

Factors Affecting Enterprise Resource Planning Adoption on Firms' Performance among Medium-Sized Enterprises

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Abstract—Empirical evidence suggests that the adoption of ERP facilitates organizational processes and activities including sales, billing, marketing, human resource management, quality control and production, which in turns, could ensure general performance. This study proposes a theoretical framework that identified factors that affecting ERP system adoption among medium-sized enterprise firms, such as organizational culture, technology infrastructures support / quality of internet and top management support. The present study also applied resource based value and contingency theories to explain the factors that affect ERP system adoption. In this study, the proposed theoretical framework has been formulated based on data obtained from a newly developed questionnaire. The sets of questionnaire were distributed to one hundred and four (104) medium-sized enterprises firms in Ogun State, Nigeria. CEO / director and managers were selected as the key respondents of the questionnaire. The empirical data were analyzed using the Partial Least Squares Structural Equation Modelling. The result obtained revealed that both organizational culture and top management support significantly influence the adoption of the ERP system to improve the performance of medium-sized enterprises firms. In this regard, technology infrastructure support has no significant relationship with ERP system adoption. The outcomes of this study are useful for firms adapting ERP as they would be able to strategize future ERP system implementation in different sectors, such as education, and large firms in general. One limitation of the study is its small sample size. Moreover, the author has not included other measures of medium sized enterprises performance outside of the procurement area despite these factors could provide further insights to medium sized enterprises performance, and will be an interesting topic for future research.

Keywords— *Enterprise resource planning, Organizational culture, Technology infrastructure support, Top management, Medium sized enterprises firms.*

1. Introduction

[4] Enterprise Resource Planning is as a software system that integrates all Departments of an enterprise organization together in a single database in order to achieve specific goals and to access information for decision making purpose in organizations. Literature has explicated that ERP is regarded as a software that coordinates or

integrates system capacities through dealing with the whole organization's resources proficiently and viably to obtain an information system that supports business processes. It can also be useful in both public and private organizations [16], [14], [24].

However, by adopting the ERP system, organizations can exchange information with customers and suppliers in order to make accurate data available in an appropriate time to reduce operational cost and reduce operational time [15]. Additionally, current literature contends that ERP system adoption provides firms or enterprise organizations with many benefits such as: to improve quality of product, to make quick decision, to improve interaction with customers and suppliers, to reduce inventory cost, to provide accurate information at needed time [14].

The present study focuses only on medium sized enterprises which employ many workers and contribute more to the nation's economy. The Ministry of Labor and Employment (2016) reported that the rate of unemployment in Nigeria is more than 47 %. Thus, by improving medium sized enterprises, organizations could help the nation by creating more job opportunities and improve the organizations' revenues as well as the nation's GDP. This study assesses medium sized enterprises in the production and services, manufacturing, agricultural, transportation and construction sectors.

According to the Nigerian President, Mr. Muhammad Buhari during his speech at the Federal Executive Council (FEC) meeting in Abuja, the new government of Nigeria is now seeking a solution in diversifying the economy of the nation from crude oil production to other areas such as, small and medium enterprises, Solid Minerals, Mining, Agriculture and Manufacturing and Production [26]. Most of the businesses in these sectors are medium sized-enterprises. This indicates that medium enterprises are important and central to this present study.

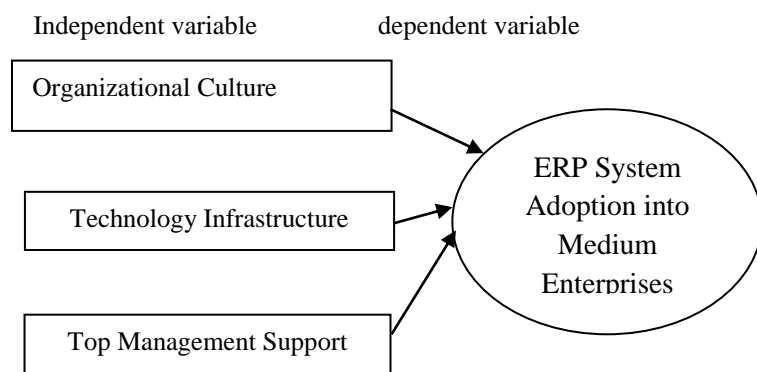
The business environment today face uncertain turbulences, hence, an organization needs to maintain its competitiveness and to improve its capabilities and resources in order to develop themselves. Organizations or firms should adopt

low cost approaches that focus on different strategies to provide a product or service at a right time in the right place. The adoption of ERP system helps medium enterprise to be more competitive and profitable. Moreover, it is essential to understand the use of ERP system in medium enterprises and to achieve this, the factors of critical success of ERP adoption need to be highlighted.

