

# Implementation and Management of ERP Systems: A Literature Review

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## Abstract

ERP has attracted phenomenal interest in the recent years. Actually, an ERP System is considered as a backbone of most organizations across all the industries. It will usually cover all business functions on all management levels, supporting most or all functional areas in the daily operations of the enterprise, and it is considered as a source of competitive advantage for some organizations, if the system is set up at the right way. However, the chance of failure has always been high. Today, many companies fail to realize the full benefits of ERP systems due to their negligence of some aspects of management and implementation. Finally, the result is either the improvement of the performance or on the contrary a slowdown because of its powerful concept.

To answer that we tried to do a literature review of “the implementation and management of ERP systems”. we have selected a certain number of papers of work published between 2010 and 2017 (1st September) . It seeks to define the general topics, to address some issues related to implementation and management of ERP , and point out overall trends.

## Keywords:

ERP literature review; ERP system; ERP implementation; ERP management. Supply Chain Management.

## 1. Introduction:

The Enterprise Resource Planning (ERP) system is a software solution that has been conceived to unify all information systems of all departments into a single integrated system that manages all of functional areas in a company such as financial and cost accounting, planning and manufacturing, sales and marketing, materials management, human resource management, distribution and transportation. It is considered as a backbone of the information systems in an enterprise, and it supports all parts of business processes by providing flow of information between all business functions on all levels within an enterprise. ERP system offers a competitive advantage especially in terms on the value of the information; according to Abd Elmonem *et al.* (2017) “Sharing data and information between enterprise departments helps in many aspects and aims to achieve different objectives”.

During the 1990's, ERP system was regarded as one of the major information technology (IT) innovation. The concept of ERP systems traced its roots to the emergence of inventory management systems around the 1960's, MRP systems in the 1970's and MRPII systems in the 1980's. However, there have been many fluctuations in the world of ERP systems. The Panorama consulting solutions report (2017) shows that the choice of 67% organizations remains focused on the traditional ERP with an increase of 11% over 2016, compared to the new innovations of ERP vendors such as SaaS or Cloud ERP that are chosen only by 27% and 6% of organizations, respectively . Despite these changes and from the same report, SAP is still leading the market of ERP (20.3% of market share) with others historical key vendors such as Oracle (13.9% of market share) and Microsoft (9.4% of market share). The need for rapidity, flexibility and transparency for access to information led to a rapid and permanent change of these systems, which explains their evolution throughout history.

A wide volume of research focused on the ERP exists in the literature. This article will facilitate continuity of research from some previous articles. Schlichter and Kraemmergaard (2010) analyzed abstracts from 885

peer-reviewed publications between 2000-2009, while Huang and Yasuda (2015), analyzed a total of 86 ERP literature reviews related to organizations, by accepting literature reviews of ERP development, technology, etc.

Our objective in this article is to contribute in this field and to provide a guide by presenting the main themes related to the ERP systems. This article is a review of the literature on ERP published between 2010 and 2017 (1st September). First, this article has as objective to define the general topics, issues, or areas of ERP and point out overall trends. Secondly, the article will offer a bibliographic database of articles published during the specific period. The themes addressed within the articles are divided into four categories:

- 1- Implementation of ERP systems
- 2-Management and ERP systems
- 3-ERP and supply chain management
- 4-Trends and perspectives

## **2. Research methodology:**

We describe the methodology adopted through collecting and analyzing the articles. We had a specific criteria to choose the articles used in this review of literature. For that, we used some web search facilities for some major publishers such as science direct, Google Scholar. In order to identify the majority of issues and fields treated within the articles, we analyzed the references and abstracts of all the articles having relations with ERP field. Then, we chose just the articles having direct relation with our field and integrating the specify time. We give more details in the following:

- (1) Defining the keywords and using web search of some academic search. We used science direct and google scholar as the major web search.
- (2) Selecting the articles, essentially of journal articles and conferences. We dismissed all the paper such as unpublished articles, master's theses, books.
- (3) Selecting the articles having a directly relation with our fields, and eliminate the articles having a loose relation with ERP.
- (4) Checking the abstracts and the full text of each of the articles, and defined the subjects treated by all of them. Then, we categorized and classified them.
- (5) Depending on the objective of the review of literature, it is important to note that this article has as objective to exhibit the main message of each research, and give an idea on the active research on the ERP field, and that there is no added value contribution.

