Review of Literature of Determinants of ERP Implementation in SMEs

Pratik Dutta[1] and Salma Ahmed[2]

[1,2]*Aligarh Muslim University*
E-mail: [1]pratikdutta@hotmail.com, [2]salmaahmed6@rediffmail.com

Abstract—*Globally, many new Small and Medium Enterprises (SME) are set up every year. Nearly 50% of them cease to exist in the first 3 years of business. Assuming, all SMEs desire growth, only 40% eventually survive beyond a decade. Majority of the firms do not plan a long-term business strategy but focus just on survival. Changes are planned when the business begin to fail due to not changing with the evolving market scenario. The firms which stay on to grow are the ones which have the ability to take risks and respond to the ever changing environment.*

The SME sector of India is considered as the backbone of the economy, contributing to 45% of the industrial output, 40% of India's exports, employing 60 million people, creating 1.3 million jobs every year and producing more than 8000 quality products for the Indian and international markets. With approximately 30 million SMEs in India, 12 million people are expected to join this workforce in the next three years, and the sector is growing at a rate of 8% per year. Government of India is taking measures to increase the competitiveness of the SMEs in the international market.

Associated with the high growth rates, SMEs in India are also facing a number of problems like sub-optimal scale of operation, technological obsolescence, supply chain inefficiencies, increasing domestic and global competition, paucity of funds, change in manufacturing strategies and a turbulent market. In order to survive with such issues and continue competing with large and global enterprises, SMEs need to adopt innovative approaches in their working.

Today, a customized software like an Enterprise Resource Planning (ERP) system is considered as the entry price for running a business and for being connected to other companies, which eventually allows business-to-business electronic commerce. In fact, many multinational companies restrict their business to only those companies that use the same ERP as them. SMEs which have MNCs as their clients need to consider ERP systems as a requirement to allow tighter integration with their bigger counterparts.

The paper discusses the quantifiable and non-quantifiable determinants for the success of a Packaged Software Solution.

1. INTRODUCTION

The global software market is a dynamic business. In the early years of commercial use of computers, software systems were developed in-house using different development platforms. This resulted in software products being developed exclusively as unique systems for each organization with minimum standardization [1].

Subsequently, next phase of software evolution witnessed the growth of proprietary software systems, commonly known as "Packaged software". Packaged software is a category of information system for which most implementations are identical and they are often termed as "template" or "core business model." In other words, the critical business functionalities and processes in the software are common for all customers irrespective of the industry. Certain industries have specific add-on processes which are configured as per the requirements of the sector. The objective of packaged software was to achieve economies of scale. This was realized by developing a standard software product and thereafter selling it to different customers. The standardized processes benefitted software customers as transaction costs were lowered and risks of development were mitigated; as it was now possible to choose from a proven set of applications. As an added advantage for both software customers and vendors, standardization enabled to capture and black-box best practices by embedding them into the standardized components of the system. [2]

Some of the standard software packages require minimal or no configuration before the customers start the usage, while other software packages provide basic features on the top of which specific functionalities required by the user can be configured or customized. Neela and Mein indicated that between 70-80 % of IT budgets are spent on system implementation and maintenance. Maintaining and running enterprise applications usually requires considerable amount of IT resources from underlying firms. [3]

Information Technology (IT) is used as a driver to impose major organizational changes. Changes driven by technology differ remarkably from organizational change projects. As addressed by Markus in 2004, change in technology is a major risk; employees may be unwilling or may resist use of the new technology and oppose it due to the deviations from the current work practices. This type of resistance is an obstacle that prevents large organizations from taking advantage of the potential benefits of an advanced technological implementation [4]. Marakas and Hornik, hypothesized that whenever a new technology brought forward uncertain

conditions and hence created a misalignment with an individual's habits or experience, passive resistance and misuse will arise [5].

In India, most SMEs are labour intensive so any technology adoption is a big change and therefore an issue that may need timely intervention. Packaged software implementations in India have witnessed many failures as they trigger changes to the business processes in order to be mapped to the standard software. With the packaged software vendors bringing in cheaper options owing to shorter implementation time frames, Small and Medium Enterprises (SME) are now seen as a potential area for sale. SMEs are culturally dependent on decisions of the owners or a group of individuals, so they have their own set of determinants which impact the implementation of a packaged software solution successfully.

This research would make an endeavour to understand the perception, typical issues and challenges faced in adopting packaged software in Indian Small and Medium Enterprises and their linkages with performance of individuals working with them.