In this study, organizational culture seems to be considered as one of factors affecting the adoption of ERP system by medium enterprise firms. However, organizational culture which constitutes the culture of the organization, culture of employees and operational capabilities, also influence the productivity of organizations by affecting individuals and the thinking of the employees in any organization [15], [5], [21]. In the same way, past studies [27], [30] have indicated that another factor that influences the adoption of ERP system on medium-sized enterprise firms is technology infrastructures support / quality of internet. Technology infrastructures support is another important factor because it enhances the performance of the organization in terms of operational efficiency and competitiveness advantage.

Evidence has also shown that top management support is an imperative factor to be considered in order to ensure the successful adoption of ERP by medium size enterprises. [17] stated that top management support is crucial for the success of any project in business organizations. The extant literature has shown that top management support is an important factor for the successful implementation of ERP in medium enterprises basically, in both developed and developing countries such as United States of America, United Kingdom, Saudi Arabia, Malaysia, Kenya and Nigeria [30], [5], [1], [20], [18]. Based on this, the study proposed to develop a framework that incorporates the main factors leading to the effective adoption of an ERP system. Motivated by the theoretical importance of ERP systems and the empirical failure in fully harvesting their potential, the proposed theoretical framework includes variables that are described as independent and dependent variables. The independent variables are identified as, Organization Culture, Technology Infrastructures Support / quality of internet and Top Management support. Meanwhile, the dependent variable is the adoption of ERP system to Medium Enterprises firms. The proposed theoretical framework dispatched in Figure one 1 below.

Figure 1.Theoretical framework



Theoretical Framework of the Study

This study has developed a conceptual framework that places the ERP adoption process at the center. According to [15] a key to the successful ERP adoption and implementation is to maintain an effective culture and efficient top management consulting process. The proposed ERP adoption process model consists of Organization Culture, Technology Infrastructures Support / quality of internet and Top Management support. All these constructs are the variables that could affect the ERP system adoption process in medium-sized enterprise firms. The aim of this study is therefore, to examine the causal relationships between three construct variables:

1. Organizational Culture (Adoption of ERP system to Medium-sized enterprise firms)
2. Technology Infrastructures Support (Adoption of ERP to Medium-sized enterprise firms)
3. Top Management Support (Adoption of ERP to Medium-sized enterprise firms).

The proposed theoretical framework of this study is based on previous studies and recommendations, such as, [30], [15], [23]. The theories and hypotheses of the study are presented below.

2. Literature Review

Resource-Based View Theory (RBV)

[15] mentioned that, for an organization to gain competitive advantage against competitors, there is need to create a value by using resources that are available, valuable, non-substitutable, rare and inimitable, such as (Physical Capital: Technology, Plant, Equipment, Location and Raw Materials. Human Capital: Employee, Training, Expertise and Manager. Organizational Capital: Organizational Structure, Planning and Controlling). In this regard, a firm's Resource-Based View (RBV) predicts that certain types of resources owned and controlled by enterprise have the potential to generate competitive advantage, better organizational culture, technology infrastructures and top

management support which eventually leads to superior organizational performance [14], [15].

Contingency Theory

Contingency theory, which was developed in the late 1960s, is one of the behavioral theories that study how environmental variables influence the behaviors of organizations [15] where an organization's decisions and actions are contingent on internal and external situations. Organizational structures are determined by contingencies in the external environment, such as the degree of environmental uncertainty and technological change [14]. Forms of organizations can be different according to the external environments they are subjected to and attaining the goodness of fit between a firm's external environment and structure affects its performance significantly [15]. Researchers of management information systems generally assume that organizational performance is contingent on a number of variables such as strategy, adoption of technology, technological change or innovation, environmental change, organizational structure, size, task, and individual characteristics [15]. When the fit between these variables is good, better performance is expected [14]. Organization's decisions and actions are contingent on internal and external situations, such as: strategy, adoption of technology, technological change or innovation, environmental change, organizational structure, size, task, and individual characteristics.

