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MEDIATION EFFECT OF SYSTEM SUCCESS FEATURES ON OPEN SOURCE ERP ADOPTION-USE AND ORGANISATIONAL PERFORMANCE

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ABSTRACT

Organisations are shifting their attention towards flexibility, savings and efficiency in order to win or to survive in the market. The emergence of open source ERP for financial institutions can be viewed as one of the most important and constructive developments that has gained momentum in recent years. Consequently, it has become crucial for many organisations in their quest to improve and enhance their competitiveness through its adoption and use. The main objective of the study was to establish the mediation effect of system success features in the relationship between open source ERP adoption-use and organisational performance of Deposit-Taking SACCOs in Kenya. Target population was 168 Deposit-taking SACCOs with sample size of 378 respondents. Questionnaire was used to collect quantitative data. PLS-SEM using smartPLS 3.2.8 was used to analyse the data. The study concludes that adoption-use of open source ERP will have significant effect on organisational performance; learning and growth, internal process, customers and financial indicators. To maintain organisational performance and sustain long term viability of the open source ERP, the service quality has to be effective has it has the largest effective size among other mediating system success features (system and information) qualities combined. The service quality components include the support staff competences, reliability and speed of attending to complaints concerning the system.

Keywords: adoption, use, organisation, performance, system features, system quality, service quality, information quality.

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1.0 INTRODUCTION

The Deposit-Taking SACCOs industry is part of the cooperative sector in Kenya, which has impacted on lives of many disadvantaged Kenyans over the years. The sector may be categorized into financial and non-financial cooperatives. Non-financial (Non-Deposit Taking) Cooperatives deal with the marketing of members' produce and services such as dairy, livestock, coffee, tea, handicrafts and many more similar cooperatives. On the other hand financial (Deposit Taking) cooperatives comprise of Deposit-Taking SACCOs, housing and investment cooperatives. In the year 2013, the Sacco Societies Regulatory Authority (SASRA) developed and issued guidelines on information management systems and places of business (supervision annual Report, 2013, 2014). The Guideline on Management Information Systems (MIS) and Information Communication Technology (ICT) infrastructure provides minimum requirements that a deposit taking Deposit-Taking SACCOs should observe in implementing MIS and related infrastructure to adequately support the deposit taking business operations. In 2014, SASRA in partnership with the Financial Sector Deepening Kenya, Commissioned a survey into core capacity and skills gaps of regulated Deposit-Taking SACCOs to gather insights and provide informed guidance on the core capacity and skills gaps in the sector requiring immediate address. The ability to provide management information system (MIS/IT) was noted as one of top three priorities among six. The implementation of ICT systems always entails both organisational and individual changes (Rogers, 1995), and therefore user adoption and establishing the use of ICT systems have proven challenging in organisations (Kwon and Zmud, 2002).

The open source enterprise resource planning (open source ERP) software offers big opportunity to deposit taking savings and credit cooperatives societies in Kenya to achieve the desired organisational performance. The cost and benefits of an ERP system are arguably the reason why Deposit-Taking SACCOs are opting to usage of open source ERP in an effort to achieve organisation performance. Although various scholars have asserted that open source ERPs have the potential to enhance organisational performance, these benefits haven't always been positive due to inappropriate adoption of open source ERP and usage, particularly by the Deposit-Taking SACCOs. These Deposit-Taking SACCOs are thought to be better placed in adopting and applying open source ERP.

1.1 Problem statement

The real value of the system can be judged from the continued usage after the system installation is over. The success of ERP systems to meet organisational goals is determined by changes in configuration and functionality considerably. With increased experience in using a system, problems come to light and

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possible improvements are recognized, leading to requests for changes and updates to the system features, what is commonly called "maintenance." These changes are the next steps in the evolving process of the life cycle of the system and they are key elements of the information system success. There is a need for researchers and practitioners for an understanding of the complex nature of open source ERP key elements for success, driven by the constantly changing role and use of information technology. There are no consensuses by researchers on critical factors set, although they define various functional variables which can contribute to successful continued ERP usage. The measures for information system success models are neither completely clear nor completely accurate. In this regard, little is also known concerning the effect of system success features namely system, information and service quality factors and how they influence open source ERPs success. Furthermore, the mediating effects of the system success features in the relationship between the open source ERP adoption-use and organisation performance has not been assessed, particularly among deposit taking savings and credit cooperatives in Kenya.

1.2 Objective of the Study

To establish the mediation effect of system success features in the relationship between open source ERP adoption-use and organisational performance of Deposit-Taking SACCOs in Kenya.

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1.3 Research Hypothesis

Ho_1: There is no mediation effect of system success features in the relationship between open source ERP adoption-use and organisational performance of Deposit-Taking SACCOs in Kenya.

1.3.1 Indirect relationship Hypotheses

To adequately address null hypothesis **Ho_1** the following null hypotheses were advanced:

$Ho_{1.1}$: There is no mediation effect of system quality factor in the relationship between open source ERP adoption-use and organisation learning and growth performance of Deposit-Taking SACCOs in Kenya.

