



ENTERPRISE RESOURCE PLANNING AND ORGANIZATIONAL PERFORMANCE IN NIGERIAN MANUFACTURING FIRMS: AN EMPIRICAL ANALYSIS

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Abstract

Enterprise Resource Planning (ERP) system is a business management system that encompasses different software components aimed at managing, integrating and optimizing all business processes within an organization (Heeks, 2007). ERP system has important characteristic of integrating information, departments, functions, and processes throughout the entire enterprise. The purpose of this paper is to identify the critical success factors of ERP implementation, to evaluate their effects on the primary measures as expressed by the ERP User satisfaction and the secondary measures as expressed by the organizational performance, and to find out the effect of the ERP user satisfaction on the organizational performance of Nigerian manufacturing firms. 656 senior and management staff of 15 Nigerian manufacturing companies, which have implemented ERP programme, were randomly selected from a business-to-business database maintained by a national list provider. Using the framework from Al-Mashari, Shehzad & Al-Braithen (2008), factors manifesting ERP user satisfaction and organizational performance were regressed on the Critical Success Factors (CSFs) manifesting successful ERP. Findings based on the survey revealed that successful ERP positively affected both performance measures in the Nigerian manufacturing firms. The results further suggest the influence of successful ERP towards improving business performance sufficiently ($p= 0.001$).

Key Words: Enterprise Resource Planning; ERP, Organizational Performance, ERP User Satisfaction, Factor analysis, Multivariate analysis, Manufacturing Firms, Nigeria.

1.0 Introduction

With the rapid globalization of production and markets world-wide, manufacturing firms are faced with a changing competitive environment. They are competing in creating the conditions that will enable them to be competitive in both domestic and international markets (Adeyemi and Aremu, 2008; Hammer, 1990; Hammer and Champy, 1993; Singh & Kant, 2008). Accordingly, all manufacturing firms seek to adopt and implement a set of operations management practices that have been successful elsewhere and that will help them to identify changes in their environment and to respond proactively through radical improvement (Al-Mashari, Shehzad & Al-Braithen, 2008; Annamalai & Ramayah, 2011a; Annamalai & Ramayah, 2011b; Avgerou, 2008). One of such management practices is ERP systems, simply called ERP, which has received great attention in the last two decades (Dezdar & Sulaiman, 2011; Dezdar & Sulaiman, 2009). The Enterprise Resource Planning System (ERP) constitutes the most important Information Technology (IT) application supporting, effectively and efficiently, the operation of an organization. At present, even before an enterprise or organization thinks about acquiring other IT applications to support a specific strategic objective, nearly every organization regardless of its size or activity sector is operating, or is planning to operate in the short or medium range, an ERP system to supporting its core business functions as well as the interconnection among them (García-Sánchez and Pérez-Bernal, 2007).

Companies use ERP to improve performance substantially on key processes that impact customers and organizational performance (Annamalai & Ramayah, 2011b). For example, ERP can serve as a veritable tool for costs and cycle times reduction, by eliminating unproductive activities and the employees who perform them (Avgerou, 2008; Dezdar & Sulaiman, 2011). In addition, ERP improves quality by reducing the fragmentation of work and establishing clear ownership of processes, hence, workers gain responsibility for their output and can measure their performance based on prompt feedback (Dezdar & Sulaiman, 2009). In addition, ERP has great potential for increasing productivity through reduced process time and cost, improved quality, and greater customer satisfaction, but it often requires a fundamental organisational change. As a result, the implementation process is complex, and needs to be checked against several success or failure factors to ensure successful implementation (Garg, 2010; Ganesh and Mehta, 2010; Heeks, 2007; Osu, 2011).

However, despite the significant growth of the ERP concept, not all organisations embarking on ERP projects achieve their intended result. Garg (2010), Ganesh and Mehta (2010), Heeks (2007), and Huang and Palvia (2001) estimates that as many as 30-60 percent do not achieve the improved results they seek. This is attributed to poor implementation of ERP rather than a problem with the concept itself (Garg, 2010; Ganesh and Mehta, 2010; Heeks, 2007; Huang and Palvia, 2001; Ifinedo, Rapp, Ifinedo, & Sundberg, 2010). Such contradictory outcomes raise concerns

among companies evaluating ERP as a crucial strategic initiative (Ignatiadis and Nandhakumar, 2007; Koh, Simpson, Padmore, Dimitriadis, and Misopoulos, 2006). Kwahk & Ahn (2010) sustained these contradictory findings offer a unique opportunity for conducting studies oriented to identify critical factors that can influence the success of ERP implementations. Most significantly, the mixture of results makes the issue of ERP implementation very important (Ignatiadis and Nandhakumar, 2007; Koh, Simpson, Padmore, Dimitriadis, and Misopoulos, 2006; Kwahk & Ahn, 2010; Malhotra & Temponi, 2010).

