

Study of Critical Success Factors for Enterprise System in Indian SMEs

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Worldwide, the small- and medium-size enterprises (SMEs) have been accepted as the engine of economic growth and for promoting equitable development. SMEs have been playing a pivotal role in India's overall economic growth, and have achieved steady progress over the last couple of years. The pressure of staying ahead in a competitive environment by reduction of costs and product development time is compelling SMEs to leverage technology and enterprise applications like Enterprise resource planning (ERP) application, as adapted by their large counterparts. 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.

Keywords : ERP, SME, Critical Success Factor

Introduction

SME's

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. According to a World Bank study, there are more than 60 definitions of small and medium industries in 75 countries. Globally, the SME segment has been an agent of change and growth in many countries, and is a major source of employment. SMEs are expected to play a significant role in the economic development of India,

given that the entrepreneurial spirit of the nation has been given a fillip in the liberalised environment. The overall business climate has become conducive for SMEs to graduate not just from small and medium to large, but also from the national to global arena.

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.

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Despite the economic downturn, Indian small and medium enterprises (SMEs) showed most optimism regarding economic growth in 2009, over majority of their counterparts in the Asia-Pacific, the UPS Asia Business Monitor survey reveals. As much as 40% of the Indian SMEs were optimistic on the growth trajectory. However, compared to last year, there is a decline, when 64% of the Indian SMEs has showed optimism regarding the same. Whereas, only 15% of the SMEs in the Asia-Pacific region showed similar optimism. The survey also reveals that the Indian SMEs see IT as the major driver for growth, followed by building & construction and healthcare & pharmaceuticals sector. About 37% felt that IT will continue to be the growth driver, whereas 29% saw building & construction to be a major force. And, 26% felt healthcare & pharmaceuticals will play an important role in their growth. Not only for the current year, Indian SMEs also feel that due to the changes in the financial services sector, the key economic pillars for SMEs in India over the next three to five years will be IT, building & construction and manufacturing.

Liberalisation, outsourcing trends, growing demand for exports and pro-SME policies such as the Micro, Small and Medium Enterprises Development (MSMED) Act, 2006 have proved conducive for the SME segment. During FY03-07, the overall industrial sector grew at a CAGR of 8.8%, while SMEs grew at around 16.9% in the same period. The scope for SME development is widening, and there is an increasing level of interest displayed by investors in this sector. The role of small and medium enterprises has magnified gradually at the global level with SME exports contributing around 33% of India's total exports. Globalisation has opened new opportunities for players of all size. The presence of a vibrant manufacturing and service sector will ensure that SMEs will be able to capitalize on these new opportunities in the domestic as well as the international markets.

The last decade of the 20th Century has seen this sector has been proving its steady growth. The SSI sector in India alone contributes 7% to India's GDP. The performance of the Indian small scale sector in terms of critical economic parameters such as number of units, production, employment and export during the last decade is indicated below. (Appendix 1). The combined effect of market liberalisation and deregulation has forced the SME segment to change their business strategies for survival and growth. Some of the changes that SMEs are focusing on include acquiring quality certifications, increasing use of ICT, creating e-business models and diversification to meet the increasing competition.

ERP Systems

ERP system is a packaged business software system that allows a company to automate & integrate the majority of its business processes, and share common data and practices across the entire enterprise further defined the concept of ERP in an easy-understood way. It can be viewed from a variety of perspectives. First, and most obviously, ERP is a commodity, a product in the form of computer software. Second, and fundamentally, ERP can be seen as a development objective of mapping all processes and data of an enterprise into a comprehensive integrative structure. Third, it can be identified as a key element of an infrastructure that delivers a solution to business. This concept indicates that ERP is not only an IT solution, but also a strategic business solution.

In the late 90's, researchers started to show interest in Enterprise Resource Planning. Davenport (1998) discussed the functionality of an ERP system and the complexity of implementation. The anatomy of enterprise system presented has a central database at the heart of enterprise system. A central database draws data from and feeds data into series of applications supporting diverse company functions

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 e-commerce 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.

