

An ERP Life cycle and its Competitive Advantages in SMEs

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Abstract

An ERP is an integrated information system that enables full and efficient utilization of resources for its information needs. The rising demand of information system, the integration of ERP components, brings the perspective of profitability growth and cuts down running costs for SMEs. Objective of this paper is to analyze the life cycle of ERP system. Since the study of ERP systems is a new area, there is very little theoretical or empirical research on the topic. Limited studies have been conducted in the past, but now, due to the magnitude of the ERP phenomenon, the need for such studies has become very important. ERP aims at integrating data, introducing cheap operation, easy monitoring processes from all areas of SMEs and unification for easy access and work flow which leads ERP to conquer the basic problems of SME by giving competitive advantages in the global world.

Keywords: *SME (Small and medium Enterprise), ERP (Enterprises Resource Planning), life cycle.*

1. Introduction

According to a recent study by International Data Corporation the enterprise resource planning services and training market is expected to grow at a rate equal to or greater than the software industry to which it caters [Weston, 1998]. AMR research Inc., the leading industry and market analysis organization specializing in enterprise enabling technologies, predicts that the enterprise resource planning (ERP) software market will grow at a compound annual growth rate of 37 % over the next five years [Caruso 1998]. This market will continue to be one of the largest, fastest growing, and most influential in the applications industry, and is poised for steady growth into the new millennium, says AMR. Nowadays, the ERP industry is one of the most promising ones, which contrasts with the obvious lack of related academics research.

Certainly, because the study of ERP systems is a new area, there is very little theoretical or empirical research on the topic. Limited studies have been conducted in the past, but now, due to the magnitude of the ERP phenomenon, the need for such studies has become very important. This initial position paper sets out to list, define and categorize the research issues around ERP systems within an ERP life-cycle process.

The research framework is structured in dimensions and phases, generic enough to permit the classification of research issues and comprehensive enough to give a general vision of the whole ERP life-cycle. While the current topics of interests are mainly centered on ERP acquisition and implementation, our framework also covers post-implementation phase's current reached by a limited number of organizations. Within each phase, each issue may be defined and analyzed according to the dimensions that make up the orthogonal part of our framework. However, the information contained in this paper is intended only to provide a general summary. It does not purport to be a complete description of the research issues. The research framework issues raised in this paper are intended for researchers and practitioners who are interested in looking at the impact of the ERP systems in organizations.

The rest of this paper is organized as follows. We present an overview of ERP issues in the next section. In section 3 we present our research framework. Based on the phases and dimensions of the framework, section 4 discusses the research issues arisen. Some conclusions and ideas about further work are included in section 5.

2. ERP Overview

Typically, Enterprise Resource Planning (ERP) are software packages composed of several modules, such as human resources, sales, finance and production, providing cross-organization integration of data through imbedded business processes. These software packages can be customized to answer the specific needs of each organization.

Regarding the significant impact of ERP systems on industry, [Davenport 1998b] refers that "the business worlds embrace of enterprise systems may in fact be the most important development in the corporate use of information technology in the 1990s". The market for

people who can work with these systems, implement these systems, and understand how these systems transform organizations is very big, and growing [Watson & Schneider 1999].

ERP implementations usually involve broad organizational transformation processes, with significant implications on the organization's management model, structure, management style and culture, and particularly, on people [Caldas & Wood, 1999]. As [Davenport 1998a] mentions, ERP systems are not projects that someday will end, but rather, they are a way of life. They require a high degree of alignment between business strategies, information technology strategies and organizational processes [Gibson et al., 1999], in the same line [Henderson & Venkatraman, 1991] mentions for more general enterprise information systems. Change seems to be the main phenomenon associated with an ERP system. According to [Jarke & Pohl 1993], in order to deal with change effectively, one has to establish the change vision in the given technical, social, and organizational context.

The interest of the scientific community in the ERP field is evident according to the new panels and tracks that some scientific events dedicate to the subject, such as Hawaii International Conference on Systems Science (HICSS), Association for Information Systems (AIS), International Information Management Association (IIMA), and Workshop on Information Technologies and Systems (WITS), as well as the birth of the EMPRS'99 itself. The main vendors also promote professional and commercial conferences like ERPWORLD or SAPPHIRE. The amount and quality of academic literature available in this field is just beginning to develop.

We believe that organizations and vendors should play an important role in researching on ERPs, because this kind of research is amenable to be field-based rather than laboratory-based. Consultants also play an important role in the research of some issues; over the years, they have accumulated probably the richest ERP experiences through thousands of ERP installations worldwide.