A review of the current literatures on ERP practices indicated that much have been written about ERP implementation in large manufacturing and service firms in developed economies, but little attention has been paid to their implementation in developing economies, like Nigeria (Al-Mashari et al., 2008; Annamalai & Ramayah, 2011a). Specifically, most of previous studies have been done on the impact of ERP practices on firm's performances in Europe, USA and the Far East (Annamalai & Ramayah, 2011b; Avgerou, 2008). In contrast, few, if any, previous writers have analyzed ERP- performance relationships of manufacturing firms in developing economies (Al-Mashari et al., 2008). In a similar vein, there is a dearth of literature regarding the impact of ERP implementation on performance of manufacturing firms, despite the potential synergies between the two areas (Avgerou, 2008). Furthermore, it has been pointed out about the lack of consistency in research in ERP due to the absence of standard and universally acceptable measurement model and instrument. Thus, there is a stringent necessity to provide a model that amalgamates ERP enablers with ERP effectiveness and ERP success (Al-Mashari et al., 2008; Dezdar & Sulaiman, 2011). Consequently, the purpose of this paper is threefold:

1. To identify the CSFs of ERP implementation efforts in the Nigerian manufacturing firms;
2. To evaluate the effects of the CSFs of ERP on the ERP user satisfaction and the organizational performances of the Nigerian manufacturing firms; and
3. To examine the effects of the ERP user satisfaction (primary measures) on the organizational performance (secondary measures).

2.0 Review of Relevant Literature

2.1 Empirical and Conceptual Frameworks

In this study, an empirical framework was created to assess the impact of critical success factors of ERP on organizational performance. When the ERP implementation effort is successful, customers are likely to be satisfied with their products or services. Furthermore, customers are also likely to be satisfied with the customer services offered by a company. In addition, a successful ERP effort can also enable manufacturing firms to better manage moderating influence of user satisfaction and the consequential increases in organizational performance. In specific terms, a successful ERP can lead to Organizational growth and sustainable competitive advantage, in relation to competitors in the industry. Overall, staff and other stakeholders are motivated to improve their value additions towards the realization of the strategic objectives of the Organization. Given the above submissions, it is pervasive that successful ERP efforts should result in positive organizational performance (Ignatiadis and Nandhakumar, 2007; Koh et al., 2006).

2.1.1 Critical Success Factors (CSFs) of ERP Implementation

Many studies have dealt with the CSFs of ERP, including Al-Mashari et al. (2008); Annamalai & Ramayah (2011a); Annamalai & Ramayah (2011b); Avgerou (2008) and Dezdar & Sulaiman (2011). By considering a few definitions given by previous authors, CSFs is defined as the few things which must go right for the ERP to happen successfully (Al-Mashari et al., 2008). From the research by Avgerou (2008), it could be summarised that in order to implement a successful ERP, an organization needs to understand its structure first and to ensure the vision was accomplished. One of the important points here is that commitment needs to be maintained and enhanced through communication. The people issue rather than the technology issue is seen as important to be dealt with and managed in order to make the change effort a success.

Table 1: The measure of CSFs of ERP

Variable	Description of factors
A1	There is a review of motivations, compensation and rewards Systems to ensure successful introduction of new work Processes and job structures
A2	There is adequate education of staff and other stakeholders regarding the ERP concepts
A3	Staff are allowed to set their goals, monitor their own performance, in relation to their work targets
A4	Staff, teams and other stakeholders are openly and actively involved throughout the ERP stages
A5	There is effective communication during the ERP Process to ensure understanding of the various cultural and Organizational changes
A6	Management actively worked to alleviate employee concerns about ERP Implementation.
A7	There is adequate training and capacity development for staff, teams and other stakeholders in interpersonal, change and conflicts management, TQM Implementation and process analysis techniques skills to ensure successful ERP implementation
A8	Our Organization prepares staff, Teams and other stakeholders to respond positively to ERP changes
B1	Users interact with our ERP naturally and without any significant complication
B2	Our ERP was easy to learn

B3	In general terms, our ERP is easy to use.
B4	There is effective anticipation and planning for risks associated with ERP in our organization
B5	There is constant ERP evaluation of work in progress and risk assessment to ensure Successful changes (e.g. risk associated with loss of personnel, loss of earnings, structural changes e.t.c.)
B6	Feedback sessions were conducted periodically to encourage participation and gauge employee satisfaction with the process.
C1	New organizational structures are created to determines ERP teams composition and process effectiveness
C2	ERP teams and Champions are experienced, credible, innovative and well empowered to handle all aspect of the organizational needs
C3	There are appropriate job descriptions and allocation of responsibilities/authority resulting from ERP implementation in my Organisation
C4	ERP Teams is made up of people from both inside and outside our Organisation
C5	When new processes and structures are designed, our jobs become Process-based rather than task-based
C6	There is emphasis on designing and implementing an adequate organizational human resources infrastructure
D1	There is effective planning and use of project management techniques in smoothing the flow of process redesign
D2	There is effective process redesign and Performance appraisals as a result of ERP implementation efforts
D3	Our Organisation carefully aligns our corporate strategy and continuous improvement techniques (i.e. TQM with ERP strategy
D4	There is adequate allocation and distribution of resources needed for the ERP effort
D5	There are experienced consultants and experts to assist ERP implementation efforts
D6	ERP mission and vision that direct both long-term and day-to-day operations are clearly stated to all employees
E1	There is adequate investment in information technology infrastructure to support ERP projects
E2	There is alignment of information technology infrastructure with ERP strategy in my Organisation
E3	There is constant control and measurement of information technology infrastructure effectiveness
E4	There is effective integration of organizational information systems (i.e. data integration and communication networking)
E5	There is adoption of information systems that uses the latest technologies/ techniques
E6	There is an effective use of software tools and information capabilities to enhance organization performance (productivity, growth , profitability e.t.c)