We define three principle themes: (1) Implementation, (2) Management and ERP systems, (3) ERP and supply chain management. On the literature the themes are divided in sub-themes, for (1) Implementation we defined three sub-themes: (a) Implementation strategy, (b) Critical success factors and reasons of failures, (c) Business process alignment (d) Change management. For (2) Management and ERP systems three sub-themes are defined: (a) Management issues of the implementation, (b) ERP and best practices in management, (c) Impact on organization. For (3) ERP and Supply chain management we have only one sub-theme: (a) Impact for the ERP in the supply chain. In the next table 1, we present the different issues that have been treated in the main themes, and in the table 2 we show them with their references.

Table 1. Major themes discussed

Section / Topic	Issues
Section 1 : Implementation of ERP	Which describes some of the practical issues associated with the implementation of ERP cited in the various articles such as steps of implementation, CSF's, and Business process alignment. <i>'How can be introduced ERP systems into organizations?'</i>
Section 2 : Management and ERP Systems	Which includes research focused on Organizational Change, Risk management of ERP, Evolutionary Changes in ERP Systems issues. <i>'How the implementation of ERP systems affects management and business organizations?'</i>
Section 3 : ERP and Supply chain management	Which describes the role of ERP systems in SCM, and their contribution to achieve a competitive advantage.

Table 2. Major themes and sub-themes in the domain of ERP systems

Section / Themes / Sub-themes	References
Section 1 : Implementation of ERP -Implementation strategy  -Critical success factors and reasons of failures  -Business process alignment  -Change management	Zhang et al. (2003), Soffer Pnina et al. (2005), Gargeya et al. (2005), Olson et al. (2007), Chang et al. (2008), Subramoniam et al. (2009), Law et al. (2010), Supramaniam et al. (2010), M Kuppusamy et al. (2010), T Ramayah et al. (2011), Annamalai, C. et al (2011), Maditinos et al. (2011), B Johansson et al. (2011), Kosalge Parag et al. (2011), AL-Nafjan et al. (2011), A Madapusi et al. (2012), ZA Hasibuan and GR Dantes (2012), M Fryling (2012), Khanna Kamal (2012), Archana Sar et al. (2012), AL-Ghamdi et al. (2013), Matende Samwel et al. (2013), AS Shatat (2013), J Razmi et al. (2013), Bazhair Ayman et al. (2015), S Abdinnour and K Saeed (2015), RM Elhuni (2015), Panayiotou Nikolaos et al. (2015), Leyh Christian (2016), Huang Tingting et al. (2016), Zouaghi Iskander et al. (2016), Altamony Hamzah et al. (2016), AS Shatat and N Dana (2016), RMA Wadi and OM Bukamal (2016), EM Abdelmoniem (2016), P Lech (2016), M Ali and L Miller (2017), K Jagoda et al. (2017), J Kiarie et al. (2017)
Section 2 : Management and ERP Systems	Hassan R. Hassab Elnaby et al. (2012) Gede Rasben Dantes and Zainal Arifin Hasibuan (2011)
Section 3 : ERP and Supply chain management	Yi-fen Su and Chyan Yang (2010a), Yi-fen Su and Chyan Yang (2010b), S.C.L. Koh et al. (2011), A Kashyap (2011), HG Hong (2012), Z Mohamed Udin et al. (2012), Huseyin Ince et al. (2013), Karin Kandanand (2014), S Almahamid et al. (2015) Bambang Leo Handoko et al. (2015)

Total of 51 papers were analyzed and categorized into three main categories and 4 subcategories. Among the 51 papers, we found 39 papers discuss the topic of ERP implementation, 2 papers discuss the topic of ERP management, and 10 discuss the topic of ERP and supply chain management. 76% of those articles are related to 'ERP implementation', only 24% of the articles are related to 'Management'.

There are various streams of research that have addressed the area of ERP system on different aspect and have tried to cover the topic on all sides. They complement each other and evaluate different aspects of ERP systems.

