Moderating Effect of Implementation Challenges on Enterprise Resource Planning Adoption and Internally Generated Revenue of States in Southwest Nigeria

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Abstract

The study investigated the moderating effect of implementation challenges on ERP adoption and internally generated revenue. The study population consists of the entire six States in the Southwest Nigeria (Lagos, Ogun, Oyo, Osun, Ondo and Ekiti). The study employed annual secondary data from 1999 to 2018. The data were sourced from the National Bureau of Statistics, Budget office and Board of internal revenue of Southwest states. The variables are real average IGR during and post ERP adoption, Pre-ERP adoption performance, and total annual revenue of States. Data collected were analyzed using descriptive and inferential statistical (squared (n2), tow-ANOVA and multiple regression model). Analysis investigate the moderating effect of implementation challenges on ERP adoption and internally generated revenue in Southwest Nigeria revealed that a significant positive linear relationship exists between Internal generated revenue and implementation hurdles (p<0.05; t=0.002) and revenue (p<0.05; t=0.000) in Southwest Nigeria. The study concluded that weak relationship exists between the implementation hurdles and the internally generated revenue, whereas, a strong relationship is observed between cost of ERP adoption and internally generated revenue in Southwest Nigeria which implied that increment in cost of ERP adoption is not necessarily increasing in the same trend as the benefits of ERP adoption.

Keywords: Enterprise resource planning • Adoption and internally generated revenues

Introduction

Prior to early 2000, there has been an increase pressure exerted on State governments in Nigeria for quality performance in their revenue generation system [1]. Most of the States in Nigeria are considered not viable and financially stable to meet their short term obligations to the workforce and society at large due to the recent dwindling in allocations from Federal Government. Moreover, Internally Generated Revenue (IGR) denotes the revenue that the Federal, State and Local governments generate within their respective areas of jurisdiction. Internally Generated Revenue (IGR) for State governments has also been described as revenues that are derived within the state from various sources such as taxes (pay as you earn, direct assessment, capital gain taxes, etc.) and motor vehicle license, among others [2]. According to Asimiyu et al. [3] economic development and sustainability of States in Nigeria depend on the ability of such States to generate revenue internally to supplement the revenue allocation from federation account. In other words, federal allocations are not sufficient to guarantee economic development of States and local governments, hence the emphasis on local generation of revenues to sustain the economy of the nation locally and at the federal level; on this note, this makes it imperative to introduce Enterprise Resource Planning (ERP) which automates the process of revenue generation across States. According to Evans et al. [4] ERP facilitates the flow of information between all business functions inside the boundaries of the organization and manage the connections to outside stakeholders. This software used by many enterprises particularly by multinational corporations, has a critical role in ensuring increased efficiency. ERP encompasses a set of business applications (modules) used to carry common business functions such as accounting, stock control, and logistics [5]. ERP system can automate business processes; share common data across the organization and most importantly produces

real-time data. Although traditional information systems (IS) offer managers transaction processing, reporting and information for decision making, this appears insufficient in this modern business environment, where automation, effectiveness and efficiency in operations and real-time data remain essential factors for business success [6]. This has brought about number of changes through its influence on the functions of the organizations. ERP has been one of the main software that helps organizations to manage their resources in the optimally effective fashion. ERP is a multi-module application system which combines the key businesses and management processes in an enterprise to enhance the efficiency level of the missions and tasks [7]. In view of this point above, adopting new technology usually bring about change and sometimes an associated risk. According to Fisher, Raman and McClelland the time available for organization to react to the change in the present market trend are limited. Due to this, ERP implementations commonly have delayed an estimated schedule and overrun an initial budget [8,9]. Furthermore, the literature indicates that ERP implementations have sometimes failed to achieve the organization's targets and desired outcomes. Much of the research reported that the failure of ERP implementations was not caused by the ERP software itself, but rather by a high degree of complexity from the massive changes ERP causes in organizations [9,10]. These failures can be explained by the fact that ERP implementation forced companies to follow the principle of 'best practices' in most successful organizations and form appropriate reference models. According to Helo et al. [9] In other words, due to changes in business processes across an organization, there can be resistance to adopting the ERP system. For instance, the general and usual practices across States, where taxes, rates and levies collection is done manually has the capacity of breeding corruption via activities such as voucher suppression, under or over invoicing and other corrupt means. It is easier than to opine that Sates where such activities are rife could experience stiff opposition and resistance by existing personnel. It can be assumed that organizations implement ERP systems because they want to gain benefits from new technologies. ERP systems on their own are complex software packages that are supposed to provide organizations with capabilities of coordinating information flows into business processes and integrating all business departmental functions into a united system [11]. In summary, it is evident that much works have been done on the effects of ERP adoption on performance of privately owned firms and public establishments without much traceable works on how implementation challenges affects the desired outcome of the ERP adoption in the public service. For example, in the work of Shang and Seddon, implementation

