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Enterprise Resource Planning (ERP) System Implementation: A case for User participation

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Abstract

The introduction of an information system such as Enterprise Resource Planning (ERP) system in an organization brings with it changes on how users work. An ERP system cuts across the different functional units of an organization and therefore if not properly managed during its implementation may lead to resistance from the users. The different streams of research on ERP systems have mainly been on ERP adoption, success measurement, and critical success factors (CSFs). There is a paucity of studies on user participation and the contribution of users towards the successful implementation of ERP systems. This paper reviews literature on ERP implementation with an aim of building a case for involving users in this implementation.

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Key terms: Enterprise Resource Planning, ERP systems, ERP implementation, user participation, CSFs.

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1. Introduction

Information Systems (IS) are social systems which deal with the interaction of people and technology. An information system, including an Enterprise Resource Planning (ERP) system, is user-interfaced and designed to provide information useful to support strategy, operations, management analysis, and decision-making functions in an organization.

The implementation of an ERP system affects users at various levels of the organization since it cuts across all functional units. These users range from top management to low level users who use the system on their day-to-day operations. Earlier studies on ERP systems that focused on critical success factors, such as Al-Fawaz *et al.* [2]; Esteves *et al.* [12]; Zhang *et al.* [33], have identified user participation and involvement as one of the important factors for successful ERP implementation. User participation is defined as the assignments, activities and behaviours that users or their representatives perform during the systems development process (Barki and Hartwick, [7]).

Based on financial resources required, the number of people involved in the process of adoption and the scale of implementation demanded by ERP systems makes them the largest systems that most organizations work with (Chang *et al.* [9]). A number of studies recently conducted, among them Wah [29] and Xue *et al.* [31], report that some ERP system implementation cases have had considerable difficulties. These difficulties have contributed to higher failure rates of ERP systems implementation reported in some studies (such as Yeh *et al.* [32]).

Chang *et al.* [9] state that an enterprise resource planning system is a new management technology. Wu and Wang [30] state that it integrates core corporate activities and diverse functions of the enterprise by incorporating best practices in order to facilitate rapid decision-making, cost reduction, and greater managerial control. Because of this promise of integration and facilitation on rapid decision-making, more organizations and institutions globally are implementing ERP systems (Markus *et al.* [19]). Along with this adoption, there has also been a greater appreciation of the challenges that arise from implementing these complex technologies.

According to Al-Mashari [4], ERP systems are one of the most innovative developments in information technology (IT) of the 1990s. Al-Mashari further asserts that many organizations are now adopting ERP systems making them today's most widespread IT solutions. This world-wide adoption is pegged on the advantages that ERP systems present which include better information sharing within the organization, improved planning and decision quality, smoother coordination between business units resulting in higher efficiency, and quicker response time to customer demands and inquiries.

There are many in the information systems discipline who believe that user participation is necessary for successful systems development. This belief is neither grounded in theory nor substantiated by research data (Mattia and Weistroffer, [21]). This indicates that researchers have not addressed fully the underlying complexity of the concept of user participation. This is indicative of a deficiency in understanding user participation in information systems development as it occurs in organisations.

A quick review of literature addressing ERP systems implementation reveals that more focus has been directed to success or failure including CSFs, success measurement and evaluation of ERP systems. There is a paucity of studies on user participation and the contribution of users towards the successful implementation of ERP systems. This paper seeks to build a case for user participation in ERP systems adoption and implementation by reviewing literature relating to ERP systems.

This paper is organised in 5 sections with the introduction being Section 1. Section 2 presents a background on ERP implementation, past research on ERP implementation and user participation in ERP implementation studies. Section 3 describes the methodology followed in identification, categorization, collecting and reviewing articles. A discussion on the reviewed articles is provided in Section 4. The paper concludes with Section 5.

2. Background

Implementation of an ERP system is a complex IT-related social phenomenon with a large body of knowledge (Sarker and Lee [24]). Amoako-Gyampah [6] asserts that this implementation involves large expenditures, lengthy periods, and organizational commitment.

There are several obstacles which make the ERP systems implementation a challenge. Among these obstacles that have been reported in literature include technical problems and people obstacles (Botta-Genoulaz and Millet [8]; Krasner [18]). Chang *et al.* [9] argue that many organizations are totally occupied by technical issues in ERP system implementations due to limited resources and short deadlines. They further state that since little attention is paid to customization of ERP modules, this is likely to create tensions, frustration, instability and conflict in the user group.