Botta-Guenolaz et al (2005) analyze 80 publications published between 2003 and 2004 academic contributions from various disciplines. Their analysis of the 80 publications was structured, they selected six areas for classification: implementation, optimization, management through ERP, the ERP tools, ERP and Supply chain management and case studies. This study provides a real overview of the ERP field in 2003 and 2004. In their review YB Moon (2007) identified six research streams while conducting a review on literature. These streams are: Implementation, using ERP, extension, value, trends, and education. A Total of 313 articles were examined on ERP systems, and the article provides a snap shot status of the field as of 2000 and 2006. Huang et al. (2016), as for him, treat a total of 86 literature reviews that have been accumulated and classified into three main categories and five subcategories. The authors adopt a multi-method approach to analyze the outcome of the survey. It includes type of review, geographic area, type of publication, theory and process approach. Table.3 show the most previous review of the literature have been conducted according to their number of times cited according to google Scholar.

Few literature reviews have been interested in articles published after 2010, leaving the ERP with a lack of knowledge about publications published as of 2010. Our review aims to fill this gap and aims to provide a general idea on the field of ERP and especially on the implementation side by analyzing most publications published between 2010 and 2016.

Table 3. Previous review of the literature

The most previous researches	Number of times cited
V Botta-Genoulaz et al. (2005)	406
YB Moon (2007)	328
B Rerup Schlichter (2010)	124
T Huang et al. (2016)	14

### 3. Implementation of ERP systems

Implementation of ERP is very expensive and complex undertakings, but once it's successfully implemented, significant improvements can be achieved such as easier access to reliable information, elimination of redundant data and operations, reduction of cycle times, increased efficiency hence reducing costs (Zhang et al., 2003), it is the largest single IT investment, impacts the greatest number of individuals, and is the broadest in scope and complexity (Chang et al. 2008.).

The implementation of an ERP system differs from that of any traditional information system due to its integrated nature which causes dramatic changes on work flow, organizational structure and on the way people does their jobs (Samwel Matendela, Patrick Ogao, 2013). Organization's people and processes must undergo significant change in response to the introduction and implementation of an ERP system. It have many issues that confront ERP implementation, and organizations continue to underestimate the complexity of implementing an ERP system throughout its life cycle (Olson, Zhao 2007) (Motiwalla, Thompson 2009). Thus, the issues surrounding the implementation process have been one of the major concerns in the domain of ERP and different kinds of research in relation with ERP implementation are observed from the literature. This section has been divided on sub-section addressing the issues of implementation steps, the business process alignment, change management, critical success factors and reasons of failures.

#### 3.1-Implementation strategy

Strategy implementation of ERP is also defined as the manner in which an organization should develop, utilize, and amalgamate organizational structure, control systems, and culture to follow strategies that lead to competitive advantage and a better performance. There are many approaches an organization can take when it comes to ERP implementation but the most important thing is to choose the best strategy for their particular business. Khanna (2012) explains the relationship of ERP transition strategies between the three basic risks, people, process and technology and thus aid the ERP implementers to better recognize what type or combination of strategies will suit their system the best. Akbar et al. (2010) present a model for evaluation of ERP procurement scheme with centralization on realization of strategic plan and focusing on small and medium enterprises. IZouaghi (2016) provides a brief overview of the literature dealing with key success factors related to an ERP implementation project and then come out with a framework analyzing these KSFs depending on implementation strategies.

#### 3.2-Critical factors of success and Reasons of failures

CSFs play a role in today's ERP implementation and management. The majority of research in ERP implementation has primarily focused on Critical success factors. It dominates the ERP literature and primarily focused on identifying, developing, and analyzing. It has been a subject of many researches, and numerous authors have identified a variety of factors that can be considered to be critical to the success of an ERP implementation. Thus, the identification of these factors and their impacts has attracted the interest of researchers and professionals (Brady, 2005). Most of the literature reviews on CSFs and risk factors still focus on critical factors particularly in the implementation phase, some reviews are showing concern in the post-implementation phase and the whole ERP implementation course as well (Huang and Yasuda, 2016). However, the existing ERP success factors research has focused on the selection and implementation in large enterprise. It is important to study and analyze those critical factors to shed light on successful ERP implementation, to define which of them can influence, and to outline