$Ho_{1.2}$: There is no mediation effect of system quality factor in the relationship between open source ERP adoption-use and organisation internal process performance of Deposit-Taking SACCOs in Kenya.

$Ho_{1.3}$: There is no mediation effect of system quality factor in the relationship between open source ERP adoption-use and organisation customer performance of Deposit-Taking SACCOs in Kenya.

$Ho_{1.4}$: There is no mediation effect of system quality factor in the relationship between open source ERP adoption-use and organisation finance performance of Deposit-Taking SACCOs in Kenya.

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$Ho_{1.5}$: There is no mediation effect of information quality factor in the relationship between open source ERP adoption-use and organisation learning and growth performance of Deposit-Taking SACCOs in Kenya.

$Ho_{1.6}$: There is no mediation effect of information quality factor in the relationship between open source ERP adoption-use and organisation internal process performance of Deposit-Taking SACCOs in Kenya.

$Ho_{1.7}$: There is no mediation effect of information quality factor in the relationship between open source ERP adoption-use and organisation customer performance of Deposit-Taking SACCOs in Kenya.

$Ho_{1.8}$: There is no mediation effect of information quality factor in the relationship between open source ERP adoption-use and organisation finance performance of Deposit-Taking SACCOs in Kenya.

$Ho_{1.9}$: There is no mediation effect of service quality factor in the relationship between open source ERP adoption-use and organisation learning and growth performance of Deposit-Taking SACCOs in Kenya.

$Ho_{1.10}$: There is no mediation effect of service quality factor in the relationship between open source ERP adoption-use and organisation internal process performance of Deposit-Taking SACCOs in Kenya.

$Ho_{1.11}$: There is no mediation effect of service quality factor in the relationship between open source ERP adoption-use and organisation customer performance of Deposit-Taking SACCOs in Kenya.

$Ho_{1.12}$: There is no mediation effect of service quality factor in the relationship between open source ERP adoption-use and organisation finance performance of Deposit-Taking SACCOs in Kenya.

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1.4 Conceptual Framework

To comprehend adoption-use of open source ERP in the Deposit-Taking SACCOs, the information system success model of DeLone and McLean was adopted. An information system in use undergoes regular maintenance changes on its system features to sustain/ achieve organisational performance. DeLone and McLean model information system quality features of information quality, system quality and service quality of the open source ERP were evaluated as mediating dimensions. The organisation performance “net benefits” were measured using the balance score card model indicators. The BSC model has four dimensions namely financial, which is cost saving perspective; Internal Business Process which is enhanced processes perspective and information availability; Learning and Growth which is change towards achieving the vision and finally Customer which are the benefits to customers due to system usage.

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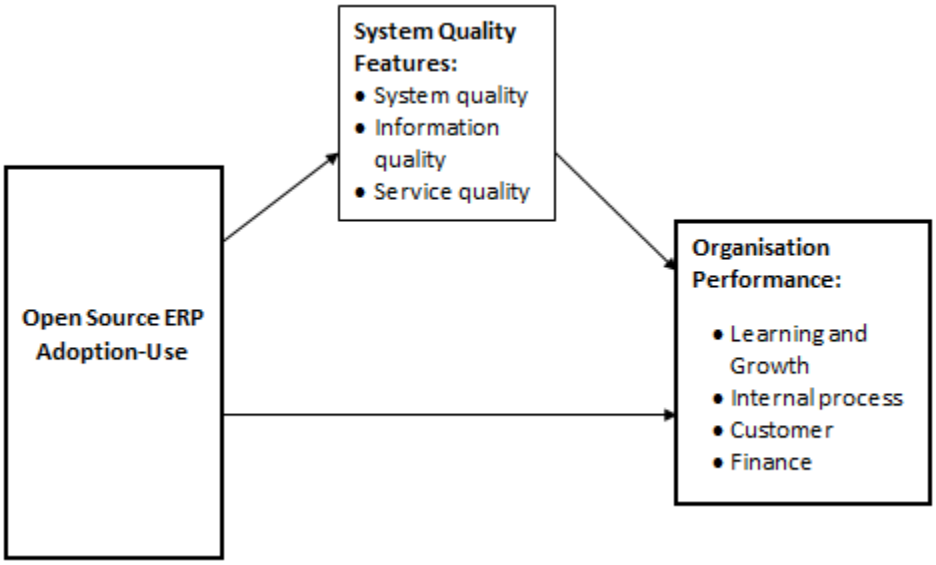

Figure 1: mediation effect of system success features in the relationship between open source ERP adoption-use and organisation performance of Deposit-Taking SACCOs in Kenya.