Source: Adapted from Al-Mashari et al. (2008), Annamalai & Ramayah (2011a), Annamalai & Ramayah (2011b), Avgerou (2008) and Dezdar & Sulaiman (2011), Maldonado (2009).

In focusing this study, the operationalisations of the CSFs of ERP were distilled from various articles and empirical research on ERP implementation. They were then categorised into a number of subgroups, similar to Al-Mashari et al. (2008), representing various dimensions of change related to ERP implementation. These dimensions are as follows: (1) Change management; (2) ERP Ease of use; (3) Organisational structure; (4) ERP Project planning and management; and (5) IT infrastructure. In summary, operationalisation of the CSFs of ERP model in this study is tabulated in table 1, depicting the CSFs of ERP. The relationship between the various constructs and ERP user satisfaction and organizational performances are depicted in the conceptual model, shown in figure 1.

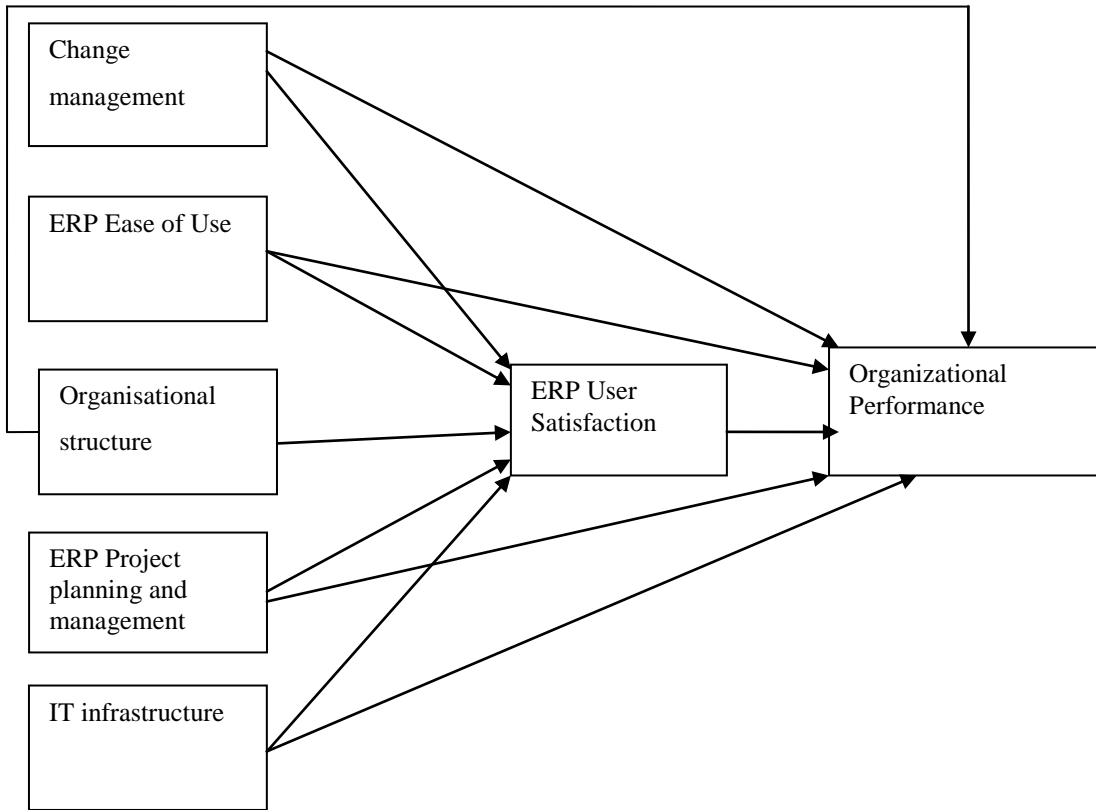


Figure 1: Proposed model for the effects of ERP efforts on performance

Figure 1 illustrates the conceptual model with the arrows depicting the hypothesized relationships between the constructs. These relationships deal with three sets of hypotheses: (1) The effects of the CSFs of ERP on the ERP user satisfaction (primary measures); (2) The relationship between the CSFs of ERP and the organizational performance (secondary measures); and (3) The influence of the primary measures (as expressed by the ERP user satisfaction) on the secondary measures (as expressed by the organizational performance).