Due to the complex nature of these systems, there have been reports of ERP implementation projects that do not succeed. Sumner [27] states that there are a number of potential explanations for these failures. The failures can broadly be classified as human/organizational reasons such as lack of strong and committed leadership, technical reasons such as challenges or difficulties that arise from software customization and testing and economic reasons such as lack of economic planning and justification). Sumner [27] further asserts that as much as each of these classes is important there appears to be a growing consensus among researchers that human factors are critical to the success of ERP projects. These human factors include the role that users play in the process of implementing these systems.

Even with this fact, few studies have attempted to examine the role of these human factors and how they affect the ERP implementation.

Past research on ERP system implementation

ERP system implementation is and continues to be an active area of interest to researchers. There are various streams of research that have been taken by researchers while exploring ERP system implementation. Some of these streams include implementation of ERP, ERP optimization, ERP software, ERP for supply chain management, case studies, ERP success models, factor research which involves identifying the factors or variables that are critical for implementing the ERP systems, process research which focuses on processes that allow an organization to focus on the sequence of activities that are associated with the successful implementation of ERP systems. Moon [22] identified six research streams while conducting a review on literature. These streams are (1) implementation, (2) using ERP, (3) extension, (4) value, (5) trends, and (6) education.

Table 1 presents the major thematic and sub-thematic research areas within the ERP domain. The ERP implementation theme is the main focus of this review. Studies conducted here focused on case studies, critical success factors (CSFs), change management, focused stage in the implementation process and cultural (national) issues that arise while implementing ERPs.

Past ERP implementation research were factor-based focusing on identifying the factors or variables considered to be critical in the successful implementation of ERP systems. Some of these studies resulted in identification of critical success factors (CSFs) for successful ERP implementation (Gibson *et al.* [16]). One of the CSFs identified by these studies is adequate user involvement and participation during the implementation phase (Upadhyay and Dan [28]). User participation in the implementation of ERP systems has been found to be beneficial because it leads to the determination of system requirements from the users and thus creating a positive attitude towards the ERP system. It is important that users are involved in determining the needs of their functional unit.

Table 1: Thematic and Sub-thematic Research Areas within the ERP Domain

Theme	Sub-theme
Implementation	• <i>General</i>
	• <i>Case Study</i>
	• <i>Critical Success Factors</i>
	• <i>Change Management</i>
	• <i>Focused stage in the implementation process</i>
	• <i>Cultural (national) issues</i>
Using ERP	• <i>General</i>
	• <i>Decision support</i>
	• <i>Focused function in ERP</i>
	• <i>Maintenance</i>
Extension	
Value	
Trends and perspectives	• <i>General</i>
	• <i>In a particular sector</i>
Education	

Source: Moon [22]

Within ERP implementation context, CSFs are defined as those factors that are necessary to ensure a successful ERP project (Gibson *et al.* [16]). Several studies identified the critical factors needed to enable project managers and management boards to improve their ERP implementation projects. Some of these CSFs are common with other IT projects such as top management support, user's involvement and others are exclusive for ERP systems such Business Process Re-engineering (BPR). However, these studies are dragged under traditional implementation research whose main aim was to investigate factors relevant to IS implementation success.

A conceptual model for ERP system implementation proposed by Marnewick and Labuschagne [20] addresses four aspects of implementation namely people, product, process and performance (4P). In relation to ERP systems, *People* as the customers that represented the organizational requirements/mindset, *Product* as software modules that are to be implemented across the business, *Process* as representing the project's change management issues and *Performance* that is analogous to data flows associated with business process. Every 4P component has a direct or indirect effect on the ERP implementation process. This includes the identification of organizational requirements, the customization of selected software, its installation and subsequent operationalization, and finally the important needs of systems training for personnel. In the ERP context, people refer to users (both key-users and end users).

Markus *et al.* [19] allude to process theory when it comes to ERP implementation. The process theory breaks down the ERP implementation into clearly defined phases. These phases allow an organization to focus on the sequence of activities that are associated with the successful implementation of ERP systems. According

to Markus *et al.* [19] there are various phases an ERP project progresses through. The initial phase is a chartering phase that addresses the decision-making issues such as the need to purchase system and requirements analysis that lead to financial approval of an ERP project. The next phase is a project phase, where system configuration, customization, data capture and conversion and rollout is conducted and finally the shakedown phase. The shakedown phase is a period in which the system begins to operate and users interact with it in their day to day operations. Furthermore, Markus *et al.* [19] tends to relate these implementation phases with key activities and players to highlight the degree of coordination required for the successful implementation of an ERP system.