All in all, we found a large scope of research issues and a great number of influencing variables, and here we have attempted to organize the research issues into a framework.

2.1 ERP Life-cycle Framework

We have mapped the research issues that can be analyzed in the ERP life-cycle process using the framework presented in Figure 1.

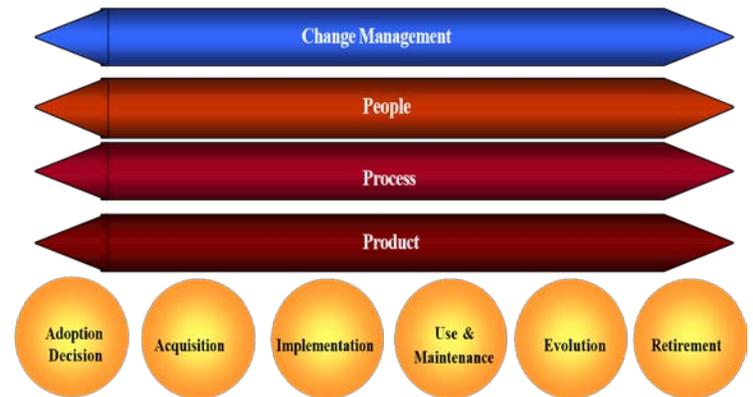


Fig. 1. The ERP life-cycle framework.

The framework is structured in phases and dimensions. Phases are the different stages of an ERP system life-cycle within an organization and dimensions are the different viewpoints by which the phases could be analyzed. We describe the dimensions and phases in the following sections. The dimensional vision of the framework presents a set of related issues. For instance, the change management dimension embodies cultural issues, organizational structures, roles and skills, management of strategic change and business process re-engineering. Finally, we would like to focus on the issues discussed here, from the viewpoint of organizations but without forgetting the vendors' perspective. Issues relating to vertical markets, mid-market focus, componentization, data warehousing, business modelling, and technology changes or skills are important issues to vendors.

The research framework is flexible and generic in order to make possible the allocation of research issues and to give a general vision of the whole ERP life-cycle, without giving attention only to some aspects. Nowadays, the

Majority of problems focus only on the acquisition and the implementation phases, because the technology is new with few organizations in the post-implementation phases, but it is vital to form a general vision to prevent future problems. Each issue should be analyzed and defined according to the dimensions that make up the orthogonal part of our framework. This orthogonality should be made more explicit in future upgrades of this framework. This

framework is useful for identifying the origins and impacts of change, and thus provides a way of identifying and characterizing research issues in ERP systems.

2.2 Phases of the ERP Life-cycle:

The phases of the ERP life-cycle consist in the several stages that an ERP system goes through during its whole life within the hosting organization. They are the following: adoption decision phase, acquisition phase, implementation phase, use and maintenance phase, evolution phase and retirement phase. Next, we describe each phase.

1. **Adoption decision phase:** This phase is the one during which managers must question the need for a new ERP system while selecting the general information system approach that will best address the critical business challenges and improve the organizational strategy. This decision phase includes the definition of system requirements, its goals and benefits, and an analysis of the impact of adoption at a business and organizational level.
2. **Acquisition phase:** This phase consists of the product selection that best fits the requirements of the organization. Thus, minimizing the need for customization. A consulting company is also selected to help in the next phases of the ERP life-cycle especially in the implementation phase. Factors such as price, training and maintenance services are analyzed and, the contractual agreement is defined. In this phase, it is also important to make an analysis of the return on investment of the selected product.
3. **Implementation phase:** This phase consists of the customization or parameterization and adaptation of the ERP package acquired according to the needs of the organization. Usually this task is made with the help of
4. **Consultants** who provide implementation methodologies, know-how and training.
5. **Use and maintenance phase:** This phase consists of the use of the product in a way that returns expected benefits and minimizes disruption. During this phase, one must be aware of the aspects related to functionality, usability and adequacy to the organizational and business processes. Once a system is implemented, it must be maintained, because

malfunctions have to be corrected, special optimization requests have to be met, and general systems improvements have to be made.

6. **Evolution phase:** This phase corresponds to the integration of more capabilities into the ERP system, providing new benefits, such as advanced planning and scheduling, supply-chain management, customer relationship management, workflow, and expanding the frontiers to external collaboration with other partners.
7. **Retirement phase:** This phase corresponds to the stage when with the appearance of new technologies or the inadequacy of the ERP system or approach to the business needs, managers decide if they will substitute the ERP software with other information system approach more adequate to the organizational needs of the moment.

