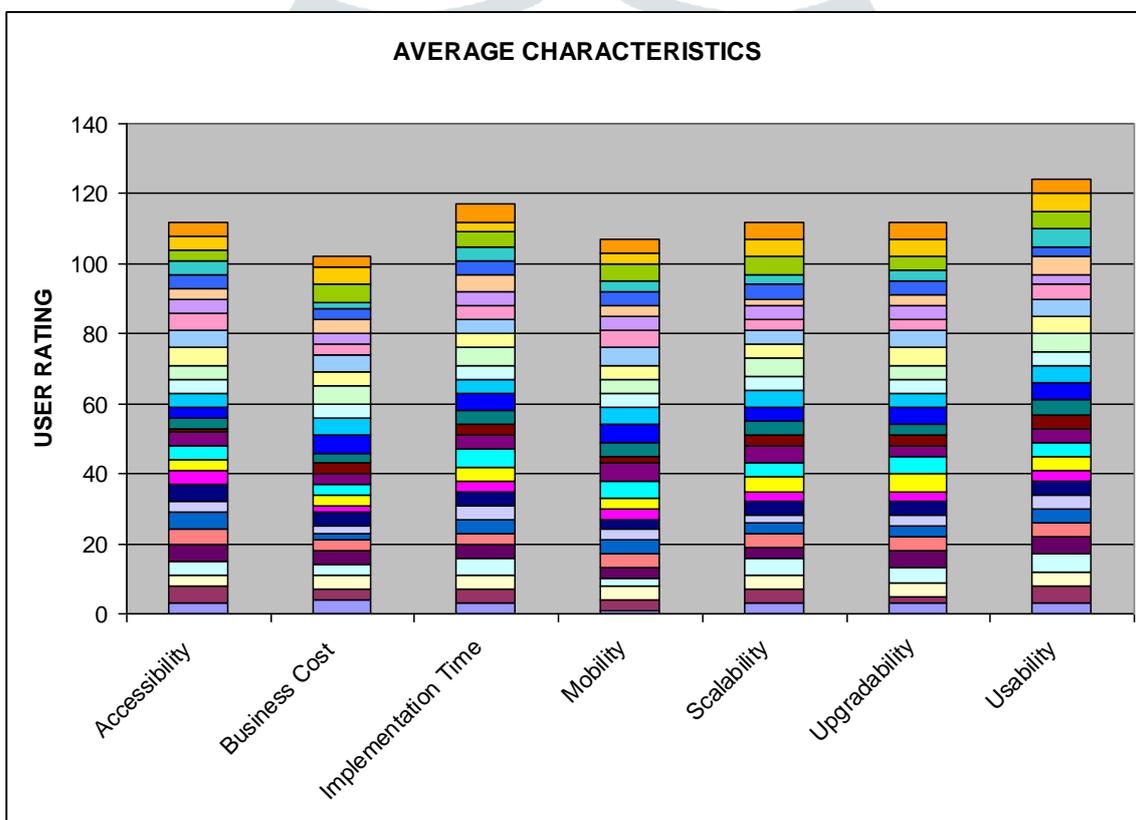


Figure 1.7: Average importance of characteristics

Analysis has been performed on SPSS tool which shows characteristics of legacy ERP systems importance order are Usability, Implementation time, least importance is given to Mobility characteristic in the survey as illustrated in figure 1.7. And similar feedbacks have given by respondents for latest ERP system in the survey.

The main challenge from the emerging technologies (Cloud Computing, Mobile computing, Machine learning, SaaS and BI tools as presented in figure 1.8) is the issue of security. Organizations want assurance that their data is secure while running on a vendor’s datacenter. Possible security problems include phishing, data loss, and botnet which could produce serious threats to an organization's data and application software. Furthermore, the use of Multi-Tenancy has introduced new security challenges that require unique solutions because of the use of pooled computing resources. The industry survey performed for this paper had many ERP users disclose that security was a critical issue for their company switching to these emerging technologies.

The inability to customize a Cloud System is another challenge for the adoption of emerging technologies for ERP Systems. Organizations generally want their ERP System to be customizable based the needs of their business and operation. To be competitive to a Legacy System the Cloud System must be configurable to the degree that properly reflects an organizations

business processes and business functions. These concerns were also shared by the many respondents in the industry survey with ERP users stating that adaptability and functionality were critical issues for adopting an Emerging Cloud ERP System.

Reliability or service outage is another challenge for the adoption of emerging technologies for ERP Systems. Outages can either be temporary or permanent but both have negative effects on business processes and the organizations they support. Temporary outages come about when the Cloud service can no longer be reached through the internet. A temporary outage can arise from a datacenter failure, a power outage, a software error or a number of other probable problems.

When this type of outage takes place the system could be down for a few hours or nearly one full day (Kim et al. 2009). The second type of outage is a permanent outage. This can occur primarily if the Cloud provider goes out of business. Industries must make sure that their data isn't lost if their ISP goes under due to financial troubles.

The overall cost of using emerging technologies for ERP Systems is another potential challenge for widespread adoption. Data center usage and maintenance costs have been shown to be lower in the Cloud Computing model but data transfer costs can be expensive and create data transfer bottlenecks. Organizations looking to use a Cloud ERP System will have to work with their service provider to minimize costs related to data transfer. The cost of using emerging technologies for ERP Systems was also the top critical issue found in the survey. Figures 1.8 illustrate the Cloud computing, Mobile computing, Machine learning, SaaS and BI tools as emerging technologies which have considerable impact on coming ERP system.