challenges were seen as the major debacle of ERP adoption among private firms. Going by this submission and coupled with the fact that ERP adoption is gradually creeping into the Nigerian public sector, where things are unfortunately done via seemingly insurmountable bureaucracy and not too welcoming attitude to change by employees, investigating how implementation challenges moderates the resultant effects of ERP adoption on performance in the public sector is therefore not out of place.

Methodology

Research design

This study employed a combination of explanatory, exploratory and cross sectional survey research design. The structure extracted relevant historical data from the records of the six selected States in Southwest Nigeria. Data for the study were collected from secondary source. The variables covered explicitly included:

1. ERP adoption (measured using cost of ERP/ICT),

2. Internally generated revenue (measured using taxes, rates, levies),

3. Implementation challenges (measured using presence of adjusted Fishbone analysis variables: political environment, implementation scope, management commitment, implementation strategy, vendor selection, project management, adequacy of trainers and educators, and change management strategy).

Population of the study

The study population consists of the entire six States in the Southwest Nigeria (Lagos, Ogun, Oyo, Osun, Ondo and Ekiti). However, the data points spanned through a period of 19 years. Also, considering the dynamic nature of the different objectives, data required were depicted hereunder:

1. Internally generated revenue and cost of ICT/ERP for 19 years covering the six States (1999 to 2018) for adopters and non-adopters. This made make up of 114 data points.

2. Checklist from 18 (Director of Finance and Admin, and Permanent Secretaries (Budget and planning, and information communication technology ministries) of the Six States of Southwest Nigeria covering a period of 11 years (2008 to 2018) for the eight variables.

Model specification

The study adopted de Andre, Lorca and Labra (2012) regression model as given in equation:

IGR=f (ImpHs, Cerp, Rev, State Dummy) (1.1)

Where:

ImpHs=ERP implementation challenges and challenges

Cerp=Cost of ERP adoption

Rev=Total annual revenue of States

State Dummy=State dummy to control for economic viability of major cities in the Selected States

Estimation techniques

In other to achieve the objective, where moderating effect of implementation challenges were evaluated on the effects of ERP adoption on IGR of Southwest States, the regression model were applied:

$IGR = \beta_0 + \beta_1 ImpHs + \beta_2 Cerp + \beta_3 Rev + \beta_4 State\ Dummy + \varepsilon \ldots$ (1.2)

Where:

IGR=average IGR during and post ERP adoption over time t_0 to t+3

β_0=constant

β_1=the coefficient for ERP implementation challenges measured by the Fishbone ranking

β_2=the coefficient for costs of ERP adoption

β_3=the coefficient for total revenue of States

β_4=the State dummy to control for a particular State's effect in determining the performance differential between adopters and non-adopters. State dummy is coded as 1 if adopters or matched non-adopters are housing any of the economically viable cities (commerce and industries) in Nigeria (e.g. Lagos, Ibadan, Onitsha, Porthacourt, Kano, Abuja, etc.) and if otherwise, 0 is allocated