There are different strategies for implementing ERP successfully identified in literature. These strategies can be classified into organizational, technical, and people strategies. Organizational strategies focus mainly on change management techniques, project management, organizational structure and resources and how these would lead to successful ERP implementation (for example, Al-Mashari and Zairi [3]; Gable and Stewart [14]; Sarker and Sarker [23]).

Technical strategies address infrastructural issues like ERP installation, ERP complexity, adequacy of in-house technical expertise, and time and cost of implementation have been proposed as determinants of successful ERP implementation (Al-Mashari and Zairi [3]; Amoako-Gyampah [5]; Sarker and Sarker [23]). Staff and management attitudes, user participation and involvement and their training are some of the people strategies that can be used in facilitating a successful implementation of an ERP system (Amoako-Gyampah [5]; Gable and Stewart [14]).

With regard to ERP systems success models, the works of Gable *et al.* [15] and Ifinedo [17] are worth noting. Basing their work on the initial work of DeLone and McLean [10][11], Gable *et al.* [15] developed a model for measuring the success of an enterprise system. In their model, Gable *et al.* [15] identified system quality, information quality, satisfaction, individual impact and organizational impact as dimensions or variables for measuring success of enterprise systems. The individual impact presents an attempt of recognizing the importance of users in the success of enterprise systems.

Ifinedo [17] studied the work of Gable *et al.* [15] and extended it by adding the Workgroup Impact dimension on to the model. This dimension is concerned with the impact of the system on the individual. These models attempt to place the users in the picture of ERP systems implementation success. The models, through Individual Impact and Workgroup Impact dimensions, indicate the importance of taking into consideration the users of the ERP system.

User Participation in ERP Implementation.

As mentioned earlier, user participation and involvement are part of the CSFs for ERP systems. End users are the people who have direct contact with the ERP systems (Esteves *et al.* [13]). User participation refers to involvement in the system development and implementation process by representatives of the target user groups. There are two main areas of user participation when a company or organization decides to implement an ERP system (Esteves *et al.* [13]). The first area is when a user participates in the stage of definition of the company's ERP system needs and the second area is user participates in the implementation of the ERP (Zhang *et al.* [33]). Understanding the contributions of user participation in ERP implementation will lead to successful implementation. One of the problems related to ERP implementation is the incompatibility of process features with organization information needs (Siriluck [25]). To address this problem users need to be allowed to participate in the implementation of the ERP system since they are familiar with the business processes and the knowledge domain in their functional units.

Involving users in the stage of defining organizational needs provides the users with an opportunity to mould and shape the system based on their priorities and business requirements and thus control the outcome (Esteves *et al.* [13]). When users are involved or participate in these stages they are bound to react positively to the potential of ERP system.

3. Methodology

The methodology used in this study heavily focused on ERP implementation literature discussing user participation and involvement. Keywords that were used in searching for appropriate literature were ERP, ERP implementation, ERP CSFs, user participation, user involvement. The derivation of these keywords formed the first stage of the methodology. The second stage involved conducting a search on journal articles, conference papers, books and web postings based on the keywords identified. A variety of tools were used to search for these papers, as follows: internet search engines such as Google scholar, and a series of journal databases; ScienceDirect, IEEE, Emerald and Inspec. The presented articles were then categorized into different groups which included ERP success models, ERP adoption, ERP implementation, User participation issues, critical success factors (CSFs), change management, ERP internal integration and implementation challenges in general. The short-listed papers from the categorization exercise formed the basis of the literature review.

4. Discussion

The focus of this paper is on user participation in the context of ERP systems implementation. Past research on ERP implementation has focused on ERP adoption, success measurement, implementation methodologies and success factors. There is a dearth of research as far as user participation in ERP system implementation is concerned.

The closest attempt in recognizing the role of users in the successful implementation of ERP systems is in the identification of critical success factors (CSFs) where user participation and involvement is mentioned as one of the CSFs. Review of literature conducted by Moon [22] and Addo-Tenkorang and Helo [1] mention that one of the most cited critical success factors in the implementation of ERP systems is user participation and involvement. However, this is only presented in form of user education and training in order to fully use the implemented system. These studies do not argue for or against the contributions that user participation makes towards a successful implementation of an ERP system.