2.2 Business Performance Measures

In this study, performance is defined as the degree to which ERP implementation efforts fulfills the performance objectives (primary measures) in order to meet the needs of the stakeholders (secondary measures) (Al-Mashari et al., 2008; Annamalai & Ramayah, 2011a; Annamalai & Ramayah, 2011b; Avgerou, 2008; Dezdar & Sulaiman, 2011; Dezdar & Sulaiman, 2009; Garg, 2010; Ganesh and Mehta, 2010; Heeks, 2007; Bontis et al., 2000; Bhote, 1996; Bontis, 1998; Guenzi and Troilo, 2007; Asikhia, 2010). Several empirical studies have been conducted to establish the link between ERP effort and organizational performance (Molla & Arjun, 2006; Moohebat et al., 2010; Nah et al., 2001; Reimann et al., 2010). The results of these studies indicated that there are various measures of performance, i.e. organizational performance, corporate performance, business performance, operational performance, financial and non-financial performance, innovation performance, and quality performance. As adapted in this study, Al-Mashari et al. (2008), Annamalai & Ramayah (2011a), Dezdar & Sulaiman (2011), Bontis et al. (2000), Bhote (1996), Bontis (1998), Guenzi and Troilo (2007) and Asikhia (2010) measures were used to measure performance in two dimensions: ERP user satisfaction and organizational performance. User satisfaction is regarded as a good surrogate measure of ERP success (Dezdar & Sulaiman, 2011).

Table 2: The measure of Performance

Variable	Key factors manifesting Business Performance
	ERP Users Satisfaction
F1	Top Management is satisfied with the ERP System
F2	In general terms, the adoption of the ERP in my organization has been a Success.
F3	Workers are satisfied with the general improvements in the quality of products after implementation
F4	Management is satisfied with Improving flexibility in production and work processes
F5	Management is satisfied with improved employee participation and morale
F6	End Users in my organization are satisfied with the ERP System.
	ORGANISATIONAL: Profitability Dimension
G1	Our Organization’s Net profit position improves relative to competition
G2	Management is satisfied with return on corporate investment
G3	Management is satisfied with return on sales

G4	Our Returns on investment (ROI) position improves relative to competition
G5	Our Organisation's Return on Assets (ROA) position improves relative to competition
G6	Our Organisation's Financial liquidity (cash) position improves relative to competition
	Growth Dimension
G7	Our deposits growth position improves relative to competition
G8	Management is satisfied with our deposits growth rate
G9	Our Market share gains relative to competition
	Sustainable Competitive Advantage Dimension
G10	Our competitive advantage in ERP implementation is difficult for competitors to copy because it uses resources that we only have access to.
G11	It took our Organisation time to build the competitive advantage and competitors would find it time-consuming to follow a similar route.
G12	Possession of unique proprietary technology, tacit know-how, and firm reputation/ image induces our companies propensity to transfer new management techniques
	Customer Services Dimension
G13	Market research is conducted to discover customers expectation and changes in customer satisfaction
G14	There is a record of customers' requests, complaints and transactions for future reference
G15	Customers' complaints, lost customer analysis and feedback are used to improve the products/ services
G16	Customers are satisfied with the customer service and Customers relationship management of my organization

Source: Adapted from Al-Mashari et al., 2008; Annamalai & Ramayah, 2011a; Dezdar & Sulaiman, 2011; Bontis, 1998; Bontis et al., 2000; Bhotte, 1996; Guenzi and Troilo, 2007; Asikhia, 2010; Maldonado, 2009.

User satisfaction is defined as the sum of one's feelings regarding an ERP implementation (Bailey and Pearson, 1983). A system lacking user satisfaction is less likely to be used and to produce beneficial results to an organization (Dezdar & Sulaiman, 2011). Wu and Wang (2006) also validated that user satisfaction is a good success measure in the ERP system context. Consequently, several researches have used this success measure in the ERP perspective; such as Bailey and Pearson (1983) and Wu and Wang (2006), by sustaining that User Satisfaction is a demanded antecedent to business performance. They are considered as primary measures because they follow directly from the actions taken during the implementation of ERP, while organizational performance measured by financial measures such as growth and profitability, and non-financial measures such as sustainable competitive advantage and customer services. They are called secondary measures because they are a consequence of ERP implementations (Annamalai & Ramayah, 2011b; Avgerou, 2008). The measures of performance are depicted in table 2.

