

A STUDY OF CRITICAL FACTORS FOR ERP IN SMEs

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Abstract: Over the last few years, however, ERP applications have begun appearing in SMEs, and in particular, in SMEs in the manufacturing sector. This paper seeks to show how ERP could create a competitive advantage for small and medium-sized enterprises. ERP could create advantage in delivery for SMEs by being responsive and agile to change, but not to uncertainty. It is important, particularly for SMEs, to recognize the elements for a successful ERP implementation in their environments. This paper provides a reference framework to examine the critical elements that constitute a successful ERP implementation in SMEs with especial reference to India.

Key Words: ERP, SMEs, Enterprise Market, Vendor and consultants.

1. INTRODUCTION:

The Components of an ERP System - The components of an ERP system are the common components of a Management Information System (MIS).

- **ERP Software** - Module based ERP software is the core of an ERP system. Each software module automates business activities of a functional area within an organization. Common ERP software modules include product planning, parts purchasing, inventory control, product distribution, order tracking, finance, accounting and human resources aspects of an organization.
- **Business Processes** - Business processes within an organization falls into three levels - strategic planning, management control and operational control.
- **ERP Users** - The users of ERP systems are employees of the organization at all levels, from workers, supervisors, mid-level managers to executives.
- **Hardware and Operating Systems** - Many large ERP systems are UNIX based. Windows NT and Linux are other popular operating systems to run ERP software. Legacy ERP systems may use other operating systems.

The boundary of an ERP system is usually small than the boundary of the organization that implements the ERP system. In contrast, the boundary of supply chain systems and ecommerce systems extends to the organization's suppliers, distributors, partners and customers. In practice, however, many ERP implementations involve the integration of ERP with external information systems.

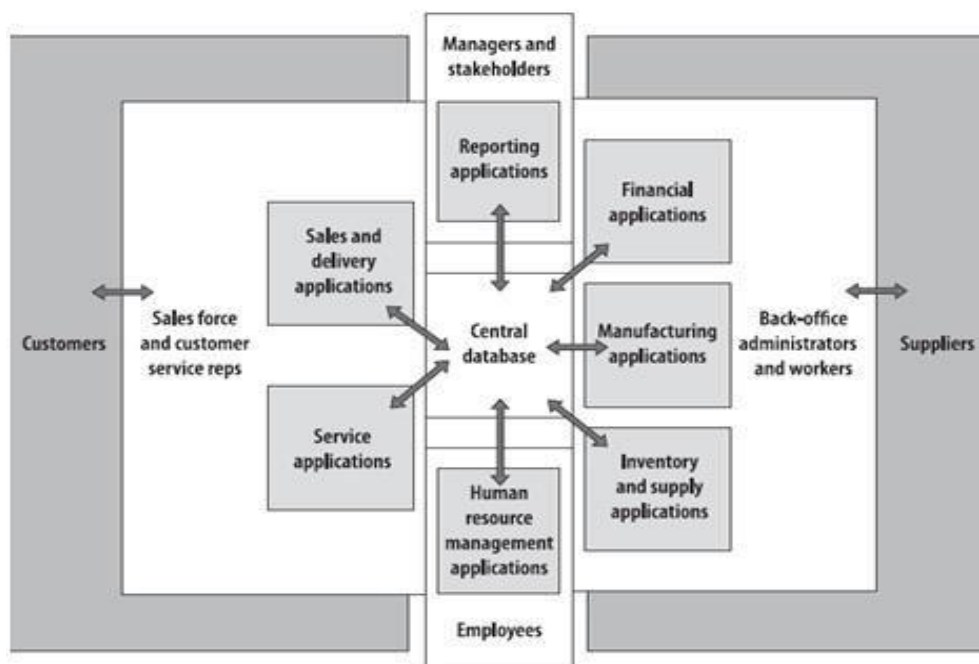


Figure 1: An anatomy of an enterprise system, davenport 1998.

2. SMEs:

Small and medium enterprises (also SMEs, small and medium businesses, SMBs, and variations thereof) are companies whose headcount or turnover falls below certain limits. The abbreviation SME occurs commonly in the European Union and in international organizations, such as the World Bank, the United Nations and the WTO. The term small and medium-sized businesses or SMBs is predominantly used in the USA. An ERP system is based on a common database and a modular software design. The common database can allow every department of a business to store and retrieve information in real-time. The information should be reliable, accessible, and easily shared. The modular software design should mean a business can select the modules they need, mix and match modules from different vendors, and add new modules of their own to improve business performance.