Most studies have focused on participation of users in traditional data processing environments such as participation in the development of transaction processing systems and management information systems. These studies, however, have identified the need for research into user participation in other types of systems and in a variety of environments.

ERP systems cut across the entire enterprise in terms of functionality and usage. They are highly complex and require a different implementation approach. Most studies on ERP implementation have analyzed the implementation from the organizational or industry perspective. There has been little research focus in ERP system adoption at the individual or user level.

End users interact with the system on a day-to-day basis. User participation refers to participation in the system development and implementation process by representatives of the target user groups or end users themselves. There are two areas in which users would participate when an organization chooses to implement an ERP system namely the phase of identification and definition of requirements for the ERP system, and user participates in the implementation of the ERP systems (Zhang *et al.* [33]).

Involving users in the stage of defining organizational information system needs has several positive points. Due to the nature of their work, users tend to develop domain expertise in their functional areas hence thoroughly understanding organizational needs and they can be involved in defining these needs. This makes it possible for them to customize the system based on their priorities and business requirements and more opportunities to control the outcome. Participation of users presents an opportunity for users to react positively to the potential ERP system.

User participation in ERP systems implementation is different from that of traditional data processing and management information systems. This is because the implementation of an ERP system requires customization of the various modules which in turn will affect how the users interact with the system.

Users participate in order to improve the functionality of the modules. Participation helps users to provide better information on requirements, overcome resistance and validate design options. Participation is also seen as a way of improving understanding between users and system builders hence enabling users have their input in the changes to their work environment.

Implementing an ERP system brings in changes to the way people work within the organization. Most organizations implement ERP systems that have been purchased from software vendors. These kind of ERP systems require customization during adoption. Processes will change and there may be job cuts and rationalization of responsibilities within departments due to the customization. All these will definitely evoke resistance from the employees and this has to be managed effectively before, during and after the implementation of the ERP package.

ERP systems differ from in-house or custom development systems in a number of ways. One of the ways stems from the fact that ERP systems are considered to be built on best business practices and thus the user may be required to make changes to business processes and procedures in order to fully utilize the system. The ERP system may need to be customized to match the business process that the user is familiar with. After the successful implementation the user usually becomes dependent on the ERP vendor for assistance and updates (Somers and Nelson [26]; Wu and Wang [30]).

The successful implementation or adoption of technology by an organization must take into account the human and management issues. Users of these technologies, such as information systems/technology, are at the central of these implementations and adoption. It is therefore important to allow these users to participate in the implementation process. User participation has traditionally been recognized as a critical component in Information System/Technology implementation.

5. Conclusion

The introduction of a new information system such as an ERP system will definitely change the way people work. The platform is new, new and different interfaces, data entry is changed and report formats are different. Users often find these changes unnecessary and therefore refuse to accept them. One of the ways to address and reduce the impact of these changes is to encourage user participation in the implementation of ERP systems.

In this paper, we have reviewed past ERP research with an aim of building an agenda for user participation in ERP system implementation. As stated earlier, the past research has focused on ERP adoption, success measurement, success factors among other technical aspects of ERP implementation. An information system, including an ERP system, is user-interfaced and designed to provide information processing capability to support the strategy, operations, management analysis, and decision-making functions in an organization. The user is at the center of an information system.

ERP implementations are expensive and complex undertakings, but once they are 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.* [33]).

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 do their jobs; Most ERP systems are not built but adopted and thus they involve a mix of business process re-engineering (BPR) and package customization; and ERP implementation is not just a technical exercise but it is a socio-technical challenge as it poses new set of management procedures.

In that sense, it has become clear that ERP implementation differs from traditional systems development where the key focus has shifted from a heavy emphasis on technical analysis and programming towards business process design and human elements (Gibson [16]). Unlike most home-growth legacy systems that were designed to fit individual working convention, ERP systems provide best practices, in other words generic processes and functions at their outset.

Alignment of the standard ERP processes with the organization's business process has been considered as an important step in the ERP implementation process (Botta-Genoulaz et al. [8]). Implementing a packaged ERP system inevitably changes the way people work. Successful implementation of an ERP system requires cooperation among different parties and departments.

In conclusion, we would like to reiterate the fact that ERP implementation is a complex IT-related social phenomenon. A substantial number of ERP implementations fail with a number of potential explanations for these failures presented. These failures, according to literature, may broadly be classified as human/organizational, technical, and economic. While each of these is important, there appears to be a growing consensus among researchers that human factors, more than technical or economic, are critical to the success of ERP projects.

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