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2. LITERATURE REVIEW

2.1 Adoption and Use

After spending many millions of dollars and throwing the entire organisation into disruption for a year or more, the desired payoff of improved results is only possible when users fully embrace the new system. Merely rolling out the new technology, while necessary, doesn't qualify as success. Usage is the ante in the IT transition game. It is necessary but not sufficient as a measure of success. After all, what choice do users have but to use the system? The data and reports derived from a system centers on usage, not adoption. Usage information from the system logs and reports do tell us who logged in, when and for how long, what tasks were and weren't accomplished, and generally the extent to which the users permeate the system. On the other hand, true adoption is more about psyche and emotions. It's generally the extent to which users have fully embraced the new system, in a manner that leads to the behavioral changes behind improved results. True adoption is all about behavioral change- embracing the new technology to make better decisions and establish improved processes. Usage and adoption are a duality. Both are essential in that neither alone can lead to success. Usage and adoption is not the same thing but they must be recognized in duality. Adoption differs meaningfully from usage in that it is all about behaviors' which are inherent and subjective (William 2014).

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2.2 The DeLone McLean I/S Success Model

DeLone and McLean, (DeLone and McLean 1992,2002, 2003) is the most cited model for success measurement in the field of information systems (IS).The DeLone and McLean model consist of six interdependent measurements of success. System quality, information quality, use, user satisfaction, individual impact and organisational impact are the main measurement dimensions. In 2002 DeLone and McLean published a reformulated IS-success model which offered the addition of service quality and the collapsing of individual impact and organizational impact on net benefits (DeLone and McLean, 2002, Ding and Straub, 2007).

The change of the model was based on alterations in the role and management of information systems and on research contributions since publishing their original paper. The "use" was replaced by "Intention to use", which is an attitude, whereas "use" is behaviour; this new part of the model may resolve some of the process versus causal concerns that Seddon (1997) raised. But attitudes, and their links with behaviour are difficult to measure and many researchers may choose to keep "use" but with a more extensive understanding of it. The new model shows that "use" must precede "user satisfaction" in a process sense, but positive experience with "use" will lead to greater "user satisfaction" in a causal sense. That's the reason why increased "user satisfaction" will lead to increased "intention to use," and, thus, "use." As a result, "net benefits" will occur. The lack of positive benefits can lead to decreased use and possible discontinuance of the system or of the whole IS department itself (e.g. outsourcing) (DeLone and McLean, 2003). The new construct "Net benefits" is the collapsing of Individual and Organisational Impact which were mentioned in the original model of 1992. This was necessary to broaden the impact of the information system also depending on the context in which the model was used (DeLone and McLean, 2003, Wu and Wang, 2005).

The arrows between the six Dimensions of the DeLone and McLean model show the relations and interdependencies between the dimensions. System quality, for example, influences the Intention to use, Intention to use influences the user satisfaction and, as a result, the net benefits occur. If the system quality is poor, the net benefits are poor too. The 6 dimensions are the dimensions DeLone and McLean identified during their research when they were investigating the dependencies of information systems success.System quality; it's the desirable characteristics of an information system. For example: ease of use, system flexibility, system reliability, and ease of learning, as well as system success features of intuitiveness, sophistication, flexibility, and response times. Information quality; it's the desirable characteristics of the system outputs; that is, management reports.

Figure 2 : DeLone and McLean, 2003

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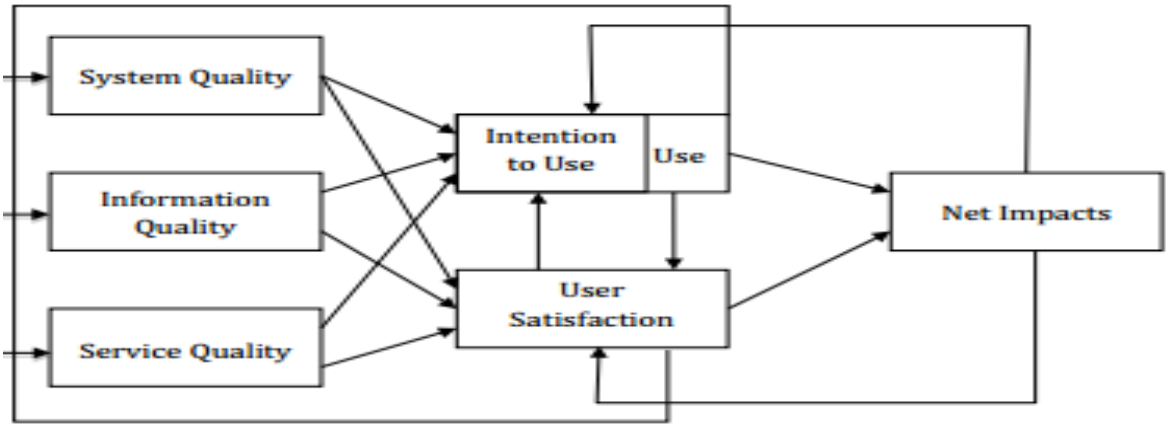

Source: DeLone and McLean IS Success Model, (2003)

