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Users' Perceptions on the Effectiveness of Enterprise Resource Planning System in Enhancing the Performance of Accounting Information Systems of Public Universities in Kenya

Bethsy Jepkeitany Kaino, Karatina University, Kenya
Kennedy Munyua Waweru, Cooperative University College of Kenya, Kenya
Humphrey R. Omondi, Karatina University, Kenya

Abstract
The study employed a survey research design and a multinomial ordinal logistic regression analysis to establish users' perception on the effectiveness of the enterprise resource planning (ERP) system in enhancing the performance of the accounting information system (AIS) through reliability, accuracy and timeliness of information generated. The target population comprised of 56 employees drawn from the selected seven public universities which had implemented ERP systems for at least three years. Census survey was used to collect the data from heads of eight department targeted by the study. A Likert-type self-administered, structured questionnaire was used to collect data from the target respondents. The study findings revealed that ERP implementation generated positive and significant effects on the performance of the AIS through enhanced accuracy and timeliness of information generated at 5 percent significance level. While the ERP system was found to have a positive effect on reliability of information generated the effect was not found to be statistically significant. The study thus concludes that implementation of an ERP system is an opportunity for public universities to implement improved controls and security of data which enhances accuracy and timeliness of information hence performance of accounting information. Future studies may be conducted on the level of ERP adoption in different departments in public universities since this has a bearing on the timeliness, accuracy and reliability of Accounting Information generated by the ERP.

Keywords: Enterprise Resource Planning System, Accounting Information, Accuracy, Reliability, Timeliness

Introduction

Enterprise Resources Planning (ERP) system is a commercial and configurable software package that manages and integrates all the information flowing through the functional areas in an organization (Chen, 2011). The integration of business process and functions into one database is the idea behind the ERP software, and the major significance of an ERP system is that it offers integration across all the entire business functions like human resource, accounting, manufacturing, material management, procurement and all other business modules (Davenport,

2008). The reliance and dependence on ERP systems have grown substantially since the early 1990s, and the purchase and implementation of ERP systems continues to be one of the fastest growing segments of the information technology sector. It is for instance reported that 60% to 70 % of ICT spending in the Middle East is on ERP systems. The reason behind this phenomenal growth is the contention that ERP systems can provide an integrated business computing solution and improve a company's ability to compete in the marketplace (Lou and Strong, 2012).

An accounting information system (AIS) on the other hand is a system that is responsible for recording, analyzing, processing, monitoring and evaluating the financial condition of companies, preparation of documents necessary for tax purposes and providing information support to many other organizational functions (Chenhall 2009). The performance of AIS is evaluated from the dimensions of reliability, timeliness and accuracy of the information it generates. This not only depends on the purposes of such systems but also on contingency factors of each organization. An effective AIS should therefore systematically provide information which has potential effects on decision-making process. From the standpoint of an ERP system environment, AIS is viewed as one of the modules of the ERP system.

Globally, ERP systems have been implemented by various industries, manufacturing industries, banking industry and service industries. Nyandiere, Kamuzora, Lukandu and Omwenga, (2012) argue that the private sector has become saturated with ERP systems. According to Thomas & Jajodia (2004), ERP vendors have directed their attention to public institutions, and ERP systems are increasingly being implemented in the public sector. This may explain reported interest by Kenyan public universities in adopting ERP systems. Those that have fully implemented ERP systems include Kenyatta University, Jomo Kenyatta University of Agriculture Technology, Moi University, University of Nairobi and Egerton University, Musinde Muliro University of Science and Technology and Maseno University, while those that have partially implemented ERP systems include Karatina University, Dedan Kimathi University of Technology and Chuka University. It has been suggested that, the major advantages of ERP system implementation for Higher Education Institutions (HEI) include; improved information access for planning and managing the institution, improved services for the faculty, students and employees, lower business risks, and increased income and decreased expenses due to improved efficiency King (2012).