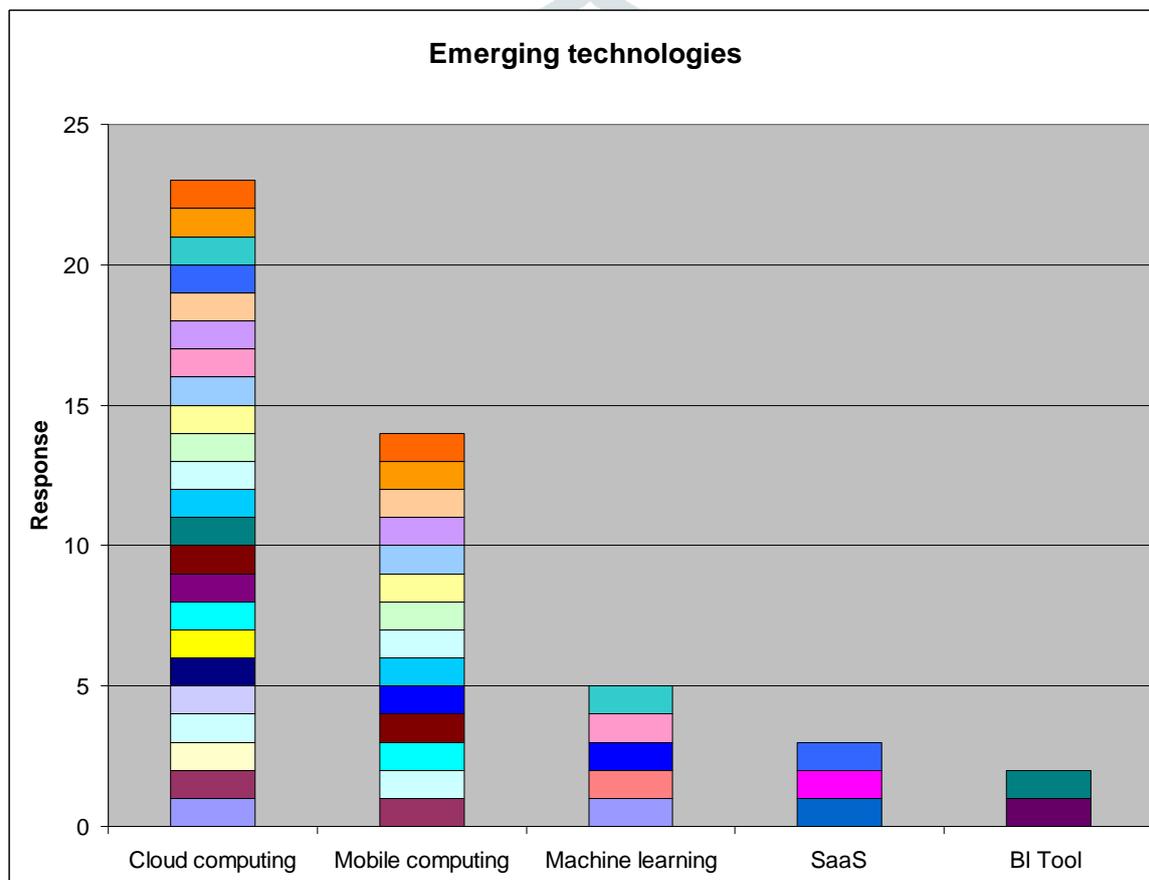


Figure 1.8: Top emerging technology

## VI. CONCLUSIONS

This paper presents the impact of different emerging technologies on the ERP Systems and its characteristics. The advantages of these emerging technologies are only recently becoming recognized but many users now feel that the transfer to these new technologies has begun. An industry survey was established to gather data from ERP users.

In this survey specialists recognized Cloud Computing, Mobile computing, Machine learning, SaaS and BI tools as the dominating emerging technologies for ERP Systems for the upcoming decade. ERP respondents also rated emerging Cloud ERP packages with more satisfaction than conventional legacy ERP packages in seven significant characteristics - Usability, Accessibility, Scalability, Business Cost, Implementation Time, Mobility and Upgradability. Survey outcome concluded for this study, and the related analysis, specify that users of emerging Cloud based ERP packages are significantly more satisfied with performance of their company's system in all of these important characteristics.

Furthermore, this study established that Cloud ERP packages had a shorter time to implement and a larger proportion of Cloud packages were on the latest software version. This means that Cloud based ERP Systems are set up faster and require much less maintenance to keep the systems current with technological advances. However, the survey found only slightly over half of the

survey experts had considered emerging Cloud ERP packages for their company. This finding was generally due to either a hesitation in switching to a Cloud ERP packages or not being familiar with new arrivals. In the industry survey the experts were asked what are main critical issues they believe one must consider before acquiring any of the emerging technologies for their company's ERP packages. The critical issue with the most responses was the security, business cost and usability.

Based on the information gathered in the literature review and the industry survey this paper concludes that Cloud Computing, SaaS and Multi-Tenancy provide many benefits for cloud based ERP packages relative to Legacy systems.

Overall, the benefits provided by emerging Cloud based ERP packages, as demonstrated in this paper, provide evidence that the move to the Cloud has begun. The ecosystem now appears aware of the dramatic shift in the method in which computing occurs. As time progresses and offerings continue to improve, emerging Cloud based ERP packages are posed to provide a multitude of benefits for both companies and their users. Currently we are only at the beginning of a dramatic change in ERP systems.

## VII. ACKNOWLEDGMENT

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