In general, there is a common assumption in the literature that the CSFs of ERP have a positive impact on the ERP user satisfaction (Al-Mashari et al., 2008; Annamalai & Ramayah, 2011a; Annamalai & Ramayah, 2011b; Avgerou, 2008). They indicated that ERP firms outperform non- ERP firms in terms of workers satisfaction and acceptance, and the consequential improvements in operational performance such as reduction in production costs, increasing productivity, improving flexibility, improving employee relations, operating procedures and improving the quality of products. However, to investigate the previous mentioned relationship, the following hypotheses are therefore proposed:

H_{1A}: change management has positive relationship with ERP user satisfaction

H_{2A}: ERP ease of use has positive relationship with ERP user satisfaction

H_{3A}: Organisational structure has positive relationship with ERP user satisfaction

H_{4A}: ERP Project planning and management has positive relationship with ERP user satisfaction

H_{5A}: IT infrastructure has positive relationship with ERP user satisfaction

Furthermore, the relationships between ERP practices and organizational performance have been addressed in several studies (Al-Mashari et al., 2008; Avgerou, 2008; Dezdar & Sulaiman, 2011; Dezdar & Sulaiman, 2009). They indicated a positive association between ERP practices and improved organizational performance. In other words, the results of those studies demonstrated the crucial role of ERP practices in enhancing the organizational performance, i.e. financial performance and non-financial performance (Annamalai & Ramayah, 2011a; Annamalai & Ramayah, 2011b). Therefore, it is hypothesized that:

H_{1B}: change management has positive relationship with organizational Performance

H_{2B}: ERP ease of use has positive relationship with organizational Performance

H_{3B}: Organisational structure has positive relationship with organizational performance

H_{4B}: ERP project planning and management has positive relationship with organizational Performance

H_{5B}: IT infrastructure has positive relationship with organizational performance

Lastly, this study attempts to investigate the effects of the primary measures (as expressed by the ERP user satisfaction measures) on the secondary measures (as expressed by the organizational performance). As emphasized by Garg (2010), Ganesh and Mehta (2010) and Heeks (2007), the ERP user satisfaction has a positive correlation with overall organizational performance. One possible explanation could be due to the success of ERP implementation as measured by workers satisfaction and the subsequent improvements in operational performance measures such as producing high quality products, speed of delivery, high flexibility, switching costs, safety, waste reduction, resource conservation and high productivity (Avgerou, 2008; Dezdar & Sulaiman, 2011; Dezdar & Sulaiman, 2009; Garg, 2010). Therefore, it is hypothesized that:

H₆: ERP User Satisfaction has positive relationship with organizational performance
Research survey and methods follows.

3.0 Methodology

Surveys were the primary source of data collection for field studies conducted in this research. Using random sampling, 656 senior and management staff of 15 Nigerian manufacturing companies, which have implemented ERP programme, were selected from a business-to-business database maintained by a national list provider. The sectoral classification of participating manufacturing firms and allotted questionnaires are shown in table 3. These levels of staff (senior and management staff) have been used in previous research (Avgerou, 2008; Dezdard & Sulaiman, 2011; Dezdard & Sulaiman, 2009), based on the premise that they were among the most knowledgeable informants on ERP projects and the derived success in their respective organizations. From a time dimension, this research adopts a one-time cross-sectional perspective, while the unit of analysis is the firm (Dezdard & Sulaiman, 2011; Guenzi and Troilo, 2007; Asikhia, 2010).

Table 3: Participating manufacturing industries in the survey

Name of Industry	Number of Company	Total Questionnaire
Crop production/ Livestock	3	81
Food products/ personal and household products	3	167
Pharmaceuticals	2	93
Electronic and electrical products	2	101
Building materials/ packaging	3	133
Oil and Gas	2	81

The construction of the questionnaire and its appropriateness to the study

A personally-administered questionnaire was primarily adopted from earlier studies (Al-Mashari et al., 2008; Annamalai & Ramayah, 2011a; Annamalai & Ramayah, 2011b; Avgerou, 2008; Dezdard & Sulaiman, 2011; Dezdard & Sulaiman, 2009; Garg, 2010; Ganesh and Mehta, 2010; Heeks, 2007; Bontis et al., 2000; Bhotte, 1996; Bontis, 1998; Guenzi and Troilo, 2007; Asikhia, 2010) and it was modified where necessary. In the questionnaire, participants were asked to answer three important sections; section A with regards to the demographic data, section B, CSFs of BPR and section C contains items measuring the business performance (ERP user satisfaction and organizational performance). In items measuring successful ERP (CSFs) implementation, respondents were asked to rate the degree of usefulness of 32 variables (table 1) in association with their company's ERP strategies. In performance measures, they were asked to rate 6 and 16 variables (table 2) in relation to stakeholders' level of satisfaction and organizational performance respectively.

All the items in the questionnaire were measured with a five-point Likert scale ranging from 1 to 5, where "1=strongly disagree, 2=Disagree, 3=neither disagree nor agree, 4=Agree, 5= strongly agree and n/a is 'not applicable' or 'no comments'". This was done to ensure consistency and the ease of data computation (Garg, 2010). This scale was also pre-tested several times by three professors in Management studies and ten experts in ERP implementation, specifically in the Nigerian manufacturing context and it was found to be valid on the basis of this study. In addition, a pretest was conducted on management staff of two Nigerian manufacturing companies, not included in the sampling frame, to test the validity and reliability of the study instrument, hence, convenience sampling techniques was deemed desirable. In the pilot studies, convenience sample was used because it allowed the researcher to obtain basic data and trends regarding this study without the complications of using a randomized sample (Dezdard & Sulaiman, 2009).