2.2 Dimensions of the ERP Life-cycle:

We defined four areas of concern or viewpoints by which the different phases of the life-cycle should be analyzed: product, process, people and

1. **Product:** This dimension focuses on aspects related to the particular ERP product in consideration, such as functionality, and on related technical aspects, such as hardware and base software needs. A thorough understanding of the software tool's capabilities must exist in order to make an alignment with the business strategy in order to determine whether the software is being used effectively, in accordance with the needs of the organization, and how it can best be applied to further the goals of the organization.
2. **Process:** Each organization has its own core capabilities and functionality that must be supported by an ERP system. Also, an ERP system must help the decision-making required to manage the resources and functions of the organization. Usually, the main ERP investment focus is on re-engineering processes to enable the organization to adapt to the new business models and functional requirements of the ERP system in order to achieve better performance.
3. **People:** This dimension refers to the human resources and their skills and roles in an ERP system life-cycle. These skills and roles must be developed to minimize the impact of the introduction and diffusion of an ERP system, in order to reduce risk and manage complexity,

while facilitating organizational change. Dealing with contingencies, changing practices, and adapting to a new organizational structure and culture are some aspects that must be learned.

Above phases are to be followed for successful implementation of ERP in any small scale industry.

3. Competitive advantages in SMEs.

3.1 Analysis of data:

After implementation of ERP in small scale industry the following analysis shows benefits of ERP system. In the analysis employer and employees vote was taken on the silent benefits of ERP software. All the employees took part in the analysis and given there valuable vote.

For this analysis employees has been divided into 3 levels based on their role in industry. Levels of the employees are as follows

Level I: Managerial department.

Level II: Administrative department.

Level III: Manufacturing department.

All the levels of employee had given feedback on the analysis of implementation i.e. the improvements in the firm before implementation of ERP and after implementation of ERP on the scale of five where 1 is very poor and 5 is great.

Table 3.1: Before implementation of ERP

Factors	Level I	Level II	Level III	Average
Operating cost	3.4	3.3	3.9	3.5
Inventory	2.8	3	2.9	2.9
On time delivery	3.6	3.1	3.4	3.3
Supply chain	2.5	2.3	2.7	2.5
Cycle time	3.3	3.1	3.5	3.3
Lead time	3.7	3.1	3.5	3.4
Man power	4.1	4	3.9	4

Table 3.2: After implementation of ERP

Factors	Level I	Level II	Level III	Average
Operating cost	4	4.1	3.9	4
Administrative cost	4.1	4.2	4.1	4.1
Inventory	3.9	4.2	4.1	4
On time delivery	4.5	4.4	4.5	4.5
Supply chain	4.1	4.2	4.4	4.3

Cycle time	4.5	4.6	4.7	4.6
Lead time	4.5	4.5	4.5	4.5
Man power	4.6	4.6	4.6	4.6

Above comparison of tables shows that there is an improvement in all the business activities after implementation of ERP in Small scale industry. Before implementing ERP the average of all the factors is 3.3 and after implementation the value rises by 1 and the average become 4.3 which shows the drastic change in business activities. Impact of implementation of ERP is shown more on reducing cycle time, Lead time and power where as other factors like inventory, on time delivery, operating cost also improved.

25% improvement has been observed in small scale industry after implementation of ERP software.

3.2 Advantages of ERP:

i. Reduced Operation Cost:

One of the most immediate benefits from implementing an ERP in SMEs is reduced operating costs such as lower inventory control costs, lower production costs and lower marketing costs. By avoiding duplication of information but not reinventing the wheel for common business processes, an ERP provides opportunities for cost reduction and value-added tasks, leading to increased margins.

ii. Reduced inventory overheads:

Due to the centralized nature of ERP systems, SMEs can track inventory levels on a daily basis, including inventory in transit and future consignments to be received. This visibility can enable company to control their working capital requirements to a great degree. This visibility in inventory management also enables company to run their enterprise in accordance with their strategy, while empowering them to make quick decisions to pursue opportunities.

iii. Reduced requirement of manpower:

HR department of SMEs observed that after implementation of ERP, manpower required of certain task has reduced. for example if in the administrative department 3 to 4 employees managing company's all data, spreadsheets, excel sheet etc. now all data is handled by one employee after successful implementation and rest employees where given another task which improves productivity of company

iv. Increased transparency in procurements:

All the procurement activities of the company increased with good transparency. Procurement activities like purchase planning, value analysis,

financing, price negotiation, making and purchase where handled easily.