For example: relevance, understandability, accuracy, conciseness, completeness, understandability, currency, timeliness, and usability. Service quality; the quality of the support that system users receive from the IS department and IT support personnel. For example: responsiveness, accuracy, reliability, technical competence, and empathy of the personnel staff. System use; the degree and manner in which staff and customers utilize the capabilities of an information system. For example: amount of use, frequency of use, nature of use, appropriateness of use, extent of use and purpose of use. User satisfaction; it's the user level of satisfaction with reports and support services. Net benefits; the extent to which Information System is contributing to the success of individuals, groups, organizations, industries, and nations. For example: improved decision-making, improved productivity, increased sales, cost reductions, improved profits, market efficiency, consumer welfare, creation of jobs, to regulatory compliance through tracking and monitoring, improved reporting and integrated information and economic development. With increased experience in using a system, problems come to light and possible improvements are recognized, leading to requests for changes and updates to the system, what is commonly called "maintenance." These changes are the next steps in the evolving process of the life cycle of the system. To capture this graphically, feedback arrows are shown leading from "Use" and "User Satisfaction" back to "System Quality," "Information Quality," and "Service Quality."

2.3 Balanced Score Card (BSC) framework

The management of ERP software consists of two main tasks, the implementation and the use of the comprehensive software afterwards (Rosemann and Wiese, 1999). The intention of the Balanced Score Card (BSC) is the supplementation of traditional financial measures with three additional perspectives – the customer perspective, the internal business process perspective and the learning and growth perspective (Kaplan and Norton, 1997).BSC approach of Rosemann and Wiese, the operational BSC, is more relevant to this research for measuring the firm performance before implementation of open source

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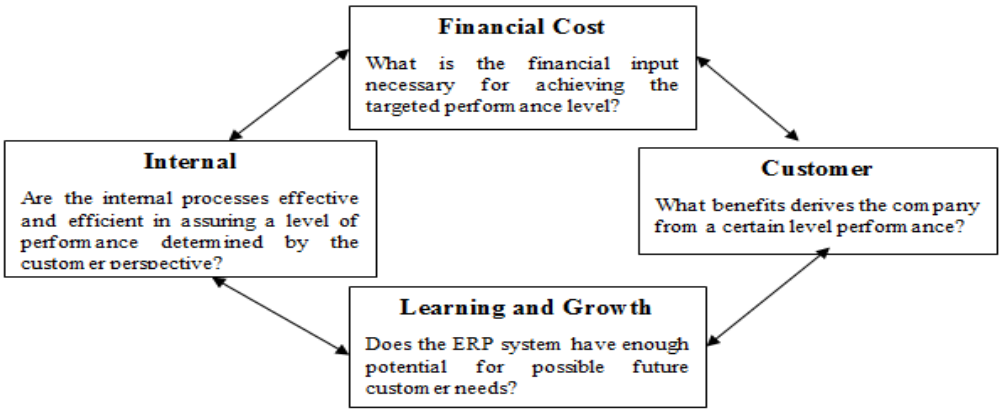
ERP and can be used for continuous customization and perfection of the open source ERP system.The most cited models for success and performance measurement in the field of enterprise resource planning (ERP) system are the DeLone and McLean, and Gable *et al.* (2003) models. The DeLone and McLean (DeLone and McLean 1992, DeLone and McLean, 2003) model, uses and is a user centered approach when trying to judge overall enterprise resource planning success. Gable *et al.* (2003) made an exploratory inventory survey which was used for model building. They built a model which was used for enterprise resource planning (ERP) system success measurement approach called the "A Priori Model". These two most commonly used models, that is; DeLone and McLean, and Gable *et al.* (2003) models, mainly focuses on ERP system measurement in an ex-post evaluation which concentrates on an evaluation of an already existing system. According to Stefanou (2011) an ex-ante evaluation is necessary because of the fact that selecting an ERP is a long time commitment and which is very costly too. It's therefore important to understand how ERP adoption influences organisational performance through analysis of the anticipated impacts of the planned ERP system prior to adoption. Balanced Score Card is an ex-ante evaluation model with four ERP measurement dimensions of financial cost, internal process, customer aspect, learning and growth aspect as shown in figure 3 by Rosemann and Wiese. On this study Balanced Score Card (BSC) model will be adopted for an ex-ante evaluation of open source ERP performance on Deposit-Taking SACCOs in Kenya.

Figure 3 : Balanced Score Card Model



2.4 Empirical review

According to Tsai *et al.,* (2015) on the their study Investigation of the mediating effects of IT governance-value delivery on service quality and ERP performance, the researchers found that an ERP system will exhibit a decreased error rate and improved performance if ERP system vendors and consultants provide good service quality. The study also found out that, value delivery provides an effective measure of ERP performance under an ITG framework. Second, it provides evidence of the partial mediating effects of value delivery between service quality and ERP performance. The study was

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conducted in Taiwan were 4366 questionnaires were sent to manufacturing and service companies listed in the TOP 5000: The Largest Corporations in Taiwan 2009. The study was conducted on proprietary ERP system thus more emphasis on quality of vendor service delivery to measure the value delivered by the ERP system however this study will be based on the open source software ERP which is acquired freely and is not provided by a particular vendor and thus removing the failures of vendor's services on the performance of the resulting adopted open source ERP by the Deposit-Taking SACCOs. On the study the mediating effect was vendors' value delivery on the relationship of ERP vendor and ERP performance however in this study the system success features will be measured to check its mediating effect on the open source ERP adoption on performance of the Deposit-Taking SACCOs.