SME AS GROWTH CONTRIBUTOR:

It has been recognised that some of the world's best performing economies, notably Taiwan and Hong Kong, are very heavily based on small enterprises'. 81% of all employment in Japan is in SMEs where the average enterprise employs nine staff as opposed to four in the EU. Chinese and foreign experts estimate that SMEs are now responsible for about 60% of China's industrial output and employ about 75% of the workforce in China's cities and towns.

Enterprise Resource planning was a term restricted purely to elite class. This scene was witnessed in the IT market for some long time ever since ERP was introduced. Most of the Software vendors are increasingly developing strategies to make their position strong in this segment as it offers significant future growth potential as SME's has limited resources, but most of them actually has identical requirements. In Addition to that small and medium scale businesses never care about extremely decisive functionality, implementation and delivery models that maintain primary and returning costs low.

In last few years most of the ERP vendors slightly changed their strategies and focusing more towards targeting and enhancing their share in Small and Medium scale enterprises. The reasons for ERP vendors to change their strategies because

- Saturated Large Enterprise Market : Most of the Fortune 500 companies with huge budgets enough to afford ERP implementations had already installed solutions, and most of the Small and middle class business in short of the finances, resources and knowledge experience to implement ERP solutions. In most of the ERP vendors (like Oracle ,SAP) modified their business model and change their target market from large businesses to SME's.

Secondly, large scale enterprises are no longer ready to pay huge license fee due to competitive pressures in IT implementation. Moreover, large scale enterprises have reduced their IT budget in recent years; In fact most of the big companies have avoided large, enterprise wise technology implementations.

ERP ADOPTION BY SME

Enterprise resource planning originates back to re-order point systems and have an internal focus on a company. ERP-systems are designed to support a number of diverse company functions, closely integrated with each other through a central database. Adoption of ERP in small- and medium sized companies has been measured and discussed by several researchers.

Sharma K.M. and Bhagat R. (2006) in their study of information system (IS) related practices in 210 SMEs of western part of India concluded that though SMEs understand and acknowledge the importance of the IS in day-to-day operations management in the present dynamic and heterogeneous business environment but these are yet to implement, operate and exploit it fully in a formal and professional manner so as to enable them to derive maximum business gains out of it.

The pressure of staying ahead in a competitive environment by reduction of costs and product development time is compelling SMEs to leverage technology and business applications adapted by their large counterparts. On the technology front, the emergence of the internet as a secure, low-cost platform for business transactions and the availability of affordable information technology infrastructure have made it simpler for SMEs to look at end-to-end business management applications.

From Vendor Perspective: Enterprise Resource planning was a term restricted purely to elite class. This scene was witnessed in the IT market for some long time ever since ERP was introduced. Firms were interested in serving such large players. So the fate of Small and Medium enterprises remained unanswered. ERP for S.M.E's remained a mere dream. This explanation of how companies adapted to ERP has lot of significance in studying their intervention with S.M.E. These bigger companies were not providing the required business to ERP vendors. Even though there are many big companies the number of vendors was always greater in multiples. This means only the best could strike

deals and there was no possibility for average vendors (in terms of performance). The best players also found that they had none to serve after a point of time because almost every company in the market successfully established ERP (whether on the first or further attempts). So Most of the Software vendors are increasingly developing strategies to make their position strong in this segment as it offers significant future growth potential as SME's has limited resources, but most of them actually has identical requirements. SME provide greener and fresher pastures for large and small ERP vendors.

TECHNOLOGICAL AND OPERATIONAL DRIVERS FOR ERP ADOPTION

- **Y2K Problem or Millennium Bug:** Larger companies expressed more confidence in solving the Y2K problem since they had large IT staffs whereas the small- and medium-sized companies did not have such dedicated resources and looked more at the ERP system to solve that problem.
- **Hardware and Software Obsolescence / Technological obsolescence:** Newer versions of software constantly render older versions obsolete and the hardware required by this software also changes over time. Consequently, information which relies on obsolete technologies becomes inaccessible. Companies are also facing problem with this version and incompatible problem; therefore they want a robust and long lived solution for their enterprises like ERP.
- **Incompatible Legacy Systems:** Most SMEs in the manufacturing sector even today are dependent on inflexible, cheap and standalone applications. But they are fast realizing the necessity of setting up intra- and inter-office networks, reliable IT infrastructure and the value of opting for branded ERP and software products.
- **High data distribution cost:** The lack of data interoperability among different application / technologies and between devices make high data distribution cost. This cause enterprises to go for a system which provide greater opportunities for data integration and data compatibility among different applications which share the same standards of data transfer.
- **Integration with other application:** These systems are designed to solve the fragmentation of information in large business organizations, and integrate all information flows within a company. The justification for adopting ERP centers on their business benefits, which, can be divided into technical and business. ERP systems have benefited from industries turning to technology, realizing the full impact.
- **Data redundancy and Inconsistency:** Implementation of ERP solution solves this data redundancy and inconsistency problems because the architecture of ERP is based on a common database and a modular software design.