Reliability of the questionnaire

Reliability analysis is conducted in order to measure the internal consistency of variables, measured by interval scale items, in a summated scale (Hair et al., 1998). In this paper, the summated scales are CSFs of ERP and business performance (BPR user satisfaction and organizational performance). Based on the data collected during the pilot stage of this study, all scales have reliability coefficients greater than 0.7 (see Table 4). Thus, the scales used in this research could be considered as reliable. In addition, factoring method used was "Principal Components", applying an Orthogonal Varimax rotation with Kaiser's normalization. Based on these conditions, 7 Factors were obtained (Kaiser's criterion of retaining factors with eigenvalues greater than 1), which was consistent with the 7 constructs used in the proposed model (Garg, 2010; Ganesh and Mehta, 2010).

Table 4: Summary of Test Result- Reliability Analysis

Constructs	Number of Questionnaire items	Cronbach's Alpha (mean)	Composite Reliability(CR)	Average Variance Extracted (AVE)
Change management	8	0.777	0.745	0.722
ERP Ease of use	6	0.789	0.794	0.734
Organizational structure	6	0.802	0.823	0.793
ERP Project planning and management	6	0.818	0.757	0.758
IT infrastructure	6	0.811	0.798	0.787

ERP User Satisfaction	6	0.789	0.734	0.723
Organizational performance	16	0.798	0.723	0.798

Using SPSS 18.0 (Statistical Package for Social Sciences), the data from the questionnaire was analyzed using the following methodologies in sequential order: factor analysis, and multiple regression analysis.

4.0 Results and Discussion of Findings

4.1 Factor Analysis

The purpose of factor analysis, in this study, was to reduce the 54 variables, of which 32 were manifesting successful ERP and 22 manifesting business Performance, to a more manageable set of factors (Hair et al., 1998). Using SPSS 18.0, the results of this factor analysis, via confirmatory factor analysis, with the assumption of extracting via principal components method and rotating via varimax, are shown in tables 5. In order to define which factors manifesting successful ERP and business performance (ERP user satisfaction and organizational performances), confirmatory factor analysis method was used; and it is common that variables with high factor loadings will be assigned to describe the respective factors, while variables that have low loadings on respective factors are constrained to zero (Hair et al., 1998). The component matrix for successful ERP (CSFs of ERP) and business performance (ERP user satisfaction and organizational performance) revealed only seven significant factors, that is, Factor 1, 2, 3, 4, 5, 6 and 7 (Table 5), representing each of the constructs. The seven factors were extracted. Consequently, factors 2,3,4,6 and 7 manifest change management, organizational structure, IT infrastructure, ERP ease of use, and ERP project planning and management respectively (CSFs of ERP); while factors 1 and 5 manifest organizational performance and ERP user satisfaction respectively. However, since variables with factor loadings above 0.70 were deemed to represent the various constructs, these variables with higher factor loadings were used to test the underline hypotheses, via multiple regression analysis (Hair et al., 1998).

4.2 Multivariate Analysis- Regression analysis

According to Hair et al. (1998), multiple regression analysis is a convenient statistical technique to be used when the researcher requires analyzing the relationship between a single dependent variable and several independent variables. However, since a mediating effect (ERP User Satisfaction) was defined in the model, the Path Analysis Technique was applied to test proposed hypotheses. Path Analysis is a regression-based technique widely used for analyzing the direct and indirect effects in model encompassing mediating variables (Asteriou and Hall, 2007; Baumgartner & Homburg, 1996; Berrington and Oblich, 1995; Bhatt, 2000). It must follow a three-step regression procedure to assess the hypotheses, as suggested by Baron and Kenny (1986), Bandara, Gable, & Rosemann (2005) and Hair et al. (1998):

- Step 1: Regression between Mediator and Independent Variables.
- Step 2: Regression between Dependent Variable and Independent Variables.
- Step 3: Regression between Dependent Variable and Independent Variables plus Mediator.

4.3 Hypothesis testing

In order to examine the relationships between CSFs of ERP (exogenous constructs) and business performance (as represented by ERP user satisfaction and organizational performance) of Nigerian manufacturing firms (endogenous constructs), the hypothesized relationships were tested, using multiple regression tool in SPSS (Statistical Package for Social Sciences) 18.0. The results are shown in table 5.

Table 5: Testing the Hypotheses
a. Step 1: Regression between Mediator and Independent Variables.