In Malaysia Ramayah and Jason (2012) used the simplified model of DeLone and McLean (2003) to measure the system characterises, satisfaction and E-learning usage. The success of an information system can be measured through the measure of its system success features and continuance usage. Using a structured questionnaire data was collected from 250 undergraduate students from a public university in Penang, Malaysia. Data was analysed AMOS which is a structural equation modelling. The study results show that service quality, information quality and system quality were positively related to user satisfaction on continuance intention of system usage. These findings were supported by Bharatia and Chaudhury (2004) and McGill *et al*., (2003) who found that information quality and system quality as separate constructs is related to satisfaction. In summary this means that system quality has a positive relationship with user satisfaction. Information quality has a positive relationship with user satisfaction and service quality has a positive relationship with the user satisfaction. The results suggest that simplified model of DeLeon and McLean's IS success model has relatively good predictive power on user satisfaction and usage.

Simeon (2014) carried out an exploratory study of information system user satisfaction on Nigeria University of Ibadan post graduate school web portal. The study examined the influence of information system (IS) characteristics namely; system quality, information quality and service quality derived from the extended DeLeon & McLean (2003) IS success model, in addition to the influence of a hypothesized technological/infrastructural factor on postgraduate (PG) students satisfaction of the University. The study was a descriptive survey of PG students of the University of Ibadan and a sample of 385 students were selected using proportional stratified sampling technique. The result shows that all the information system characteristics; system quality, service quality, information quality, and technological /infrastructural factor in that order, significantly.

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In Kenya Makau *et al.*(2017) on their study on information quality, information systems support capability and performance of hotels in Nairobi, Kenya using information quality as a moderator discusses that The economic uncertainty and technology change requires service organizations to accelerate the replacement of information systems and add new capabilities that improve customer service and enhance their performance. The study adopted a survey design and a questionnaire was used to collect data from a sample consisted of 324 respondents picked from senior employees of hotels. The collected data were analyzed by using Pearson correlation and hierarchical regression analysis. The results indicate that information support capabilities have a positive and significant effect on hotels performance. Further, information quality has a positive moderating effect on the relationship between information support capabilities and hotel performance.

According to Abdelrahim (2016) on the publication Adoption of Information Systems (IS): The Factors that Influencing IS Usage and Its Effect on Employee in Jordan Telecom Sector (JTS): A Conceptual Integrated Model the author investigated how technological, organizational, and individual characteristics as primary factors influence the IS adoption in JTS. The author states that Adoption is conceived as a social change process in which an innovation is communicated over time among members of a social system (Ashrafi, Xu, Kuilboer, & Koehler, 2006). Adoption as the process through which an individual or other decision-making unit passes from first knowledge of an innovation, to forming an attitude towards the innovation, to a decision to adopt or not adopt new idea, and to confirmation of this decision (Rogers, 1995). In the study TAM and TOE models were used as suitable framework for the study. TAM variables perceived IS usefulness and perceived IS ease of use was used as moderating variables between the technological and individual characteristics and adoption of IS. The study found out that Perceived usefulness has moderating effect on an employee expectation that computer usage will be helpful in improving his functional duties while Perceived ease of use had a moderating on the extent to which a person believes that using a particular system with little effort.

In Nigeria Awolusi and Onigbinde (2013) on their study to investigate enterprise resource planning and organizational performance in Nigerian manufacturing firms: an empirical analysis, findings based on the survey revealed that successful ERP positively affected both performance measures in the Nigerian manufacturing firms. The study investigated the effects of the primary measures (as expressed by the ERP user satisfaction measures) on the secondary measures (as expressed by the organizational performance). 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. As emphasized by Garg (2010), Ganesh and Mehta (2010) , the ERP user satisfaction had a

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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.

In Libya Naser and Suzana (2016), examined the extent to which management accounting system (MAS) success, defined in terms of MAS effectiveness and system end-user satisfaction's items, has an intervening effect on the relationship between information quality and organizational performance. A primary survey was conducted on a group of managers who are working in bank and petroleum sectors in Libya. The result of this empirical study shows that the management accounting system usefulness is positively associated with information quality and mediates the indirect effect between information quality and organizational performance. More specific, end users' satisfaction has a mediating impact on the relationship between information quality and organizational performance. This study is limited to the effect of information quality as an independent variable on management accounting system effectiveness and organizational performance on the Libyan banks and petroleum organizations. A cross-sectional study presented in this study can establish association but not causality.