3. CHALLENGES:

VENDOR PERSPECTIVE

- *Cost:* The small size of the companies proves to be another challenge to the vendor. Since there are too many S.M.E.'s in the market they demand a very low price from the vendor. It becomes practically impossible for the vendor to offer at such quotations as he would not even be guaranteed of a return in the costs.
- *Choice:* Companies have to exercise adequate care in choosing their ERP vendor and Small business ERP Software. This is a big dilemma for companies because they are unsure of choosing software offered by a branded player or a small player. That really makes no difference as long as the software and vendor suits all the requirements.
- *Customization:* The bigger players have a trouble when it comes to offering solutions for S.M.E.'S. The level of customization and the work demanded by the S.M.E.'s sometimes appear to be too much for a bigger player.
- *Confidentiality:* Big vendors don't even offer the source code when it comes to S.M.E.'s. This has resulted in lots of functional errors and the very purpose of ERP has been questioned by and large.
- *National boundaries:* The trade practices, statutory regulations and commercial requirements and rules differ greatly from one country to the other. This in itself requires lots of frameworks to be done before taking ERP to that particular nation.

COMPANY PERSPECTIVE

The boom in the ERP business segment is accompanied by a lot of challenges. ERP decisions are a "high-risk high reward" option. Some of the key challenges presented by SME to ERP implementation are as follows:

- Top Management attitude towards IT adoption
- Lack of IT Knowledge
- SME operate in dynamic world
- Lack of Business Process Reengineering culture
- Improper cost estimation tools
- Extended Implementation (prolonged implementation)
- Insufficient IT Resources
- Employee competence of Information System
- Poor Infrastructure
- Less experience in large scale projects
- Greater dependence on Consultant
- Change Management Issues
- Treat ERP adoption as IT Project

4. CRITICAL FACTORS FOR ERP IN SME:

Success definition & measurement: One of the most enduring research topics in the field of information systems is that of system/project success. However, with many new types of information technology emerge, the question of success comes up again. In ERP systems, success takes on special urgency since the cost and risk of these valuable technology investment rivals the potential payoffs. The definition and measurement of success are pointed. Success depends on the point of view from which you measure it. People often meant different things when talking about ERP success. Project managers and ERP consultants often defined success in terms of completing the project plan on time and within budget. But people whose job was to adopt ERP system and use them tended to emphasize having a smooth operation with ERP system and achieving business improvements. In this paper, I adopt both perspectives, from project managers/consultants' perspective to customers/companies' perspective, because I would like to be balance in our judgment by considering from both sides, and it is also considered with our further empirical research that is to investigate on the CSFs from customers, consultants, and vendors point of view.

An important issue in the measurement of success concerns when one measures it. Because project managers and implementers can afford to declare success in the short run but executives and investors are in it for the long haul. Companies that adopted ERP systems needed to be concerned with the success not just at the point of adoption, but also further down the road.

4.1 DEFINE CRITICAL FACTORS

Critical success factors (CSFs) are often used to identify and state the key elements required for the success of a business operation (Hossain & Shakir, 2001). Further on critical success factors can be described in more details as a small number of easily identifiable operational goals shaped by the industry, the firm, the manager, and the environment that assures the success of an organization.

The taxonomy represented in Figure 2 is a means for illustrating on the one hand the inter-relationship between core business strategy aspects, and on the other, the role of IT and associated systems can play in supporting the effective deployment of key business imperatives through process improvement and management and through regular performance monitoring and review.