R²= 0.6332		Sig <.0001				
Durbin Watson= 1.992		ERP User Satisfaction				
Construct Association	'α' Level	Beta	ρ-value	Significant (yes/no)	Hypothesis	Validation
Change management with ERP user satisfaction	0.05	0.36	0.047	Yes	Accept H1A	Yes
ERP Ease of use with ERP user satisfaction	0.05	0.19	0.049	Yes	Accept H2A	Yes
Organizational structure with ERP user satisfaction	0.50	0.39	0.029	Yes	Accept H3A	Yes
ERP Project planning and management with ERP user satisfaction	0.05	0.32	0.043	Yes	Accept H4A	Yes
IT infrastructure with ERP user satisfaction	0.05	0.31	0.043	Yes	Accept H5A	Yes

b. Step 2: Regression between Dependent Variable and Independent Variables.

R² = 0.5222						
Durbin Watson= 2.238						
Sig <.0001						
Organisational performance						
Construct Association	'α' Level	Beta	p-value	Significant (yes/no)	Hypothesis	Validation
Change management with organizational performance	0.05	0.39	0.023	Yes	Accept H ₁ B	Yes
ERP Ease of Use with organizational performance	0.05	0.13	0.178	No	Reject H ₂ B	No
Organizational structure with organizational performance	0.10	0.18	0.087	Yes	Accept H ₃ B	Yes
ERP Project planning and management with organizational performance	0.05	0.26	0.037	Yes	Accept H ₄ B	Yes
IT infrastructure with organizational performance	0.05	0.21	0.035	Yes	Accept H ₅ B	Yes

c. Step 3: Regression between Dependent Variable and Independent Variables plus Mediator.

R² = 0.6331						
Durbin Watson= 2.022						
Sig <.0001						
Organisational performance						
Construct Association	'α' Level	Beta	p-value	Significant (yes/no)	Hypothesis	Validation
Change management with organizational performance	0.05	0.45	0.029	Yes		Yes
ERP Ease of Use with organizational performance	0.05	0.09	0.156	No		No
Organizational structure with organizational performance	0.05	-0.02	0.1678	No		No
ERP Project planning and management with organizational performance	0.05	0.18	0.0410	Yes		Yes
IT infrastructure with organizational performance	0.05	0.19	0.0340	Yes		Yes
ERP User Satisfaction with organizational performance	0.05	0.18	0.005	Yes	Accept H ₆	Yes

Note: α level denotes significant level

4.3 Discussion of Findings

Findings based on the survey revealed that successful ERP (CSFs) positively affected organizational performance. Except for ERP Ease of Use ($\beta=0.13$, $p=0.178$), the results suggests the positive effects of the CSFs of ERP (Change management - $\beta=0.39$, $p=0.023$; organizational structure - $\beta=0.18$, $p=0.087$; ERP project planning and management - $\beta=0.26$, $p=0.037$; and IT infrastructure- $\beta=0.21$, $p=0.035$) on improved organizational performance in Nigerian manufacturing firms, and were corroborated empirically in this study. The only surprising result of this study was the inability to corroborate the influence of ERP ease of use on improved organizational performance, as a result of ERP implementation effort in Nigerian manufacturing firms.

This unique finding was contrary to many empirical findings (Annamalai & Ramayah, 2011b; Avgerou, 2008; Dezdar & Sulaiman, 2011). There are few possible explanations for this result. The first one can be drawn from empirical research by Asikhia (2010). In this study, it was found that many Nigerian companies often failed to attract the needed personnel or consultants, especially in highly technical industry like in a manufacturing firm. Hence, ERP effort is often characterized by poor assimilation, skills and education needed for its successful implementation (Dezdar & Sulaiman, 2011). The second one can be more related to the findings posted by Annamalai & Ramayah (2011b) and Avgerou (2008). They assert that Nigeria, and indeed all developing economies, is characterized by lack of effective anticipation and planning for technology transfers associated with ERP efforts.

In addition, the results also suggests the positive effects of the CSFs of ERP (Change management - $\beta=0.36$, $p=0.047$; ERP ease of use- $\beta=0.19$, $p=0.049$; organizational structure - $\beta=0.39$, $p=0.029$; ERP project planning and management - $\beta=0.32$, $p=0.043$; and IT infrastructure- $\beta=0.31$, $p=0.043$) on ERP User Satisfaction (Step 1) in Nigerian manufacturing firms, and were also corroborated empirically. Validation of H₆: was done based on Baron and Kenny (1986) established conditions for mediation. Meaning that, ERP user satisfaction has significant positive relationship with organizational performance ($\beta=0.18$, $p=0.005$), based on the data set of this study. Thus, this finding confirmed a

previous study that investigated the relationship (Garg, 2010; Ganesh and Mehta, 2010). This finding shows the nature of the relationship between ERP effectiveness-ERP user satisfaction- and the success of ERP – organizational performance. In other words, ERP user satisfaction measures should be brought into the proactive measurement loop. They should be the starting point of the measurement cycle, particularly if ERP managers are really interested in reaping the full benefits of ERP implementation. However, only organizational structure experienced full mediation. This implied that positive and significant relationships exist between CSFs of ERP and business performance (ERP user satisfaction and organizational performance) variables of the Nigerian manufacturing firms. In relation to other studies, a positive and significant relationship obtained in this study agrees with the findings of Al-Mashari et al. (2008), Garg (2010), Ganesh and Mehta (2010) and Heeks (2007). The study also supports Nah et al. (2001) and Reimann et al. (2010) premise that improved management support, structures and user satisfaction reduces a firm's risk of failure in ERP effort, hence, a positive relationship with improved organizational performance.