2. LITERATURE REVIEW CLASSIFICATION

Literature Classification provides an outline on the areas in which review of literature has been conducted. The review of literature for this proposed research has been sub-divided as per Fig. below:
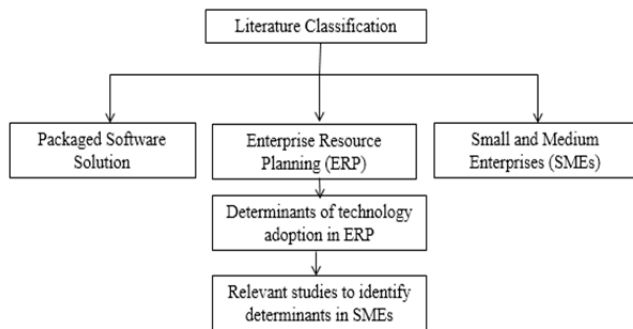
Fig. 1: Literature Classification for the proposed research

3. SMALL AND MEDIUM ENTERPRISES (SME) SECTOR – A GLANCE

The SME sector of India is considered as the backbone of the economy, contributing to 45% of the industrial output, 40% of India's exports, employing 60 million people, creating 1.3 million jobs every year and producing more than 8000 quality products for the Indian and international markets. With approximately 30 million SMEs in India, 12 million people are expected to join this workforce in the next three years, and the sector is growing at a rate of 8% per year. Government of India is taking different measures so as to increase the competitiveness of the SMEs in the international market.

There are several factors that have contributed towards the growth of Indian SMEs. They include funding of SMEs by local and foreign investors, the new technology that is being used in the market is assisting SMEs to add considerable value to their business, and availability of various trade directories and trade portals is helping facilitate trade between buyers and suppliers [6].

As per the Ministry of Micro, Small and Medium Enterprises, the classification in the sector for micro, small and medium enterprises are based on the ceiling of investment are per the table below:

Table 1: Investment Limit for MSME sector (Ministry of Micro, Small and Medium Enterprises)

Classification	Service Enterprises*
Micro	Rs 1 million/ Rs 10 lakhs (USD 20,000)
Small	Rs 20 million/ Rs 2 crore (USD 40,00,000)
Medium	Rs 50 million/ Rs 5 crores (USD 1 million)

*Investment limit in equipments

SME has been in focus for the Central Government. A fund allocation of Rs. 10,000 crores for start-up SMEs has been proposed in the 2014-15 national budget. Addressing the SME credit concerns in the country, the government has announced the formation of a venture capital fund to extend financial assistance in the form of equity, quasi-equity and risk-capital. Besides encouraging entrepreneurship in India, the move is aimed at eliminating investment related issues in the SME sector. [7]. In addition, many other initiatives have also been undertaken - a fund with an initial corpus of Rs 5,000 crores and anchored by two state-owned financial institutions, Life Insurance Corporation (LIC) and Small Industries Development Bank of India (SIDBI), an institution will be set up to provide funding for SMEs [8].

Associated with the high growth rates, SMEs in India are facing a number of problems like sub-optimal scale of operation, technological obsolescence, supply chain inefficiencies, increasing domestic and global competition, fund shortages, change in manufacturing strategies and a turbulent and uncertain market. In order to survive with such issues and continue competing with large and global enterprises, SMEs need to adopt innovative approaches in their working [9].

Traditionally, Indian SMEs' are plagued with internal operational inefficiencies due to high manual tasks and activities. In order to improve on the operational efficiency the sector is adapting and restructuring it to face competition from the global players head-on. SMEs which embraced high technology, accepted norms of quality and competitiveness; continue to expand faster than the rest of the industrial economy [10].

Globally, many new Small and Medium Enterprises' (SME) start every year. Nearly 50% of them cease to exist in the first 3 years of business. Assuming that all SMEs desire growth,

only 40% eventually survive beyond a decade. Majority of the firms do not have a long-term business strategy but focus on survival only. Change is planned when the business begins to fail due to not changing with the evolving market scenario. The firms which stay on to grow are the ones which have the ability to take risks and respond to the changing environment.

4. PACKAGED SOFTWARE SOLUTIONS

Packaged software solutions are a category of information systems for which most of the implementations are identical and they are often termed as "template implementations" or "core business model." The main business functionalities and core processes in the software are similar for all customers, and only certain select processes would need to be configured as per the requirements of the industry or the company. The package software industry registered a CAGR of 6.3% for the period of 2010-15 with a revenue of USD 402.3 billion in 2014 [11]. Forrester reported that 63 % of organizations want to buy or use or re implement packaged software in the future [12].
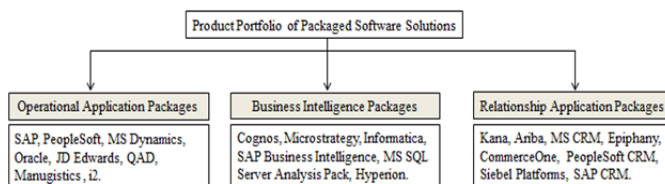
Fig. 2: Product Portfolio of Packaged Software Solutions with examples

5. ENTERPRISE RESOURCE PLANNING (ERP)

Enterprise Resource Planning (ERP) – a term coined by the Gartner Group in the early 1990's is an organization wide software system based on best business practices. It is defined as a customizable commercial software system, embedding best business practices, built on a modular structure which automates and integrates key business and management processes and information using a common database, providing real time seamless integration of information flow [13].