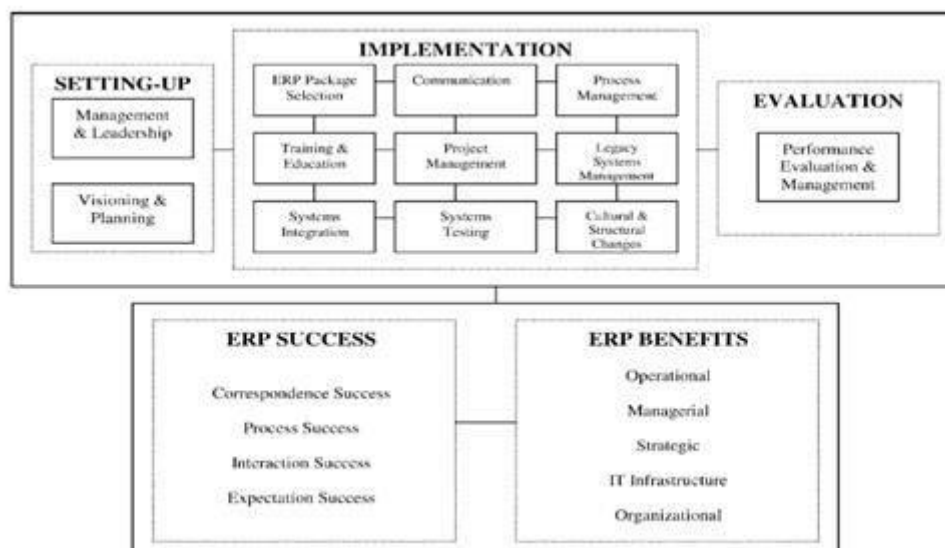


Figure 2 Taxonomy for ERP critical factors, M, Al-Mashari et al. (2003)

4.2 CSF FOR SME

The body of research relating to the implementation of enterprise resource planning (ERP) systems in small- and medium-sized enterprises (SMEs) has been increasing rapidly over the last few years. It is important, particularly for SMEs, to recognize the elements for a successful ERP implementation in their environments. Brown (1994) merely emphasized effective project management and an efficient change management program and culture, which could significantly affect the success of such an implementation. Buckhout et al. (1999) disagreed with Brown's findings, and instead suggested that a clear business plan and vision; top management support and strong ERP teamwork and composition are the key factors for a successful implementation. Suraweera T. et al (2006) studied the managerial aspects of implementing IT projects (like accounting software system) in SMEs in New Zealand. They provide simplified list of some significant factors that impact upon the management of IT projects in general. These success factors are also applicable to Indian SMEs.

Success Factors:

- Simplified/standardized project plan;
- Motivated /experienced staff;
- Clear objectives;
- Alignment of IT project with business strategy;
- Careful planning of change process;
- Top management support

Results indicate that the issues related to managing IT projects in the SME sector are somewhat different from that of complex projects in large firms. Top management support has been highlighted as a key success factor for managing IT projects.

Hamid Nach and Albert Lejeune(2008) provide some the key processes and skills required for successful implementation of ERP in an SME.A study gives an idea of the reasons why an SME might consider undertaking an ERP project. With regard to external flow, SMEs facing major environmental uncertainties could benefit from ERP that would help them further integrate their information and processes. Tafti Mohammed H.A. and Sledgianowski D. (2008) identify ERP system sourcing strategies available to SMEs and to provide insights from a case study (Kanebridge Corporation) of the practices applied and decisions made by an SME in using a hybrid of sourcing resources to implement the successful conversion of their legacy ERP system to a new information technology (IT) environment.

Sourcing Strategies for SMEs: The advent of the internet and open systems has brought about several options for SMEs in sourcing information technology (IT) solutions such as ERP that until recently, have only been within the reach of large organizations. Several new providers of ERP solutions have joined SAP and other providers to offer various options for SMEs in implementing their ERP systems. These recent developments have opened new windows of opportunities for SMEs in ERP sourcing strategies including the use of outsourced software. Sourcing strategies involve a range of options. One side of the sourcing-option spectrum is "total insourcing" which involves production, operation, and maintenance of software completely by the company's staff within the boundary of the enterprise. The other side is "total outsourcing" which is allocation of over 80 percent of the IT budget to external vendors. Between these two options, there exists a large variety of sourcing strategies involving some combination of insourcing and outsourcing.

4.3 REFERENCE FRAMEWORK

Based on literature review and findings in the studies we presented a conceptual reference framework for a successful ERP implementation, particularly for the SMEs in India. Figure 3 shows the conceptual reference framework for a successful ERP implementation in SMEs. The framework shows the Critical Factors and important people involved in each phase of Implementation which are significant for the success of an ERP implementation in SMEs. It shows the elements they need to be aware of and also the constituents at each phase of ERP implementation. This useful indication was expected to enable SMEs to look out for the critical issues before and during implementation.