aspects which are essential to ensure that a successful ERP implementation. Law *et al.* (2010) explores and identifies the critical success factors (CSF) of ERP adoption, and shows that maintenance and support must be included as a key element from the outset and throughout the system lifecycle. Bazhair *et al.* (2012) suggest the main factors that the organization must take into account during the implementation of the ERP, and discussed some factors such as financial performance, the user satisfaction, change management, or clarity whether it is at the level of the distinction of the ROI or the benefit of acceptance of the ERP. DMaditinos (2011) seeks to introduce a conceptual framework that investigates the way that human inputs (top management, users, external consultants) are linked to communication effectiveness, conflict resolution and knowledge transfer in the ERP consulting process, as well as the effects of these factors on ERP system effective implementation. Leyh (2016) provides more information on the CSF's research area for ERP implementation projects, with a focus on ERP projects in small and medium-sized enterprises through the literature review. This research has yielded valuable information that can improve the degree to which an organization's implementation project succeeds. schiederjans *et al.* (2012) present a conceptual model that better defines critical success factors to ERP implementation organized with the technology, organization and environment (TOE) framework, also they adds a success factor of trust with the vendor, system and consultant. Despite the popularity of ERP, the failure rate of ERP implementation remains high. High failure rate and difficulties in implementing ERP systems have been widely cited in the literatures, furthermore, according to Panorama conultign solutions report 2017, it has been estimated a 13% increase in success rates compared to recent years, but in parallel there has been a 19% increase in respondents who have rated their project as a failure. According to the same report 26% of respondents estimated their project as a failure. Moreover, 75% ERP projects were considered as failure and cannot be accepted (Huang et al., 2004). Sar *et al.* give an analysis of critical failure in ERP implementation. This study is subjected to root-cause analysis of the failure factors to which the Pareto analysis is applied to identify the vital factors, according to him the top three reasons for the failure, were poor planning or poor management, change in business goals during the project, and lack of business management support.

### **3.3- Business process alignment**

The Business Process Reengineering phase is recognized a crucial step of an ERP implementation, supposed to make possible the mapping between the company activity and the ERP standard processes. It is an approach consisting of computer modeling of the business processes of the company, in both their application and human aspect. The aim of this approach is to gain a better understanding of all the company's business processes, their progress and their interactions. Due to technological and behavioral changes mainly linked to the multiplication of informational exchanges and the massive use of management systems, companies today seek to rely on infrastructures combining business process Reengineering (BPR) and ERP. According to Panorama consulting solutions report 2017, 93% of organizations improved some or all of their business processes. This issue attracted the attention of a several authors in view of its importance.

Panayiotou *et al.* (2015) described and analyze the benefits of the application of a requirements engineering framework to assist (ERP) development. This framework combines the technology-driven and the process-driven approaches for requirements analysis and implementation. Specific business process modeling methods enhance the framework and assist the formulation of the functional specifications of the ERP system and the management of requirements. Soffer (2005) proposed an iterative alignment process, which takes a requirement-driven approach. It benefits from reusing business process design without being restricted by predefined solutions and criteria. Subramoniam *et al.* (2009) showed some sample ERP installations to come out with various types of business BPR, ranging from small-r to big-R, practiced while implementing ERP.

### **3.4- Change management**

Organizational Change Management (OCM) is the structured approach to transitioning project stakeholders from their current state to a desired future state. OCM activities are designed to empower stakeholders to embrace organizational and process changes required by new ERP software. By identifying the human impacts of a change, the OCM team supports the project management team that is primarily focused on the technical side of implementation. This issue is among the topics most treated in the articles.

Altamony et al (2016) try to explore the critical success factors in change management strategy in order to guarantee a successful implementation of an organization's Enterprise Resource Planning (ERP) system and present the three phases of successful change management strategy: preparing to change, implementation of change, and

measuring the impact on user. AL-Ghamdi (2013) discusses the change management strategies and processes for the success of ERP system implementation and proposed a model. An Al-Nafjan *et al.* (2011) targeted to investigate and identify the reasons for resistance to diffusion and why individuals within an organization resist the changes, and also suggests strategies to minimize the resistance if not overcome completely. Bazhair (2015) investigates the effects of ERP change management and ERP perceived ease of use on ERP systems acceptance and its impact on the financial performance.

#### **4. Management and ERP systems**

The majority of articles in the literature evoke the structural changes that result from implementing ERP in the company, attempt to measure the impact of ERP on organizations, and some examine their functional impact more specifically by defining the mode of management that must be implemented.