ERP brings standardization across all critical organizational functions, facilitating better communication amongst departments. Organizations invest in an ERP endeavour to accomplish a number of objectives. All organizations want to benefit from ERP's cross-functional integration and best-practice capabilities, modular structure; and its flexible and highly scalable architecture. They seek to achieve a wide range of benefits, i.e.

- Operational, eg. reduced operating costs, accurate demand forecasts;

- Managerial, eg improved decision making and enhanced resource management;

- Strategic, eg. support for business alliances, business innovations and cost leadership;

- IT infrastructure, eg. greater business flexibility; reducing costs; and

- Organizational benefits, eg assisting organizational change, facilitating business learning and empowerment [14].

The world in which we do business is shrinking, and now nearly every enterprise is marketing and selling to customers across the globe, or are using parts or raw materials that are produced elsewhere. Most ERPs have multilingual capability, transacting in multi-currency and can recognize legal and tax reporting needs of different countries. The need for an integrated system had begun with the onset of Supply Chain Management, e-business and operations which calls for exchange of information with vendors and customers directly.

Today, an ERP system is considered as the entry price for running a business and for being connected to other companies, which eventually allows business-to-business electronic commerce. Many multinational companies restrict their business to only those companies that use the same ERP as them [15]. Small and Medium Enterprises (SMEs) which have MNCs as their clients need to consider ERP systems as a requirement to allow tighter integration with their larger counterparts.

Before ERP, different departments in an organization had their own software systems to fulfill their business requirements. This resulted in fragmentation of information, as all the needed information was stored independently in different systems of the business units, sales office and factories, often spread across the world. This made it difficult to get accurate information on time. In 1990s, globalization led to increased competition and companies, especially in the manufacturing sector realized the need for being more customers centric. Corporations had to move towards agile manufacturing, continuous improvement of business processes and business process reengineering. This has resulted in an integration of manufacturing with other functional areas like Accounting, Marketing and HR.

6. DETERMINANTS OF TECHNOLOGY ADOPTION IN ERP

Technology adoption is important because it is a vehicle that allows people to participate in a rapidly changing world where technology has become key to our lives. Individuals who cannot adopt will increasingly limit their ability to participate fully in the convenience and financial benefits associated with technology. Understanding the factors influencing technology adoption will help us in predicting and managing conditions under which an organization or an individual adapts.

In order to shortlist the technology adoption factors of an ERP usage, one needs to understand the success factors of an ERP

implementation across all the phases of the implementation. Armed with this information one can assess individuals in the adoption process and support them as they move from the technology acceptance phase through to usage.

Critical Success Factors (CSFs) can be defined as factors which can impact the success of ERP implementation either positively or negatively. A perspective of finding CSFs is to identify factors which can create obstacles in the path of successful implementation process. As per the literature review different researchers based on their studies have identified different factors.
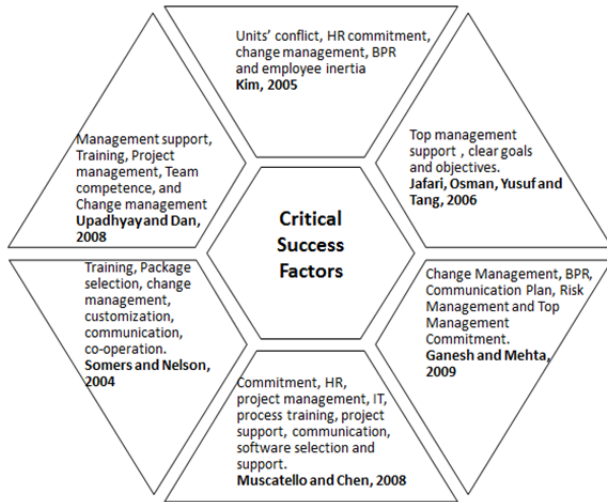
Fig. 3: Critical Success Factors (CSFs) identified by select researchers

Various papers were looked into to identify the Critical Success Factors in ERP Implementations.