- v. **Reduced delay in supply chain:**
Proper purchase order, purchase receipt, sales order has reduced delay in supply chain. before implementing ERP it takes 2 to 3 days to generate purchase order for any product, after implementation it is a job of few minutes to create any purchase order as all the data is available in the system already. So supply chain time is reduced.
- vi. **Reduced manufacturing cycle time:**
The amount of time required to convert raw material into finished product is known as manufacturing cycle time. Manufacturing cycle time is an important measure of internal business process performance it includes wait time, inspection time, process time, move time, queue time. After implementation manufacturing cycle time in SMEs reduced by 24%.
- vii. **Reduced Lead time:**
Lead time is the time elapsed between when a process starts and when it is completed. In SMEs reduction in lead time has seen after implementation, it approximately 26%.
- viii. **Enables faster response to changing market situations:**
If any small scale industry wants to sustain in the 21st century they have to implement ERP system for global outreach.
- ix. **Improved visibility of procurement spend and savings from improved sourcing policies.**
- x. **Decrease of work-in progress and days-of-sale-outstanding,**
- xi. **Improved productivity through better sales order handling, better procurement operations and more efficient planning.**
- xii. **Integrated supply chain: from network planning through scheduling and Manufacturing Execution Systems (MES)**
- xiii. **Easier integration of business processes with business partners**
- xiv. **Increased information transparency to enable better decisions**
- xv. **Better utilization of resources**
- xvi. **Increased customer satisfaction**
- xvii. **Enables global outreach.**

Table 3.3: Improvement after Implementation of ERP

Business Activities	Actual improvement after implementation ERP
Operating cost	22% reduction in operating costs
Administrative cost	20% reduction in administrative costs
Inventory	17% inventory reductions
On time delivery	19% improvements in complete and on-time delivery
Supply chain	17% improvements in schedule compliance
Cycle time	18% reduction in cycle time
Lead time	24% reduction in lead time

4. Conclusions

A well-designed and properly integrated ERP system allows the most updated information to be shared among various business functions, thereby resulting in tremendous cost savings and increased efficiency and provide Competitive advantages. Proper study of life cycle of ERP can give us a better understating of the ERP. All the parameters included in the study of ERP life cycle like man, machine, material plays important role in optimizing and automating any small scale industry. Application of ERP system in Indian Small Scale industries is still in nascent stage and during research review; it was observed that the awareness level on the latest information tools like ERP is limited among managements of some large industries only.

References

- [1] Jose M. Esteves, “An ERP Life-cycle-based Research Agenda” International workshop in Enterprise Management and Resource Planning: Methods, Tools and Architectures, Venice, Italy 1999, pp 45-55.
- [2] Alah awari, “Explaining ERP failures in developing countries” International journal of emerging trends and technology in computer science, vol. 1 issue 2, , 2010, pp. 107-117.
- [3] Parijat Upadhyay1 and Rana Basu2, “A Comparative Study of Issues Affecting ERP Implementation in Large Scale and Small Medium Scale Enterprises in India”, International Journal of Computer Applications Vol 8, 2010, pp 23-27.
- [4] Hala M. Al-Shamlan et al , “The Chang Management Strategies and Processes for Successful ERP Implementation: A Case Study of MADAR” IJCSI International Journal of Computer Science Issues, Vol. 8, Issue 2, March 2011, pp 373-390.
- [5] Kamal Khanna et al, “Choosing an Appropriate ERP Implementation Strategy”, IOSR Journal of Engineering Mar. 2012, Vol. 2(3),pp: 478-483.

- [6] R.M.Bhawarkar¹ and DR. L.P. Dhamande, “ Exploring Enterprise Resource Planning (ERP) System Outcomes in Indian Small and Medium Enterprises (SME’s)”,*International Journal of Engineering Research & Technology (IJERT)*, vol 1, , 2012, pp. 1-7.
- [7] Abdulelah Almishal, “study of impact of ERP on small and medium scale enterprises”, *Journal of science and technology*, vol 2, issue 3, 2012, pp 56-66.
- [8] Vijay M. Khaparde, “Barriers of ERP while implementing ERP: a Literature Review”. Vol 3, Issue 6, Nov 2014 . pp 38-45.