Adoption of ERP system

A study conducted by [28] in South Africa focused on the adoption of ERP system by business organizations found out that ERP system assists business organizations to gain competitive advantages in their business both in the local and international markets. In addition, it is shown we cannot underestimate the impact of ERP systems on business organization and the link between the adoption of ERP system to growth of enterprises [30]. Similarly, the existing body of knowledge has elaborated that the factor of ERP system adoption has both internal and external effects that can prevent ERP from being successfully adopted by enterprise organizations. These factors include information access, communication process, organizations structure, government policies, stakeholder support, customers and suppliers, the lack of unknown ERP system logo on the market or the lack of awareness on ERP system, the lack of expertise amongst the users in organization and the lack of technologies innovations [14], [28], [30].

Organizational Culture (OC)

Having a strong organizational culture will add value to a firm's employees by reposing confidence on the its leadership. Often times, organizations with low culture only provide general guidelines

for its members and organizations with weaker culture provide employees with low compliance of the organization's rules. It also opens the door for new entrants or employees to quickly adapt to the system [15]. Similarly, [2] stated that, the impact of organizational culture in the adoption of ERP system to an organization plays a critical role. In addition, ERP system constitutes of the environment in a social context selected and implemented into the organizational culture. Undoubtedly, the social context is referred to as the users of the system, project team and vendors who are involved in the process of adoption of ERP system. Each one of them shares different cultural values. Furthermore, there is a relationship between organizational culture and ERP system adoption in improving performance of enterprise firms [4].

H1. There is a positive relationship exists between organizational culture and ERP system adoption in medium-sized enterprise firms.

Technological Support Infrastructure (TSI)

In this study, technological support infrastructure refers as Internet connection. The internet is described as strong component which provides business enterprise as a way of promoting its product, create website, communication between customers and suppliers. The study conducted on the adoption of ICT in the Nigerian SMEs content by [5] highlighted that in 2010 only 28.9% of the population in Nigeria use internet, indicating very low internet usage . However, Internet usage in the country has increased in 2016 to 46.1% (Internet World Stats, 2016). Despite the increase, Internet subscriptions in Nigeria costly which causes many business organizations to not use it. The internet service is also unreliable which is a major setback for the Nigerian SMEs. Consequently, the Internet World Stats (2016) stated that, Nigeria needs to improve on Internet connection, in order for the enterprise organizations to easily adopt and implement ICT technologies for their organizations. In this regard, [5] reported that most of SMEs business organizations have websites, but the sites are not functioning well due to the lack of quality Internet connection. This happens because most of enterprises organizations in African countries, especially in Nigeria have poor technological infrastructure support which links to low quality of Internet connection.

It is interesting to note that, internet usage is very important in business operation nowadays and network problems seriously affect SMEs business organization in developing countries, particularly in Africa. Moreover, it generally affects the continent's economy [12]. Hence, there is relationship between technologies infrastructures support and ERP system adoption to medium-sized enterprise firms. In this light, poor Internet

connection and unreliable Internet access, lack of regular electricity power supply, lack and cost of computer availability, quality of Internet connection, poor Internet services from Internet service provider and lack of reliable Internet really affect enterprise business organizations [12], [6], [5].

H2. There is a positive relationship between technological support infrastructure quality of internet and ERP system adoption among medium-sized enterprise firms.

TOP MANAGEMENT SUPPORT (TMS)

[20] Contended that top management is described as the degree by which senior management show commitment to their task for the development and improvement of the organization. Top management provides full support for any advancement of project being carried out in enterprise organizations.

[15] highlighted that top management support is the level by which top officers understand the ideas and advantages of the adoption of ERP system by their organizations. Additionally, it is useful to understand the benefit of ERP system and commitment of top management in adopting the ERP system. [14] posited it is paramount for a firm’s top management to encourage the use of the system users and provide all necessary materials needed for the project team in every stage . Similarly, top management’s approval is financial resources is important during the process of ERP system adoption. Consequently, the lack of top management support will affect the adoption of ERP system by an organization [18].

H3.A positive relationship exists between top management support and ERP system adoption among medium-sized enterprise firms.

3. Methodology

Sample of the study

The conceptual framework of the present study was tested with the use of a newly developed questionnaire. The data were collected from 82 medium sized enterprises firms in Ogun State, Nigeria. This sample size is based on [19] which stated that if the population is under 104, then the sample size is 82. Data concerning medium enterprises firm that could possibly be included in the sample of the study were obtained from the SMEDAN web site in Nigeria. This method was the only one that able to provide usable information for study.

Measurement

The questionnaire of the present study comprises of items (questions) that have been used by various previous researchers [14], [16], [31], [7]. The five-point Likert scale was used for the measurement of all variables (1“strongly disagree” to 5“strongly agree”). The tables below demonstrate the research variables, the number of items used for their measurement and the studies from which they were adapted.