Abundant literature exists on ERP adoption and implementation in which ERP implementation benefits have often overshadowed the disadvantages. This notwithstanding, ERP implementation is costly and requires a long period of time (Adomako, 2013). ERP systems also face serious resistance associated with their massive and fundamental changes to organizational processes because they affect the way different stakeholders do their work (Spathis & Constantantide, 2010). Chen (2011) contends that the success of ERP implementation is quite low, with only 33 percent of those implemented being successful. It has also been argued that ERP systems can be implemented successfully from a technical perspective but not from an end user perspective because success depends on users' willingness to operate with the new ERP system (Chen 2011).

Although anecdotal evidence exist linking companies that have successfully implemented ERP systems to enhanced performance of the AIS (Nichols & Wahlen, 2012), some studies have also revealed that ERP systems are effective in transaction processing but less effective in reporting accounting information (Spathis and Contastantides, 2009). Despite these conflicting findings in the private sector, the accounting module has been implemented in all the public universities that have fully or partially implemented ERP systems. An outstanding issue is

therefore whether ERP system implementation with its antecedent cost enhances the performance the AIS in public universities. This was the focus of the study.

Hypothesis Development

Reliability is an essential characteristic contributing to the usefulness of accounting information; it is the quality of information that assures that the information is reasonably free from error and bias (Maines & Wahlen, 2010). The implementation of an ERP system involves changing disaggregated and individualized systems to a highly integrated environment, which can be complex. However, the reliability and continuity of (automated) processes and the provision of management information is not necessarily guaranteed by implementing ERP software alone (Nichols & Wahlen, 2012). The study's first hypothesis is thus:

H1: There is no significant relationship between ERP system implementation and the reliability of accounting information system in public Universities in Kenya.

Timeliness of information is another key characteristic influencing the performance of AIS. It is measured by the time taken between organization's financial year end and the date of audit report which is called Audit Report Lag. In a study of the ERP and timeliness of the annual reports, Dogan, (2007) report that companies that used ERP systems, release their annual reports within a small period of time than companies which don't use the ERP systems. A testament of the importance of timely audited report is exhibited by the number of studies conducted on the phenomenon of audit delay in different countries, see for instance (Afify, 2009) Egypt, (Leventis, 2013) in Greece, (Hashim & Abdul, Rahman, 2011) in Malaysia, (Bonsón-Ponte, 2008) in Spain, (Al-Ajmi 2008) in Bahrain, (Habib & Bhuiyan 2011) in New Zealand, (Alkhatib & Marji 2012) in Jordan, (Abdelsalam & Street 2007) in UK, (Fagbemi & Uadiale 2011) in Nigeria and (Khasharmeh & Aljifri 2010) in Bahrain and UAE. We therefore hypothesize as follows:

H2: There is no significant relationship between ERP system implementation and timeliness of accounting information system in public Universities in Kenya.

Finally accuracy is another important parameter bearing upon the efficiency of the AIS. It is argued that ERP systems enhances the accuracy of data through requiring data to enter only once which eventually helps AIS to generate a more adequate, reliable and high quality of accounting information. This contention is supported by studies by Velcu (2007), Gassen & Schwedler (2010) and Wu, Li, Chu, Sculli, & Wu (2012). A divergent view is however held by Spathis and Contastantides (2009) who argues that ERP systems are effective in transaction processing but less effective in reporting accounting information. In this regard we hypothesize that:

H3: There is no significant relationship between ERP system implementation and accuracy of accounting information system in public Universities in Kenya.

Methodology

The study employed a descriptive survey design because the information being sought was descriptive in nature. Out of the 22 fully charted public universities, 7 had implemented fully ERP system for at least three years. The study's population therefore comprised of the 7 universities. While the target respondents were drawn from head of various sections in finance department, procurement, human resource, ICT, marketing, internal audit, administration and public relations who are engaged in financial related transactions. Census survey was therefore

used to collect the data from heads of eight departments targeted by the study from the seven public universities (56 in total). A Likert-type self-administered, structured questionnaire with a reliability score of 0.83 was used to collect data.