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3. METHODOLOGY

The study adopted correlational research design as it is designed to investigate factors influencing open source enterprise resource planning software adoption-use by of deposit taking savings and credit cooperatives in Kenya. The target population was the 164 deposit taking SACCOs licensed by SASRA as at 31st December 2016 and the target respondent group is senior managers for example: General Manager, Chief Accounting Officer, Procurement Officer, Human Resource Manager, Customer Service Manager, and ICT Manager with dedicated involvement in the adoption and implementation of ERP in their respective organisations. To obtain a representative sample size of the population, multi-stage sampling consisting of stratified, proportionate and convenience sampling was applied. To arrive at the appropriate sample size, Creative Research Systems (2003) formula will be used.

$$SS = \frac{Z^2 * (p) * (1-p)}{C^2} = SS = \frac{1.96^2 * (.5) * (1-.5)}{.04^2} = 600.25$$

where:

SS=Sample size

Z=Z-value (e.g., 1.96 for a 95% confidence level)

P= Percentage of population picking a choice, expressed as decimal 0.5 (50%) used for sample size needed.

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C= Confidence interval, expressed as decimal (e.g., .04=+/- 4 percentage points)

From the total target population of 984, the required sample size for an infinite population is 601, the sample size was reduced using correction formula:

New SS $= \frac{SS}{1+\frac{SS-1}{POP}} == \frac{601}{1+\frac{601-1}{984}} =$ 373.35 respondents.

A total of 378 questionnaires were self-administered to the respondents accompanied. The semi structured questionnaires were constructed using the 1-5 Likert scale type of statements, where the respondents were required to either to indicate strongly agree (5), agree (4), not sure (3), disagree (2) and strongly disagree (1). Using 8% of the sample size, a pilot test was conducted to determine the questionnaire's validity and reliability. Reliability was tested using questionnaire duly completed by thirty (30) randomly selected respondents.

4. RESULTS

Partial least square structural equation modelling (PLS-SEM) is a nonparametric statistical method that does not require the data to be normally distributed but it is important to verify and address instances of missing data as well as non-normal data. The data was first assessed for the missing values and outliers. Outliers should first be identified before running PLS-SEM (Hair *et.al,* 2014). The data collected per item in this study was within the acceptable margins of skewness of -1 and + 1 and kurtosis -2 and + 2 and satisfied (Kline, 2005).

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4.1 Measurement Model

Before evaluating causal relationship between constructs in PLS-SEM, measurement model was conducted using smartPLS 3.2.8.

4.1.1 Internal Consistency and Convergent Validity

Table 1. shows that the measures are strong in terms of their internal consistency reliability as indexed by the composite reliability (CR^c). All CR^c values are above the recommended value of 0.70. Table 1.0 also shows that all the outer loadings were above 0.70. According to Bagozzi and Yi (1988), the average variance extracted (AVE) for each measure should exceed 0.5.

Table 1. Measurement model

	Items	Loadings[a]	AVE[b]	CR[c]	Rho_A[d]	α[e]
Adoption-Usage Factor (AUF)	ExtUSG1	0.9378	0.8925	0.9803	0.9759	0.9759
	ExtUSG2	0.9358				
	ExtUSG3	0.936				
	ExtUSG4	0.9559				
	ExtUSG5	0.9592				

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	ExtUSG6	0.9434				
Learning Growth Factor (LGF)	OPerLW1	0.926	0.8635	0.9499	0.9242	0.921
	OperLW2	0.9305				
	OperLW3	0.9314				
Internal Process Factor (IPF)	OPerIP1	0.9612	0.9046	0.966	0.9499	0.9473
	OPerIP2	0.9358				
	OPerIP3	0.9561				
Customer Factor (CF)	OPCu1	0.9056	0.7247	0.8867	0.8149	0.8047
	OPCu2	0.8985				
	OPCu3	0.7392				
Finance Factor (FF)	OPFi1	0.9258	0.8612	0.938	0.9195	0.9194
	OPFi2	0.9172				
	OPFi3	0.9409				
System Quality Factor (SyQF)	ASSyQ1	0.9099	0.8853	0.9686	0.9576	0.9566
	ASSyQ2	0.9546				
	ASSyQ3	0.9617				
	ASSyQ4	0.9364				
Information Quality Factor (IQF)	ASIQ1	0.9094	0.8556	0.9467	0.929	0.9155
	ASIQ2	0.9249				
	ASIQ3	0.9405				
Service Quality Factor (SQF)	ASSeQ1	0.9318	0.8663	0.9511	0.9233	0.9228
	ASSeQ2	0.9471				
	ASSeQ3	0.9132				

a. All Item Loading >0.5 indicates indicator Reliability (Hulland,1999,p.198)
b. All Average Variance Extracted(AVE)>0.5 as indicates convergent Reliability (Bagozzi and Yi (1988); Fornell and Larcker (1981))
c. All Composite reliability (CR) >0.7 indicates internal Consistency (Gefen, et al, 2000)
d. rho_A - coefficient Dijkstra-Hensele

4.1.2 Discriminant Validity

The study employed the Fornell and Larcker (see table 2) to test discriminant validity. The results indicate that the values are not above 1.0 as recommended by Fornell and Larcker and therefore no discriminant validity.