Table 1. ERP System Adoption

No	Items	Alpha
1	Our current internet service provider provides the organization with sufficient information.	0.82
2	Our current technology internet service provider provides attractive network.	
3	Our current internet service provider provides an up-to-date internet services.	

Source: Hwang and Min (2013).

Table 2. Organizational Culture

No	Items	Alpha
1	Our current internet service provider provides the organization with sufficient information.	0.82
2	Our current technology internet service provider provides attractive network.	
3	Our current internet service provider provides an up-to-date internet services.	

Source: Ifinedo and Nahar (2009).

Table 3. Technology Infrastructures Support

No	Items	Alpha
1	Our current internet service provider provides the organization with sufficient information.	0.82

2	Our current technology internet service provider provides attractive network.	
3	Our current internet service provider provides an up-to-date internet services.	

Source: Zhou (2013).

Table 4. Top Management Support

No	Items	Alpha
1	. Top management understands that the adoption of new technology will benefit the enterprise.	0.90
2	Top management willingly assign resources to facilitate the adoption of new technology.	
3	Top management identifies the adoption of new technology as a top priority.	
4	Top management reinforces the commitment of all the employees to the adoption of new technology.	

Source: Chen and Paulraj (2004).

Data collection

The final questionnaire and a cover letter including all necessary clarifications, were sent to the manager of the selected companies. The CEO / MD and managers were selected as the key respondents based on their experience. The questionnaires were sent only after telephone contact has been made with the manager in each company.

After making all necessary telephone calls, 164 questionnaires were distributed to 164 respondents in the medium-sized enterprise firms that have agreed to participate in the survey. However, only 123 questionnaires were returned, and after realizing all necessary controls, 104 were used for data analysis (data analysis was conducted with the use of the Partial Least Squares Structural Equation modeling).

4. FINDINGS

Internal Consistency Reliability

In this study, the internal consistency reliability was assessed based on Cronbach Alpha (Cronbach,

1951). The estimation was based on the indicators of manifest variables inter correlations, whereby all the indicators are assumed to have the same outer loadings [11]. However, the main concern in PLS is the individual reliability of the indicator. Therefore, due to the drawbacks of Cronbach Alpha, as discussed in [11] a more robust measure of assessing internal consistency reliability, which is based on the criteria for assessment of internal consistency reliability using composite reliability, known as composite reliability is proposed.

[10] Suggested that the composite reliability value should be greater than 0.70, though in some circumstances, the values between 0.60-0.70 are acceptable in exploratory research. Internal consistency reliability is deemed deficient when the values of composite reliability is less than 0.60. Furthermore, the composite reliability for all the latent construct in this study was calculated using Partial Least Squares Structural Equation modeling standard algorithm and the result indicates that all the latent constructs have met and exceeded the minimum threshold value of 0.70 [11]. Table 4.2 depicts the dependent variable ERP composite reliability as 0.828 and the independent variables organizational culture (0.833), technology infrastructure support (0.881) and top management support (0.909).

Convergent Validity

[11] Convergent Validity is a degree of agreement among multiple items in measuring a particular concept. The Average Variance Extracted (AVE) was used to evaluate the convergent validity criteria. According to [10] latent construct should at least explain half of the variance of the indicators. The result of the PLS algorithm reveals that the AVE values for all the constructs have met and exceeded the minimum threshold value discussed above.

Table 5. Cross Loading

Constructs	Items	Organizational Culture	Technology Infrastructure Support	Top Management Support	ERP
Organizational Culture.	OC1	0.665	0.370	0.220	0.236
	OC2	0.841	0.324	0.455	0.354
	OC3	0.856	0.418	0.485	0.379
Technology Infrastructure Support.	TIS1	0.422	0.859	0.485	0.372
	TIS2	0.405	0.883	0.501	0.398
	TIS3	0.337	0.787	0.496	0.292

Top Management Support	TMS1	0.465	0.473	0.823	0.475
	TMS2	0.461	0.485	0.853	0.406
	TMS3	0.308	0.473	0.798	0.373
	TMS4	0.490	0.537	0.903	0.453
ERP	ERP1	0.389	0.389	0.556	0.784
	ERP2	0.327	0.315	0.337	0.744
	ERP3	0.264	0.206	0.250	0.727
	ERP4	0.176	0.290	0.215	0.702