ERP's intervention in SMEs in India

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.

The opportunity: Owing to a lack of education, most SMEs in the manufacturing sector even today are dependent on inflexible, cheap and standalone applications. But they are fast realising the necessity of setting up intra- and inter-office networks, reliable IT infrastructure and the value of opting for branded ERP and software products. This provides an extensive opportunity for software business solution providers to offer cost-effective tailor-made applications and solutions to Tier 2 and Tier 3 companies, especially in the manufacturing sector. Industry analyst ARC Advisory pegs Indian ERP growth at a CAGR of 25.2 per cent over the next five years. The ERP market was \$83 million in 2004 and is forecast to be over \$250 million in 2009.

ERP systems are gaining the most popularity of all the e-business applications deployed by organisations. Geared to streamline and integrate business operations, ERP providers are exploring the opportunities in the SME segment that has remained untapped for years. The ERP implementation that began over two decades ago in India has also led to opportunities for replacement market players. The replacement ERP market for the SME sector itself in India is growing at over 30 per cent annually, along with an overall rise in the ERP / SCM market of 20 per cent over the next 12 months (according to webresearch). The early adopters of

the system were unable to cope with the development requirements of the Indian market, either because of a lack of resources or lack of functionality. Both these criteria need to be successfully managed through extensive domain knowledge and team strength.

Challenges

The boom in the ERP business segment is accompanied by a lot of challenges. One of the key challenges faced by solution providers is that the SME sector is poor paymasters. Vendors are offering ERP at an introductory cost of Rs 4-6 lakh. In fact, the cost of ERP software should not be viewed as an expense but as an investment, towards an ability that provides better profitability, market share and / or customer service. The costs will remain high but the advantages far outweigh the expense, and ERP decisions are a "high-risk high reward" option. Considering the concept is just a decade old in India, SMEs are reluctant to invest in an ERP replacement as they lack domain-specific knowledge, technical knowhow and monetary resources to implement solutions. At the same time, educating these companies about the benefits of ERP is not an easy task. To conquer this problem, solution providers and implementers are spreading awareness in their target audience by organising programmes, seminars and road shows in their target market. And then, there are the technical challenges of training, integration and implementation, which can take from two to 12 months.

Enterprise Resource planning helps S.M.E.'s to enjoy unimaginable benefits. Nevertheless the problems of ERP in S.M.E.'s are also present. There are still ups and downs in it. SMEs disregard financial constraints as the main cause for ERP system non-adoption, suggesting structural and organizational reasons as major ones. This pattern is partially different from large organizations where the first reason for not adopting an ERP system is organizational. Moreover, the decision

process regarding the adoption of ERP systems within SMEs is still more affected by exogenous reasons or "opportunity of the moment" than business-related factors, contrary to large companies that are more interested in managing process integration and data redundancy/inconsistency through ERP implementation. There are some problems for S.M.E.'s in the ERP market. They are not only from the address in the vendor's perspective but also in the company's perspective.

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

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.

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 1 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. (Fig. on next page)