5.0 Conclusion and Implications for Practice

This study was aimed at identifying the critical success factors of ERP implementation and to evaluate their effects on the primary measures as expressed by the operational performance and the secondary measures as expressed by the organizational performance in the Nigerian manufacturing firms. Using the framework from Al-Mashari et al. (2008), factors manifesting Business Performance (operational and organizational performances) were regressed on the Critical Success Factors (CSFs), manifesting successful ERP. Findings based on the survey revealed that successful ERP positively affected business Performance of Nigerian manufacturing firms. The results further suggest the influence of successful ERP towards improving business performance sufficiently ($p= 0.001$). However, with the exception of ERP ease of use, the influence of change management, organizational structure, ERP project planning and management and IT infrastructure on the ERP success (improved business performance) of manufacturing firms were all corroborated empirically.

Theoretical implications

This study seems to be among the few examining the success of ERP, and the related CSFs, in the perspective of how organizations fare after implementing ERP. The notion of ERP success was analyzed explicitly by assessing the level of satisfaction and business value derived from implementing ERP. This gap was originally positioned as a critical area for future research by Al-Mashari et al. (2008: 123). Another contribution of this study is the measurement of business performance, which was not limited to or focused on financial metrics, but encompasses diverse business indicators and perspectives, like users satisfaction and organizational performance. Annamalai & Ramayah (2011a) and Avgerou (2008) specifically identified this gap in the literature. This is on the premise that many researchers often use objective measures such as turnover and profit as a form of measuring firms' performance. However, according to Al-Mashari et al. (2008), perceived measures can replace objective measures of business performance.

In addition, this study also seems to be one of the few that aims at investigating ERP's success in a developing economy, like Nigeria, by proposing a model and attempting to validate it empirically. Lastly, Garg (2010) and Ganesh and Mehta (2010), contends the stringent necessity to provide a model that amalgamates ERP enablers with ERP effectiveness and ERP success. Consequently, this study integrates the CSFs of ERP practices, with user satisfaction and organizational performance as related drivers of the effectiveness and success of ERP practices in a developing economy, like Nigeria. In addition, this study offers a theoretical model that can be considered as a step forward in developing an integrated model toward investigating the relationship between CSFs of ERP, ERP effectiveness as expressed by the ERP user satisfaction and ERP success as expressed by the organizational performance and might serve as a basis for future research. Finally, this research adds to the body of knowledge by providing new data and empirical insights into the relationship between the CSFs of ERP practices and performance related measures of manufacturing firms in Nigeria.

Managerial implications

Nigerian manufacturing firms should consider ERP as an innovative tool for improving users' satisfaction and organizational performance in today's dynamic business environment. The measurement model provides predictive implications on improved ERP users' satisfaction, as well as its moderating influence on organizational performance, given the activities of CSFs manifesting successful ERP. Moreover, the study is expected to provide specific direction to companies contemplating a ERP programme, hence, the study is expected to be beneficial to Nigerian manufacturing firms and other Nigerian companies alike, policy makers in private and public sectors of the Nigerian economy by, enabling better strategic and tactical judgments with regards to ERP implementations. It will help Nigerian companies understand ERP as a business philosophy, its key components and benefits. It will also explore imperatives for successful implementation.

However, this research is subject to the normal limitations of survey research, by using perceptual data provided by senior and management staff which may not provide clear measures of business performance. However, this can be overcome using multiple methods to collect data in future studies. In addition, since only one perspective in each organization was collected – senior and management staff that actively participated in the ERP implementation process, it is not unreasonable to claim that a method bias may limit the research findings. That notwithstanding, additional guidelines might be used in future studies to minimize this potential limitation, including, the use of different methods to measure the exogenous and endogenous variables.

Table 6: Results of factor analysis for CSFs and Business performance

	Factor
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	1	2	3	4	5	6	7
G8	.876						
G12	.831						
G5	.779						
G15	.777						
G1	.750						
G14	.718						
G6							
G9							
G7							
G16							
G3							
G4							
F2							
G10							
G13							
G11							
A1		.789					
A3		.769					
A2		.761					
A7		.722					
A4							
A8							
A6							
A5							
C1			.788				
C3			.780				
C6			.779				
C4			.763				
C2			.761				
C5			.733				
E5				.877			
E3				.823			
E2				.791			
E6				.781			
E1				.778			
E4							
F1					.778		
F6					.769		
F3					.750		
F5					.719		
F4							
G2							
B5						.867	
B4						.822	
B2						.780	
B1						.758	
B3						.739	
B6							
D2							.865
D3							.833
D1							.809
D6							.791
D5							.743
D4							

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.
Rotation converged in 7 iterations.

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