Table 6. Internal Consistency Reliability and Convergent Validity

Constructs	Items	Loading	AVE	Composite Reliability	Cronbachs Alpha
Organizational Culture.	OC1	0.665	0.627	0.833	0.704
	OC2	0.841			
	OC3	0.856			
Technology Infrastructure Support.	TIS1	0.859	0.712	0.881	0.798
	TIS2	0.882			
	TIS3	0.787			
Top Management Support	TMS1	0.823	0.714	0.909	0.866
	TMS2	0.853			
	TMS3	0.798			
	TMS4	0.903			
ERP	ERP1	0.784	0.547	0.828	0.744
	ERP2	0.744			
	ERP3	0.727			
	ERP4	0.702			

The AVE value for the dependent variable ERP is 0.547, while the independent variables of organizational culture, technology infrastructure and top management support recorded the AVE value of 0.714, 0.714 and 0.627, respectively.

Table 7. Discriminant Validity

Constructs	Organizational Culture	Technology Infrastructures Support	Top Management Support	ERP
Organizational Culture	0.792			
Technology Infrastructures Support	0.462	0.844		
Top Management Support	0.516	0.583	0.845	
ERP	0.417	0.424	0.509	0.740

From the findings, the highest correlation between the constructs is 0.665, which is between organizational culture and ERP, followed by top management support – technology infrastructure support (0.516), ERP – technology infrastructure support (0.462), ERP – organizational culture (0.417), respectively. On the other hand, the values of square root of average variance extracted for all the constructs in Table 4.1 are all above the correlation of other constructs (the off-diagonal). Table 7 shows that the lowest value of the square root of AVE is 0.547 for ERP, which is above the value of correlations of any constructs in the model. This is also in line with [8] criteria.

Table 8. Hypothesis testing

Constructs	Beta	Standard Error (STER)	T-Value	P-Value	Decision
Organizational Culture.>ERP	0.177	0.098	1.797	0.036	Supported
Technology Infrastructure Support.>ERP	0.15	0.119	1.256	0.105	Not Supported
Top Management Support.>ERP	0.33	0.131	2.531	0.006	Supported

Table 8 highlights the results of the hypotheses testing, where out of the three (3) direct hypotheses, two (2) are supported, while the other one did not show any proof of effect on dependent

variable. In terms of the supported paths, organizational culture -ERP (p. 0.036), top management support – ERP adoption (p. 0.006) are supported, while technology infrastructure support – ERP adoption with (p. 0.105) was rejected as it does not show any evidence of positive effect on ERP adoption.

5. CONCLUSIONS

This study has proposed a theoretical framework that identifies the factors affecting the adoption of ERP system by medium sized enterprises in order to improve their performance. It has demonstrated the relationship between organizational structure, technology infrastructure support and top management support, variables that are connected with the ERP adoption process and the final outcome of this process. The determinants in the theoretical framework was chosen based on the input obtained from a newly developed structured questionnaire and the results offer interesting implications to medium-sized enterprise firms.

The study empirically shows that the support of organizational culture is crucial for the effectiveness of ERP systems adoption. Organizational culture significantly influences the ERP system adoption to improve performance of medium enterprises firms. The findings on organizational culture are in line with [14] who suggested that organization culture as a whole affects the productivity of the organizations by affecting individuals and drastically affects the thinking of the employees in any organization. Therefore, medium sized enterprises need to focus on organizational culture in order to have successful ERP adoption.

Top management support significantly influences the ERP system adoption to improve performance of medium-sized enterprise firms and significantly influence system adoption. Top management support and the selection of the appropriate ERP system are the major success factors for the adoption of successful ERP systems. This implies that adopting the ERP system alone does not sustain or guarantee the competitiveness of an organization, unless the managers in charge welcome the use of these systems. Furthermore, organizations should select the most appropriate type of ERP system. It is also deduced from the study that top management support affects the adoption of ERP system which in turn influences the firm's performance, which is in line with the findings of [25].

The findings of this study revealed that technology infrastructure support does not have any effect or significant to ERP system adoption in medium-sized enterprise firms, hence, it has no effect on firm performance, therefore, this factor has no relationship with the adoption of ERP system in medium-sized enterprise firms.

Recommendation

This study shows that organizations need to focus on organizational culture when changing from one system to the other and the commitment of top management in the adoption of the ERP system to improve firm performance. This study recommends the use of the qualitative approach in large scale settings to determine the respondents' perspectives on ERP systems. Likewise, multi-dimensional approach needs to be applied in the adoption and implementation of the ERP system.

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