Table 2. Forenell and Larcker Criterion

	CF	**FF**	**IPF**	**IQF**	**LWF**	**SQF**	**SyQF**	**AUF**
CF	**0.851**							
FF	0.661	**0.928**						
IPF	0.889	0.467	**0.951**					
IQF	0.395	0.391	0.409	**0.925**				
LWF	0.578	0.569	0.468	0.334	**0.929**			
SQF	0.615	0.499	0.559	0.467	0.611	**0.931**		
SyQF	0.578	0.498	0.571	0.534	0.470	0.606	**0.941**	
AUF	0.681	0.576	0.602	0.504	0.594	0.576	0.647	**0.945**

Note: LWF-Learning and Growth factor, IPF- Internal Process factor, CF- Customer factor, FF-Finance factor, AUF-Adoption-Use factor, SQF-Service Quality Factor, SyQF-System Quality Factor, IQF-Information Quality Factor

*The diagonal are the square root of the AVE of the latent variables and indicates the highest in any column or row thus this shows there is discriminant validity

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4.1.3 Structural Model Path Coefficients and Coefficient of Determination (R^2)

The results (see table 3) show the R-squared value before and after introduction of mediators. The R^2 value for the endogenous construct was above the 25% accepted level set as the threshold. The R-squared of all the endogenous (dependent) constructs increases significantly implying that the mediators plays an important part in the relationship between open source usage and all organisational performance constructs.

Table 3: R-squared for mediation

R^2 before mediation			**R^2 after mediation**		
Construct	R Square	R Square Adjusted	Construct	R Square	R-Square Adjusted
CF	0.465	0.463	CF	0.546	0.54
FF	0.332	0.329	FF	0.384	0.376
IPF	0.363	0.360	IPF	0.453	0.445
LWF	0.352	0.349	LWF	0.463	0.453
AUF	0.642	0.634	AUF	0.642	0.634
			SQF	0.332	0.329
			SyQF	0.419	0.417
			IQF	0.254	0.252

Note: LWF-Learning and Growth factor, IPF- Internal Process factor, CF- Customer factor, FF-Finance factor, AUF-Adoption-Use factor, SQF-Service Quality Factor, SyQF-System Quality Factor, IQF-Information Quality Factor

In (table 4) shows the bootstrapping test results after including mediation variables system quality factor, information quality factor and service quality factor. The resultant indirect paths are significant implying that the mediators absorbed some of the direct effects.

Table 4: Indirect Relationship Test of mediation hypothesis by bootstrapping

		Direct Effect				**Indirect Effect**				**Total Effect**				
	Hypothesis Relationship	β	|t-value| ʌ	P Values	Sig. Level	β	|t-value| ʌ	P Values	Sig. Level	β	|t-value| ʌ	P Values	Sig. Level	Mediation Type
$Ho_{1.1}$	AUF -> SyQF -> LWF	0.49	7.68	0.00	***	0.09	2.36	0.01	***	0.09	2.35	0.01	***	Partial
$Ho_{1.2}$	AUF -> SyQF -> IPF	0.39	5.98	0.00	***	0.20	4.39	0.00	***	0.20	4.39	0	***	Partial
$Ho_{1.3}$	AUF -> SyQF -> CF	0.06	8.19	0.00	***	0.15	3.07	0.00	***	0.15	3.56	0.00	***	Partial
$Ho_{1.4}$	AUF -> SyQF -> FF	0.43	6.21	0.00	***	0.13	3.07	0.00	***	0.14	3.06	0.01	***	Partial
$Ho_{1.5}$	AUF -> IQF -> LWF	0.57	10.8	0.00	***	0.02	0.78	0.43	N/A	0.59	10.70	0.00	***	Full
$Ho_{1.6}$	AUF -> IQF -> IPF	0.50	10.8	0.00	***	0.07	2.51	0.01	**	0.60	11.76	0.00	***	Partial
$Ho_{1.7}$	AUF -> IQF -> CF	0.64	12.7	0.00	***	0.03	1.44	0.15	N/A	0.68	16.12	0.00	***	Full
$Ho_{1.8}$	AUF -> IQF -> FF	0.51	8.48	0.00	***	0.07	2.65	0.01	***	0.58	10.85	0.00	***	Partial
$Ho_{1.9}$	AUF -> SQF -> LWF	0.36	5.15	0.00	***	0.23	5.42	0.00	***	0.23	5.42	0.00	***	Partial
$Ho_{1.10}$	AUF -> SQF -> IPF	0.41	5.96	0.00	***	0.18	3.95	0.00	***	0.18	3.95	0.00	***	Partial
$Ho_{1.11}$	AUF -> SQF -	0.48	7.97	0.00	***	0.19	4.68	0.00	***	0.19	4.68	0.00	***	Partial