ε=error term

Results

The Table 1 showed the descriptive analysis results of implementation challenges, cost of ERP adoption (CERPA), revenue (REV), State dummy (STADUM) and ERP dummy (ERPDUM) effect on internally generated revenue (IGR) in Southwest Nigeria for the period from 1999-2018. The result revealed that, on average, the values of internally generated revenue (IGR), implementation challenges (IMPH), cost of ERP adoption (CERPA), revenue (REV), state dummy (STADUM) and ERP dummy (ERPDUM) were 32.95, 9.44, 0.54, 58.69, 0.37 and 0.52 respectively. The maximum and minimum of internally generated revenue (IGR), implementation challenges (IMPH), cost of ERP adoption (CERPA), revenue (REV), state dummy (STADUM) and ERP dummy (ERPDUM) were 382.18 and 0.14, 36.00 and 0.00, 2.33 and 0.00, 453.60 and 12.79, 1.00 and 0.00 as well as 1.00 and 0.00 respectively. The standard deviation values of 74.60, 14.01, 0.47 and 80.71 revealed the rate at which the internally generated revenue (IGR), implementation challenges (IMPH), cost of ERP adoption (CERPA), and revenue (REV) were been deviated from their respective expected value.

Also, it was discovered that internally generated revenue (IGR), implementation challenges (IMPH), cost of ERP adoption (CERPA), revenue (REV) were positively skewed with Skewness coefficient of 2.95, 1.03, 1.36 and 3.53 respectively thus implies the distribution of the internally generated revenue and enterprise resource planning programme under consideration had a long tail to the right. However, the kurtosis of the internally generated revenue (IGR), implementation challenges (IMPH), cost of ERP adoption (CERPA), revenue (REV) with kurtosis coefficient indexes of 11.16, 4.93 and

Table 1. Descriptive Analysis of IGR, IMPH, CERPA and REV.

	IGR	IMPH	CERPA	REV	STADUM	ERPDUM
Mean	32.95914	9.441667	0.536333	58.69450	0.366667	0.516667
Median	4.040000	0.000000	0.440000	30.79500	0.000000	1.000000
Maximum	382.1800	36.00000	2.330000	453.6000	1.000000	1.000000
Minimum	0.140000	0.000000	0.000000	12.79000	0.000000	0.000000
Std. Dev.	74.59804	14.01128	0.465944	80.70537	0.483915	0.501817
Skewness	2.948143	1.027088	1.356699	3.531125	0.553372	-0.0667
Kurtosis	11.16368	2.369348	4.925710	15.21244	1.306220	1.004449
Jarque-Bera	490.1573	23.08680	55.35443	995.0953	20.46885	20.00010
Probability	0.000000	0.000010	0.000000	0.000000	0.000036	0.000045

15.21 respectively were mesokurtic in nature while, implementation challenges (IMPH) had a kurtosis coefficient of 2.37. A statistically significant result of Jarque-Bera shows that the distribution is not normally distributed and the probability values revealed that the internally generated revenue (IGR), implementation challenges, cost of ERP adoption (CERPA) and revenue (REV) were statistically significant in examining the relationship between the enterprise resource planning programme implementation challenges and the internally generated revenue in Southwest Nigeria.

Table 2 revealed the correlation between the internally generated revenue (IGR) and implementation challenges (IMPH), cost of ERP adoption (CERPA), revenue (REV), state dummy (STADUM) and ERP dummy (ERPDUM). A positive correlation was discovered between internally generated revenue (IGR) and implementation challenges (IMPH), internally revenue (IGR) and cost of ERP adoption (CERPA), internally generated revenue (IGR) and revenue (REV), internally generated revenue (IGR) and ERP dummy (ERPDUM), internally generated revenue (IGR) and state dummy (STADUM) with the correlation coefficient of 0.03, 0.68, 0.83, 0.38 and 0.41 respectively. The study also revealed a positive correlation between implementation challenges (IMPH) and cost of ERP adoption (CERPA), implementation challenges (IMPH) and state dummy (STADUM), cost of ERP adoption (CERPA) and revenue (REV), cost of ERP adoption (CERPA) and state dummy (STADUM) and cost of ERP adoption (CERPA) and ERP dummy (ERPDUM) with the correlation coefficient of 0.28, 0.12, 0.75, 0.66 and 0.53 respectively. From the result, a negative correlation was discovered between the implementation challenges (IMPH) and revenue (REV) with the correlation coefficient given as 0.07. Thus, establish a weak relationship between the implementation challenges and the internally generated revenue while it was discovered that cost of ERP adoption strongly related with the internally generated revenue in Southwest Nigeria.