HElnaby *et al.* (2012) examine whether the implementation of ERP impacts both business strategy and organizational capabilities which in turn enhance firm performance. Specifically, he investigates the mediating effect of business strategy and organizational capabilities on the relationship between ERP implementation and firm performance. Dantes and Hasibuan (2011) explore a strategical and tactical impact induced by the implementation of ERP and find out the correlation among ERP implementation success with the strategical and tactical impact.

#### **5. ERP and Supply chain management**

The most efficient manufacturers are also those who know how to manage more configurations in their supply chain, this determines the degree of a company's ability to adapt quickly to new customer demands and market opportunities, it can be a competitive advantage or a handicap. Today, the enterprise resource planning (ERP) system is expected to be an integral component of supply chain management (SCM), and for that many research have been conducted to define the impact of ERP systems and benefit on the supply chain management.

Su and Yang (2010a) provide further insights into the adoption of ERP systems and the impacts on firm competence in SCM and propose a model featuring ERP benefits to firm competences in supply chain management, they also hypothesize that three constructs of ERP benefits positively impact firm competences in SCM. A Kashyap (2011) documents the effect of implementation of an ERP system within a firm and also its impact on supply chain system. Hong and Hyun-Gi (2012) find out how the Enterprise Resource Planning system's maturity effects on the implementation intension of Supply Chain Management system, for that the empirical research about influence of ERP system on SCM system was carried out. Almahamid *et al.* (2015) guide a research that aims to understand the impacts of enterprise resource planning (ERP), e-business technologies, and organizational collaboration on supply chain agility.

#### **6. Trends and perspectives**

ERP systems attract the attention of decision makers and are an integral part of planned procurement. Today, the use of an ERP is seen as a real competitive advantage for most executives. In fact, this software facilitates the processing of information within the company thanks to an activity management organized on the same database. More and more additional modules are also being developed to bring new functionalities to the ERP such as CRM systems, HCM systems, SCM systems, Business intelligence, Mobile Solutions, and Cloud solutions. They allow a flexible and creative use of potential technologies without being constrained by a single type of technology. For that, several authors dealt with the subject of ERP, through their articles they provide a definition of ERP and they present the issues related to this theme. The majority of articles in the litterature focus more on the issues of implementation than it is in the managerial side or project side and provide informative guides for managers and beginning researchers in ERP.

Now, the aim of ERP vendors is to make it easier for businesses to add functionality to their business and accounting management software based on their needs. This will enable a large number of companies, whether large or small, to have access to them through functionalities and solutions. With all of these advancements and improvements, there are a number of trends that are growing rapidly in todays. Several authors present various future solutions and try to define them through their articles, and research is becoming more and more interesting. Among the most discussed

topics is Cloud Deployment, Social Media Integration, Mobile, and Adoption by small and midsize companies. Mutual assistance between the academic and industrial sectors makes it possible to highlight potential future trends in terms of expansion and make tasks easier for managers to make the right choice and for ERP vendors to create the right product according to market need.

## **Conclusion**

Since ERP solutions address all organizational needs it become an important subject which has attracted attention for a research communities as its introduction brings a new culture, cohesion and vigor to the organization. However, the research in this domain is still small relative to the importance of this informational system. However, the research become more mature in the recent years and tried to pinpoint the subject from all sides.

ERP represents an important area for research. Researchers still need to further explore these systems. While, they have contributed so much to the field and have covered and treated most of the topics, but we have noticed an enormous decline in this research in recent years contrary to what was expected.

Publications used in this paper research were conducted by academics and are quite recent. We chose to do a review of literature between 2010 and 2017 because we noticed that it was necessary to give an overview on the research that has been conducted to ensure a continuity of research that has already been done. Next, we were able to analyze several articles and publications published in the main journals, and have dealt with some problems related to ERP. This survey gives a general idea on a different area, topics, and issues regarding ERP systems, and is focused on the dynamic subjects in the literature. Our results show that all major research since 2010 is concerned with the same problems and approaches with more attention on those of the implementation. It attempted to treat the subject at the level of organization and management of these systems and is more related to ERP lifecycle, but on the other hand there is a huge lack of research at the technological level. The difficulty of implementation explains the concentration on this strand of research and the lack of desire to delve into other, more technological, subjects.

The objective of this review of the literature is to offer an overview and to specify the main features and the various characteristics that punctuate it. This will help direct future research in other areas of investigation related to ERP systems.

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