Model Specification and Testing

The general model used in testing the study's hypothesis was:

$$\ln\left(\frac{P_{ij}}{P_{i1}}\right) = \beta_{0j} + \beta_1 x_1 + \beta_2 x_2 + \ldots . \beta_J x_i + \varepsilon$$

Where:

ln = natural log
P_{ij} = probability of success
P_{i1} =Probability of failure or (1-P_{ij})
β_{0j} = the intercept/constant
$\beta_1, \beta_2 \ldots . \beta_j$ = the partial regression coefficients (slope)
X_1 = Reliability of information generated by ERP
X_2 = Timeliness of information generated by ERP
X_3 = Accuracy of information generated by ERP

Findings

Reliability is one of the measures of performance of the AIS. The first objective of the study was to find out whether ERP implementation had a significant effect on the reliability of information generated and thus the performance of AIS in public Universities in Kenya. Reliability was measured in terms of consistency, clarity and ease of workload. The study hypothesized that: *There is no significant relationship between ERP system implementation and the reliability of accounting information system in public Universities in Kenya.* In testing this hypothesis it was deemed necessary to test the relationship each measure of reliability of information generated by the ERP this would help establish if different reliability factors have the same or different effect on performance of AIS. To test the hypothesis, the specific model was formulated as follows:

$$\ln\left(\frac{P_{ij}}{P_{i1}}\right) = \beta_{0j} + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \varepsilon$$

Where:

ln = natural log
P_{ij} = probability of success
P_{i1} =Probability of failure or $1-P_{ij}$
β_{0j} = the intercept/constant
$\beta_1, \beta_2 \ldots . \beta_j$ = the partial regression coefficients (slope)
X_1, X_2 *and* X_3 = Measures of reliability: X_1- Consistency, X_2- Clarity, X_3- Ease of workload,
ε = Error term

Findings presented in table 1 indicate clarity of information has a significant effect on performance of accounting information system at 5 percent significance level. The chi-square statistic for clarity was 8.317 with an associated p-value of 0.040 which is less than 0.05. Consistency of information and ease of workload were not found to have a significant effect on

performance of accounting information system. The chi-square statistics were respectively 3.579, p-value, 0.311 and 0.716 p-values, 0.870 for consistency and ease workload. The null hypothesis was therefore accepted.

Table 1: Likelihood Ratio Tests of ERP reliability factors on performance of AIS

Effect	Model Fitting Criteria	Likelihood Ratio Tests		
	-2 Log Likelihood of Reduced Model	Chi-Square	Df	Sig.
Intercept	28.488	0.661	3	0.882
Consistency	31.405	3.579	3	0.311
Clarity	36.144	8.317	3	0.040
Ease workload	28.542	0.716	3	0.870

Table 2 below indicates the model fitting information results that compares the final model against the baseline to see whether it has significantly improved the fit to the data. The Model fitting Information table gives the -2 log-likelihood values for the baseline and the final model, and also performs a chi square to test the difference between the -2log likelihood of the two models. From the table, the statistically significant chi-square statistic is 0.144 (p-value>0.05). This indicates that the final model does not provide a significant improvement over the baseline intercept-only model.

Table 2: Model Fitting Information

Model	Model Fitting Criteria	Likelihood Ratio Tests		
	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept Only	41.261			
Final	27.827	13.434	9	0.144

The effect of ERP implementation on the reliability of information generated and thus the performance of AIS in public Universities in Kenya can be summarized in the model

$$Logit = 28.488 + 31.405X_1 + 36.144X_2 + 28.542X_3 + \varepsilon$$

The other measure of performance of the AIS is timeliness of information. The second objective of the study therefore sought to establish whether ERP system implementation has a significant effect on the timeliness of information generated and thus the performance of AIS in public Universities in Kenya. Timeliness of ERP system was measured in terms of access to information, timely generation of reports and reduction of audit lag. The study hypothesized that: *There is no significant relationship between ERP system implementation and timeliness of accounting information system in public Universities in Kenya.* In testing this hypothesis it was deemed necessary to test the relationship of each measure of timeliness as this would help establish whether they have the same or different effect on performance of AIS. To test the hypothesis, the specific model was formulated as follows:

$$\ln\left(\frac{P_{ij}}{P_{i1}}\right) = \beta_{0j} + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \varepsilon$$