Results from the fitted regression model for the internally generated revenue, implementation challenges (IMPH), cost of ERP adoption (CERPA), revenue (REV), state dummy (STADUM) and ERP dummy (ERPDUM) presented in Table 3 depicted that a positive linear relationship exists between the dependent variable (Internal generated revenue) and the explanatory variables (implementation challenges (IMPH), cost of ERP adoption (CERPA), revenue (REV), state dummy (STADUM) and ERP dummy (ERPDUM)) in Southwest Nigeria. The result specifically revealed that an improvement in the implementation challenges (IMPH), cost of ERP adoption (CERPA), revenue (REV), state dummy (STADUM) and ERP dummy (ERPDUM) will lead to 0.21%, 2.18%, 0.64%, 0.03% and 0.26% improvement respectively in internally generated revenue (IGR) during the period under investigation in Southwest Nigeria.

The test for the significance of the estimated parameters of the fitted regression model using the probability value showed that the probability value of implementation challenges (IMPH) and revenue (REV) were 0.002 < 0.05 and 0.000 < 0.05 respectively. The probability value of 0.231, 0.998, 0.981 showed the statistical insignificance of the cost of ERP adoption (CERPA), state dummy (STADUM) and ERP dummy (ERPDUM) in Southwest Nigeria. The standard error test for the parameters also established the same result and thus implies the statistical significance of the estimated parameters for the implementation challenges (IMPH) and revenue (REV) in determining the internally generated revenue (IGR) while, cost of ERP adoption (CERPA), state dummy (STADUM) and ERP dummy (ERPDUM) were statistically insignificance in examining the internally generated revenue in Southwest Nigeria.

Moreover, it was also discovered that the Adjusted R-square value of 0.65 revealed that 65 percent improvement in the internally generated revenue can be explained by the implementation challenges (IMPH), cost of ERP adoption (CERPA), revenue (REV), state dummy (STADUM) and ERP dummy (ERPDUM) in Southwest Nigeria. The F-statistic value of 43.45 with the probability value of 0.000 < 0.05 showed that the fitted regression model was statistically significance and thus appropriate, reliable and acceptable for assessing the effect of implementation challenges (IMPH), cost of ERP adoption (CERPA), revenue (REV), state dummy (STADUM) and ERP dummy (ERPDUM) on the internally generated revenue in Southwest Nigeria.

The test for the economic or theoretical significance of the parameters determined based on the sign of the estimated parameters revealed that implementation challenges (IMPH), cost of ERP adoption (CERPA), revenue (REV), state dummy (STADUM) and ERP dummy (ERPDUM) in Southwest Nigeria were positively signed. Thus, it implies that implementation challenges (IMPH), cost of ERP adoption (CERPA), revenue (REV), State dummy (STADUM) and ERP dummy (ERPDUM) positively affected the internally generated revenue in Southwest Nigeria during the period under investigation.

Table 2. Correlation Matrix for IGR, IMPH, CERPA and REV.

	IGR	IMPH	CERPA	REV	STADUM	ERPDUM
IGR	1.000000	0.032891	0.682547	0.806446	0.452176	0.363877
IMPH	0.032891	1.000000	0.283544	-0.06511	0.122522	-0.02342
CERPA	0.682547	0.283544	1.000000	0.756021	0.658914	0.532964
REV	0.806446	-0.06511	0.756021	1.000000	0.504424	0.411006
STADUM	0.452176	0.122522	0.658914	0.504424	1.000000	0.609872
ERPDUM	0.363877	-0.02342	0.532964	0.411006	0.609872	1.000000

Table 3. Fitted Regression Model.