Table 2: ERP Critical Success Factors mentioned in research work - Year wise

Critical Success Factor	Author (Year)
Organizational commitment and support	Davenport (1998), Bingi, Sharma and Godla (1999), Holland and Light (1999), Shanks, Parr, Hu, Corbitt, Thanasankit and Seddon (2000), Parr and Shanks (2000), Nah and Lau (2001), Motwani, Mirchandani, Madan and Gunasekaran (2002), Umble and Umble (2002), Trimmer and Wiggins (2002), Akkermans and Helden (2002), Al-Mashari, Al-Mudimigh and Zairi (2003), Sarker and Lee (2003), Somers and Nelson (2004), Loh and Koh (2004), Yusuf, Gunasekaran and Abthorpe (2004), Gargeya and Brady (2005), Ehie and Madsen (2005), King and Burgess (2006), Olson and Zhao (2007), Woo (2007), Law and Ngai (2007), Remus (2007), Garcia-Sanchez (2007), Kansal (2007), Dawson and Owens (2008), Muscatello and Chen (2008), Parr and Shanks (2009), Francoise (2009).

Critical Success Factor	Author (Year)
Change management	Bingi, Sharma and Godla (1999), Pawlowsiki and Boudreau (1999), Al-Mashari and Zairi (2000), Parr and Shanks (2000), Markus, Axline, Petrie and Tanis (2000), Nah and Lau (2001), Hong and Kim(2002), Motwani, Mirchandani, Madan and Gunasekaran (2002), Loh and Koh (2004), Nah and Delgado (2006), King and Burgess (2006), Dawson and Owens (2007), Woo (2007), Garcia-Sanchez (2007), Kansal (2007), Parr and Shanks (2009), Francoise (2009), Hairul, Nasir, and Sahibuddin (2011), Alaskari, Ahmad, Dhafr, and Pinedo-Cuenca (2012).
Project management	Davis and Wilder (1998), Bingi, Sharma and Godla (1999), Sumner (1999), Laughlin (1999), Rosario(2000), Wee (2000), Umble and Umble (2002), Hong and Kim(2002), Scott and Vessey (2002), Al-Mashari, Al-Mudimigh and Zairi (2003), Al-Mashari, Al-Mudimigh and Zairi (2003), Nah and Delgado (2006), Olson and Zhao (2007), Woo (2007), Remus (2007), Muscatello and Chen (2008), Dawson and Owens (2008), Francoise (2009), Hairul, Nasir, and Sahibuddin (2011), Alaskari, Ahmad, Dhafr, and Pinedo-Cuenca (2012).
BPR and system's customization	Holland and Light (1999), Bingi, Sharma and Godla (1999), Shanks and Parr (2000), Light (2001), Somers and Nelson (2001), Nah, Lau and Kuang (2001), Hong and Kim(2002), Palaniswamy and Frank (2002), Yusuf, Gunasekaran and Abthorpe (2004), King and Burgess (2006), Woo (2007), Law and Ngai (2007), Remus (2007), Garcia-Sanchez (2007), Kansal (2007), Muscatello and Chen (2008).
Training	Bingi, Sharma and Godla (1999), Aladwani (2001), Stratman and Roth (2002), Tarafdar and Roy (2003), Mandal and Gunasekaran (2003), Gargeya and Brady (2005), Olson and Zhao (2007), Woo (2007), Garcia-Sanchez (2007), Kansal (2007), Muscatello and Chen (2008).
ERP team composition	Davis and Wilder (1998), Bingi, Sharma and Godla (1999), Sumner (1999), Shanks, Parr, Hu, Corbitt, Thanasankit and Seddon (2000), Wee (2000), Siriginidi (2000a), Shanks and Parr (2000), Nah, Lau and Kuang (2001), Somers and Nelson (2001), Kalling (2003), Mandal and Gunasekaran (2003), Umble, Haft and Umble(2003), Somers and Nelson (2004), Nah and Delgado (2006), King and Burgess (2006), Woo (2007), Kansal (2007), Dawson and Owens (2008), Francoise (2009).
Visioning and planning	Holland, Light and Gibson (1999), Wee (2000), Parr and Shanks (2000), Nah and Lau (2001), Akkermans and Helden (2002), Somers and Nelson (2004), Loh and Koh (2004), Nah and Delgado (2006), Nah and Delgado (2006), King and Burgess (2006), Grabski and Leech (2007), Garcia-Sanchez (2007), Kansal (2007), Dawson and Owens (2008), Dezdar and Sulaiman (2009), Francoise (2009).