Where:

ln = natural log
P_{ij} = probability of success
P_{i1} =Probability of failure or $1\text{-}P_{ij}$
β_{0j} = the intercept/constant
$\beta_1, \beta_2 \ldots\ldots \beta_j$ = the partial regression coefficients (slope)
X_1, X_2 *and* X_3 = Measures of timeliness: X_1- Access, X_2- Report, X_3- Audit lag
ε = Error term

Findings in presented in table 3 show that the access to information and timely generation of reports were found to have significant effect on performance of AIS. The chi-square statistics were respectively 52.251, p-value 0.000 and 15.823 p-value, 0.003 for access to information and timely reports. The null hypothesis was therefore rejected. The implementation of ERP system was however found not to have a significant effect on reduction of audit lag, another measure of timeliness of AIS. The chi-square statistic for audit lag was 3.511 with an associated p-value of 0.476.

Table 3: Likelihood Ratio Tests of ERP timeliness factors on performance of AIS

Effect	Model Fitting Criteria	Likelihood Ratio Tests		
	-2 Log Likelihood of Reduced Model	Chi-Square	Df	Sig.
Intercept	133.349	80.292	4	0.000
Access	105.308	52.251	4	0.000
Report	68.880	15.823	4	0.003
Audit lag	56.568	3.511	4	0.476

The model fitting information presented in Table 4 compares the final model against the baseline to see whether it has significantly improved the fit to the data. The Model fitting Information table gives the -2 log-likelihood values for the baseline and the final model, and also performs a chi square to test the difference between the -2log likelihood of the two models. The p-value is less than 0.005 indicating that the final model gives a significant improvement over the baseline intercept-only model.

Table 4: Model Fitting Information

Model	Model Fitting Criteria	Likelihood Ratio Tests		
	-2 Log Likelihood	Chi-Square	Df	Sig.
Intercept Only	144.417			
Final	53.057	91.360	12	0.000

The effect ERP implementation on the timeliness of information generated and thus the performance of AIS in public Universities in Kenya can be summarized in the model

$Logit = 80.292 + 52.251X_1 + 15.823X_2 + 3.511X_3 + \varepsilon$

The other measure of performance of the AIS is accuracy of information. The last objective of the study sought to evaluate whether accuracy of information generated by ERP has significant relationship on performance of AIS in public Universities in Kenya. Accuracy of ERP system was measured in terms of error reduction, completeness of information and efficiency. The study hypothesized that: *There is no significant relationship between ERP system implementation and accuracy of accounting information system in public Universities in Kenya.* In testing the third hypothesis it was deemed necessary to test the relationship of each measure of accuracy of information generated ERP on performance of AIS as this would help establish whether different measures of accuracy have the same or different effect on performance of AIS. To test the hypothesis, the specific model was formulated as follows:

$$\ln\left(\frac{P_{ij}}{P_{i1}}\right) = \beta_{0j} + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \varepsilon$$

Where:

ln = natural log
P_{ij} = probability of success
P_{i1} =Probability of failure or $1\text{-}P_{ij}$
β_{0j} = the intercept/constant
$\beta_1, \beta_2 \ldots\ldots \beta_j$ = the partial regression coefficients (slope)
X_1, X_2 *and* X_3 = Measures of accuracy: X_1- Reduction of errors, X_2- Completeness, X_3- Efficiency
ε = Error term

Findings presented in table 5 indicate that efficiency was found to have statistically significant effect on performance of AIS. The chi-square statistic for efficiency was 46.003 with an associated p-value of 0.000 at the 5 percent level of significance. Completeness of information and reduction of errors were not found to have a significant effect on performance of AIS. The chi-square statistics were respectively 5.918, p-value of 0.205 and 3.357, p-value of 0.500 for completeness of information and reduction of errors. The null hypothesis was therefore accepted.