Variable	Coefficient	Std. Error	t-Statistic	Probability
C	-17.9378	6.799518	-2.6381	0.0095
IMPH	0.20973	0.058312	3.596675	0.002
CERPA	2.187472	1.816081	1.204501	0.231
REV	0.640026	0.086169	7.427533	0
STADUM	0.028718	12.43075	0.00231	0.9982
ERPDUM	0.263203	10.87548	0.024202	0.9807
R-squared	0.663873	Mean dependent variable		32.95914
Adjusted R-squared	0.648594	S.D. dependent variable		74.59804
S.E. of regression	44.22134	Akaike info criterion		10.46663
Sum squared resid	215107.9	Schwarz criterion		10.60906
Log likelihood	-601.065	Hannan-Quinn criterion		10.52445
F-statistic	43.4514	Durbin-Watson stat		1.106306
Probability (F-statistic)	0			

Dependent Variable: IGR**; Method**: Least Squares; **Sample**: 1 120; **Included Observations**: 116

Thus, the result affirmed the stated APriori expectation that implementation challenges, cost of ERP adoption, revenue, state dummy and ERP dummy influenced the internally generated revenue in Southwest Nigeria.

The result of collinearity was presented in the Table 4 to show the relationship among the explanatory variables that include implementation challenges (IMPH), cost of ERP adoption (CERPA), revenue (REV), state dummy (STADUM) and ERP dummy (ERPDUM) in Southwest Nigeria. The inflation factors for implementation challenges (IMPH), cost of ERP adoption (CERPA), revenue (REV), state dummy (STADUM) and ERP dummy (ERPDUM) which were 1.391, 4.507, 2.999, 2.383 and 2.231 < 10 revealed that the explanatory variables under consideration were independently and statistically related and thus implies their important in assessing the improvement of internally generated revenue in Southwest Nigeria.

Table 5 presented the result for testing of serial correlation and constant variance of the residual term to determine the presence of Autocorrelation and Heteroskedasticity among the variable used in the study such as implementation challenges (IMPH), cost of ERP adoption (CERPA), revenue (REV), ERP dummy (ERPDUM) and state dummy (STADUM) in Southwest Nigeria. It was discovered from the Table 4 that the F statistic value of 17.542 and the probability value $0.000 < 0.05$ revealed that there is no serial correlation between the error term and constant variance of the error term.

Furthermore, the Durbin Watson statistic value of 1.106 in Table 3 showed the absence of positive autocorrelation or serial correlation. Thus, it implies that there was no underestimation or overestimation of the parameters; the estimated standard error values and the probability values of the parameters were unbiased, sufficient, consistent and efficient. Thus, established the validity, reliability and acceptability of enterprise resource planning in determining and drive the internally generated revenue in Southwest Nigeria. The probability value of $0.460 > 0.05$ led to rejection of Heteroskedasticity and thus establish the constant variance of error term (homoscedasticity).

The stability of the model can affect the validity and robustness of the results. Hence, the need to test for stability of the model and this is done using Ramsey test and CUSUM test presented in Table 6 and Figure 1 respectively. From the Table 6, the probability value for F- statistic value of $0.000 < 0.05$ revealed the statistical significance of the Ramsey test and thus implies the

Table 4. Test for Multi collinearity among the IMPH, CERPA and REV.

Variable	Coefficient variance	Uncentered VIF	Centered VIF
C	44.38856	2.633238	NA
IMPH	0.119846	1.971562	1.391264
CERPA	344.3341	10.27845	4.506935
REV	0.007581	4.520538	2.998579
STADUM	173.9241	3.735683	2.383108
ERPDUM	150.4786	4.540333	2.231026

Variance Inflation factors; **Sample**: 1 120; **Included observations**: 116

Table 5. Test for Autocorrelation and Homoscedasticity.