Critical Success Factor	Author (Year)
Consultant selection and relationship	Bingi, Sharma and Godla (1999), Al-Mudimigh et al., (2000), Willcocks and Stykes (2000), Motwani, Mirchandani, Madan and Gunasekaran (2002), Ehie and Madsen (2005), Olson and Zhao (2007), Garcia-Sanchez (2007), Kansal (2007), Hairul, Nasir, and Sahibuddin (2011).
ERP Communication	Sumner (1999), Holland, Light and Gibson (1999), Nah and Lau (2001), Akkermans and Helden (2002), Mandal and Gunasekaran (2003), Grant (2003), Al-Mashari and Al-Mudimigh (2003), Somers and Nelson (2004), Loh and Koh (2004), Nah and Delgado (2006), King and Burgess (2006), Nah and Delgado (2006), Garcia-Sanchez (2007), Kansal (2007), Olson and Zhao (2007), Woo (2007), Remus (2007), Muscatello and Chen (2008), Dawson and Owens (2008), Francoise (2009).

The top Critical Success Factors that have impact the all phases ie Pre-ERP implementation, during the ERP implementation and Post ERP implementation have been tabulated in the table below, citing the research paper where the CSF has been mentioned

Dezdar and Sulaiman [16] adopted content analysis approach of extensive literature and developed the taxonomy of ERP implementation CSFs. The CSFs were grouped into three major environments of ERP system, organization and implementation success. These environments were further sub-divided into ERP technology, external expertise, project success, business success, ERP user and project. The list of CSFs suggested by Dezdar and Sulaiman is included below.

Table 3: Critical Success Factor versus Degree of Importance

ERP Perspectives	Critical Success Factors	Importance
Stakeholders	Top management commitment	High
	Project champion	High
	Execution team	High
	External advisory support	Medium
	Vendor partnership	Low
	Total end-user involvement	Low
Process	Business process design	High
	Customization approach	Medium
	Performance measurement and control	Low
Technology	Package requirements and selection	Medium
	System testing	Low
Organization	Change management	High
	Organization/ ERP communication	High
	Business vision goals and objectives	High
	Training and education	Medium
	Organizational structure and culture	Low
Project	Project management	High
	Budget – Cost parameters	Low
	Time	Low

7. EFFECTS ON PERFORMANCE DUE TO ERP IMPLEMENTATION

Impact of ERP Usage on Business Performance and Financial Performance has been done in a few researches [18], [19].

Organizational managers have a broad set of options to increase ERP usage within their organizations and assess the impact of such usage on outcomes such as productivity or performance gains. Indian SMEs are typically organizations having average employee strength of 75 individuals, so Individual Performance is critical along with organization performance; therefore our objective is to assess the impact of ERP usage on perceived individual performances.

Organizations deploy IT or an ERP to facilitate organizational work and it is not intended to match users' personal preferences or habits. Work Compatibility is the fitment of ERP to the organizational work only, and not to personal preferences or work habits. Like Perceived Usefulness and Perceived Ease of Usage, work compatibility is very much a perceptual construct as it is the perception of fit between IT/ ERP and work that motivates employees to use the system, irrespective of the actual extent of fit [20]. Being perceptual in nature, it is named here as Perceived Work Compatibility.

8. OBSERVATIONS AND GAPS FROM LITERATURE

Key observations identified from review of literature:

- The Indian SME sector contributes 45% of the industrial output and employs 60 million people.

- There is an increased focus on SMEs by the Government of India.

- In order to get rid of daily operational issues and increase automation, there has been a sudden requirement of SMEs to integrate and streamline their internal processes as a pre-requisite to remain competitive.

- Inspite of ERP vendors targeting the SME segment, the companies are still not clear of the offerings of an ERP and the steps needed to mitigate ERP adoption risks

Perceptible research gap has been identified in the technology adoption of ERP in the SME sector in India. Some of the key gaps observed after literature review were: -In recent years, only a few studies examining ERP systems in SMEs have been published in the Indian context.

Best to our knowledge, acceptance and use of ERP systems has not been yet studied in small- to medium-sized Indian enterprises. The aim of this study is to fill this gap. -Limited work has been done globally on a comprehensive model that covers the reasons of ERP adoption and also links them to user performance within the same framework. The literature review would be key to have base data to fill up this gap.

9. CONCLUSION

A number of studies have been undertaken in the area of Packaged Software globally, but issues and problems typical to the SME segment in India; and their impact on the performance of the users has not been evaluated. In India, relatively limited work has been done in the research of determinants of technology adoption of users of ERP and also investigating the linkages of these determinants with performance of the organization or individual. This research aims to assess the impact of the key ERP adoption determinants and understand their effect on performance of individuals.

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