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,

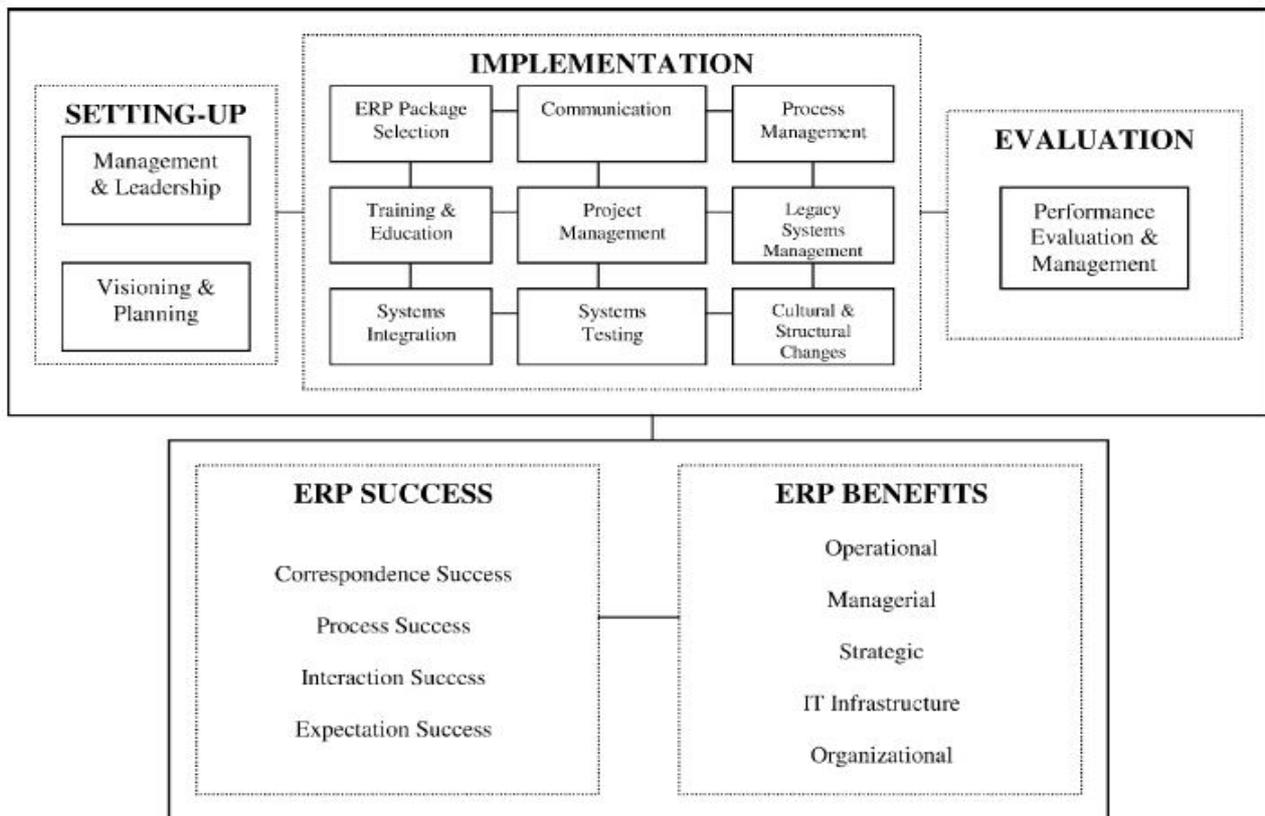


Figure 1: Taxonomy for ERP critical factors, M, Al-Mashari et al. (2003)

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. (Appendix 1: Figure C)

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.

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.

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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Appendix 1**Table A: MSEs Performance: Units, Investment, Production, Employment & Exports**

Year	Total MSEs (lakh)	Fixed Investment (Rs. Crore)	Production (Rs crore) in Current Prices	Employment (lakh person)	Exports (Rs. crore)
2002-03	109.49	162317	314850	260.21	86013
2003-04	113.95	170219	364547	271.42	97644
2004-05	118.59	178699	429796	282.57	124417
2005-06	123.42	188113	497886	299.85	150242
2006-07	128.44	213219	585112	312.52	177600
2007-08**	133.68	238975	695126	322.28	NA

** Projected

Source: Ministry of Micro, Small & Medium Enterprises, India, Annual Report 2008-09

Table B: Comparative Growth Rates.

Year	Growth Rate of MSE Sector (%)	Industrial Sector (%)
2002-03	8.68	5.70
2003-04	9.64	6.90
2004-05	10.88	8.40
2005-06	12.32	8.10
2006-07	12.60	11.5
2007-08*	13.00*	8.00

Source: Ministry of Micro, Small & Medium Enterprises, India, Annual Report 2008-09

**Figure C: Characteristics of client- vendor outsourcing relationship,
Tafti Mohammed H.A. and Sledgianowski D. (2008)**