Hiring Phase: The hiring phase comprises decisions leading to financial aids so that a secure funding is allocated to the ERP implementation project. Key players in this phase include vendors, consultants, company executives and IT specialists. Key activities include the initiation of the idea to adopt ERP, developing a business case, a decision on whether or not to proceed with ERP, the initiation of a search for project leader/ champion, the selection of ERP software and its implementation partner, and project planning and scheduling.

System configuration & Rollout: This phase consists of system configuration and rollout. Key players include the project manager, members from business units and functional areas, internal IT experts, vendors and consultants. These groups of people are known as the implementation partners. Main activities cover the software configuration, system integration, testing, data conversion and training. In this phase, the implementation partners must not only be knowledgeable in their respective areas of expertise, but also they must work closely and get along well to achieve the organizational goal of ERP implementation.

Go Live: This phase refers to the period from ‘going live’ to ‘normal operation’ has been achieved. Main activities include bug fixing and rework, system performance tuning, retraining, and staffing up to deal with temporary inefficiencies. In this phase, the errors of prior causes can be felt, typically in the form of reduced productivity or business disruption. Therefore, it is important to monitor closely and to make adjustments constantly to the system until the ‘bugs’ are eliminated and the system is stabilized.

ERP Phases	Hiring Phase	System configuration and Rollout	Go Live	Maintenance
Critical Factors	<ul style="list-style-type: none"> ◆ Proper Project Management ◆ Clear Business vision ◆ Top management support ◆ Proper communication and group work ◆ Clear scope definition of product ◆ User friendliness 	<ul style="list-style-type: none"> ◆ Customization ◆ Business Process Reengineering ◆ Vendor Support ◆ System compatibility with existing infrastructure 	<ul style="list-style-type: none"> ◆ Change Management ◆ Organization culture management ◆ Testing ◆ Troubleshooting 	<ul style="list-style-type: none"> ◆ Evaluation ◆ Performance Measurement ◆ Monitoring
People Involved	<ul style="list-style-type: none"> ◆ consultant ◆ vendor ◆ executives ◆ IT specialist ◆ End User 	<ul style="list-style-type: none"> ◆ consultant ◆ vendor ◆ Project Manager ◆ executives ◆ Internal IT specialist ◆ End User representatives ◆ IT Support ◆ Representative from functional areas 	<ul style="list-style-type: none"> ◆ consultant ◆ vendor ◆ Project Manager ◆ executives ◆ IT Support ◆ Representative from functional areas ◆ End User representatives 	<ul style="list-style-type: none"> ◆ vendor ◆ consultant ◆ IT Support ◆ End User representatives ◆ Operational Managers

Figure 3: Reference framework for successful ERP implementation in SME in Indian context

Maintenance: The last phase refers to ongoing maintenance and enhancement of the ERP system and the relevant business processes to fit the evolving business needs of the organization. It continues from normal operation until the system is replaced with an upgrade or a different system. Main players include operations managers, end users and IT supports personnel (internal and external). Vendor and consultants may be involved when upgrades are concerned. Main activities include continuous business improvement, additional user skill building, upgrading to new software releases and post-implementation benefit assessment. The results showed that most of the CSFs were significant at the Initial Hiring phase and the majority of the care should be taken at this phase and rollout phase. Therefore, it was clear that meeting and managing the CSFs, people at the initial phases is the key start-up stage towards a successful ERP implementation.

5. CONCLUSION:

Indian context, the following issues can assume immense importance namely, clarity in goals and objectives behind the implementation, adequacy of user training, competency of the project implementation team, acceptance of changes

brought about by the implementation and adequate vendor support and external consultant participation. S.M.E.'s market still continues to be a "bed of opportunities" for ERP Vendor in spite of the above mentioned drawbacks. Equally promising is the demand for ERP from Small and Medium enterprises. Some proposal should be put forward for the welfare of both parties to counter the problem of ERP in S.M.E.'s. We can conclude that SMEs make use of ERP solutions mostly for contingency, exogenous reasons rather than as a result of accurate analyses of their needs and opportunities. However, the strategic evaluation of ERP use within SMEs is a relatively new issue, and definitely needs more research.

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