Breusch-Godfrey Serial Correlation LM Test:			
F-statistic	17.54199	Prob. F(2,108)	0
Obs* R-squared	28.44303	Prob. Chi Square(2)	0
Heteroscedasticity Test: ARCH			
F-statistic	0.576086	Prob. F(1,109)	0.4495
Obs* R-squared	0.583573	Prob. Chi Square(1)	0.4449

Table 6. Diagnostic Stability Test for the Fitted Model.

	Value	Df	Probability
F-statistic	11.98772	(5,105)	0.0000
Likelihood ratio	52.38708	5	0.0000

Ramsey RESET Test
Equation: UNTITLED; **Specification**: IGR C ERPADP REV ERPDUM STADUM;
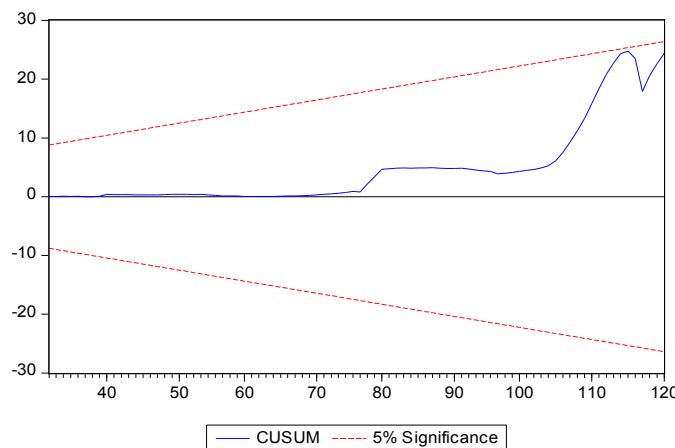**Omitted Variables**: Squares of fitted values

Figure 1. CUSUM Test for Stability of the Fitted Model for Objective II.

stability of the fitted model in determining the internally generated revenue through implementation challenges and cost ERP adoption. Also, in the Figure 1, it was shown that all estimated values are within the confidence limit at 5 percent level of significance. Thus, suggests the stability of the fitted model in examining the effect of implementation challenges and cost ERP adoption on internally generated revenue in Southwest Nigeria.

Summary of findings

According to Tijani et al. [12] the major reasons for companies adopting ERP systems are the integration of accounting information systems and industry-wide requirements. This led to the implementation of ERP adoption in organizations. The result of hypothesis two signified that Implementation challenges significantly moderate the effect of ERP adoption on internally generated revenues of States in Southwest Nigeria. This implies that implementation challenges, cost of ERP adoption, revenue, state dummy and ERP dummy influenced the internally generated revenue in Southwest Nigeria. Fowler et al. [13] opined that the key attributes of an ERP package purchase and implementation process include, knowing and understanding the benefits; goals; costs; project methodologies; drawbacks, pitfalls, and short comings; successful implementations strategies; and lessons learned. Organizations can obtain many benefits and advantages through the successful implementation of an ERP system. Hence, the massive organizational changes that accompany an ERP implementation product allow an institution to go from a fragmented, functional-based organization to a process-based organization with an integrated system [14].

The result is in consistence with [15-18] that there was a significant effect of ERP implementation on employees' productivity, innovation and service quality respectively. The study further validated the finding [19,20] those enterprise resource planning implementations have significant effect on financial performance of organizations in Nigeria.

Conclusion and Recommendations

From the findings of the study, it was concluded that Weak relationship exists between the implementation challenges and the internally generated revenue, whereas, a strong relationship is observed between cost of ERP adoption and internally generated revenue in Southwest Nigeria which implied that increment in cost of ERP adoption is not necessarily increasing in the same trend as the benefits of ERP adoption. ERP projects involves a long term development process and can also cost huge sum of money, that is the reason why not all the States of Southwest can afford to implement it. However, ERP implementation helps public sector to improve their business processes and improve their effectiveness. It was further recommended that in order to achieve successful implementation of organizational change, government must communicate clearly the public sector objectives to all the head of government parastatals, this is essential in order to get them informed and strategize on the best way to tackle ERP implementation hurdle.

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