Table 5: Likelihood Ratio Tests of ERP accuracy factors on performance of AIS

Effect	Model Fitting Criteria	Likelihood Ratio Tests		
	-2 Log Likelihood of Reduced Model	Chi-Square	Df	Sig.
Intercept	128.300	45.982	4	0.000
Reduction of errors	85.675	3.357	4	0.500
Completeness	88.237	5.918	4	0.205
Efficiency	128.321	46.003	4	0.000

The model fitting information presented in Table 6 compares the final model against the baseline to see whether it has significantly improved the fit to the data. The Model fitting Information table gives the -2 log-likelihood values for the baseline and the final model, and also performs a chi-square to test the difference between the -2log likelihood of the two models. The

p-value is less than 0.005 indicating that the final model gives a significant improvement over the baseline intercept-only model.

Table 6: Model Fitting Information

Model	Model Fitting Criteria	Likelihood Ratio Tests		
	-2 Log Likelihood	Chi-Square	Df	Sig.
Intercept Only	146.614			
Final	82.318	64.296	12	0.000

The effect ERP implementation on the accuracy of information generated and thus the performance of AIS in public Universities in Kenya can be summarized in the model.

$$Logit = 45.982 + 3.357X_1 + 5.918X_2 + 46.003X_3 + \varepsilon$$

Discussion

This study established that reliability of information generated by ERP has a positive effect on performance of AIS, the effect was however not significant on reliability of information generated by ERP system. This finding concurs with earlier studies by Maines & Wahlen, (2010), and HassabElnaby, Hwang, & Vonderembse, (2012) who noted that reliability is an essential characteristic contributing to the usefulness of accounting information implementation of ERP software alone may not guaranteed reliability.

The finding that access to information and timely generation of reports, both measures of timeliness of information were found to have significant effect on performance of AIS while reduction of audit lag was found to have an insignificant effect reaffirmed earlier studies by Leventis, (2013) and Owusu-Ansah (2010), who concurred that timeliness of generation of accounting information is most important factor affecting the timeliness of corporate financial statement reporting.

Efficiency as a factor of accuracy was found to have significant effect on performance of AIS while completeness of information and reduction of errors were not found to have a significant effect This finding reinforces previous studies by Velcu, (2007) and Spathis & Constantinides, (2010), who concurred that accuracy of accounting information system was enhanced by ERP implementation as it requires data to be entered only once and the relevant ledgers are updated automatically.

Conclusion

The study findings revealed that ERP implementation has positive effect though not significant effect on performance of accounting information. The study thus concludes that implementation of an ERP system is an opportunity to implement improved controls and security of data which enhances reliability hence performance of accounting information. Effective use of ERP in public universities has become a powerful driver in performance of business processes as it leads to improved information access for planning and managing the institution, improved services for the faculty, students and employees, lower business risks, and increased income and decreased expenses due to improved efficiency.

The strength of ERP system is based on integration and automation which has helped in improving the information accuracy, timely generation of reports and in better decision making. A successfully implemented ERP system can be the backbone of business intelligence for an

organization, by giving management an integrated view of the business processes since it cuts across all the departments ensuring standardization of various business practices and access to real-time up-to-date data. The study further conclude that when the information that is generated by the ERP system is accurate, timely and reliable, this goes hand in hand in helping the organization to realize its goals. Following this findings, this study recommends that public universities should put more emphasis on the use of ERP across all the departments. Future studies may be conducted on the level of ERP adoption in different departments in public universities since this has a bearing on the timeliness, accuracy and reliability of AIS generated by the ERP.

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