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$Ho_{1.12}$	> CF AUF -> SQF -> FF	0.42	6.57	0.00	***	0.15	3.14	0.00	***	0.15	3.14	0.00	***	Partial

Note: β- beta coefficient, *** p≤0.01, LWF-Learning and Growth factor, IPF- Internal Process factor, CF- Customer factor, FF-Finance factor, AUF-Adoption-Use factor, SQF-Service Quality Factor, SyQF-System Quality Factor, IQF-Information Quality Factor

4.2. The mediation effect of system success features in the relationship between open source ERP usage and organisational performance of Deposit-Taking SACCOs.

The study tested the mediating effects of system success features of system quality, information quality and service quality in the relationship between open source ERP and the organisational performance. Software system is expected to undergo change after continued change occasioned by technological, organisational, and environmental and people needs. These changes define the suitability of the system for the organisation competitiveness and sustainability of the system for the organisation over time. The system quality features will include; user satisfaction with the speed of the open source ERP after continued use over time, ease of system recovery and restoration after failure, and ease of interaction with the software user access interface (human computer interaction) that measures up to global standards. The information quality features focuses on the quality of data output which will include; timeliness, accuracy and relevance of the information produced by the open source ERP after continued use and subject to changes. The service quality features will involve the support staff technical competence, speed of attending to user issues and complaints and reliability or the consistency of the support staff on continued support of the system.

The hypothesis to be tested in this case was;

Ho_1: There in no mediation effect of adopted software system success features in the relationship between open source ERP adoption-use and organisational performance of Deposit-Taking SACCOs in Kenya.

Given the three distinct system success features tested in this study and the results (see table 5) it was necessary to disintegrate this null hypothesis to different alternate hypotheses to reflect the results of test carried out.

Partial Mediation hypotheses:

$H_{1.1}$: There is mediation effect of system quality factor in the relationship between open source ERP adoption-use and learning and growth performance of Deposit-Taking SACCOs in Kenya.

$H_{1.2}$: There is mediation effect of system quality factor in the relationship between open source ERP adoption-use and internal process performance of Deposit-Taking SACCOs in Kenya.

$H_{1.3}$: There is mediation effect of system quality factor in the relationship between open source ERP adoption-use and customer performance of Deposit-Taking SACCOs in Kenya.

$H_{1.4}$: There is mediation effect of system quality factor in the relationship between open source ERP adoption-use and finance performance of Deposit-Taking SACCOs in Kenya.

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$H_{1.6}$: There is mediation effect of information quality factor in the relationship between open source ERP adoption-use and internal process performance of Deposit-Taking SACCOs in Kenya.

$H_{1.8}$: There is mediation effect of information quality factor in the relationship between open source ERP adoption-use and finance performance of Deposit-Taking SACCOs in Kenya.

$H_{1.9}$: There is mediation effect of service quality factor in the relationship between open source ERP usage and learning and growth performance of Deposit-Taking SACCOs in Kenya.

$H_{1.10}$: There is mediation effect of service quality factor in the relationship between open source ERP adoption-use and internal process performance of Deposit-Taking SACCOs in Kenya.

$H_{1.11}$: There is mediation effect of service quality factor in the relationship between open source ERP adoption-use and customer performance of Deposit-Taking SACCOs in Kenya.

$H_{1.12}$: There is mediation effect of service quality factor in the relationship between open source ERP adoption-use and finance performance of Deposit-Taking SACCOs in Kenya.

Full mediation hypothesis;

$H_{1.5}$: There is mediation effect of information quality factor in the relationship between open source ERP adoption-use and learning and growth performance of Deposit-Taking SACCOs in Kenya.

$H_{1.7}$: There is mediation effect of information quality factor in the relationship between open source ERP adoption-use and customer performance of Deposit-Taking SACCOs in Kenya.

Table 4 shows that there were 12 partial mediation effects where the direct effect and the indirect effect of the independent (exogenous) construct and the dependent (endogenous) construct are both significant where their values are, the |t-value| is above 1.96 and p-value is below 0.05 (<0.05) for all significant partial mediation effect. The results (table 4) also show that there were two full mediations through information quality factor to learning and growth performance factor and through information quality to customer performance factor where their indirect effect were |t-value| is below 1.96 and p-value is below 0.05 (<0.05) and the direct effect is |t-value| is above 1.96 and p-value is below 0.05 (<0.05) for all significant full mediation effect.

The R-square (see table 3) value which measures the model's predictive accuracy shows that before and after the introduction of mediators, the endogenous construct changed from: 46.4% to 54.6%, 33% to 38.4%, 36.2% to 45.2% and 35.2% to 46.2% for customer, finance, internal process and learning & growth organisation performance factors respectively. These means that open source ERP usage has a positive correlation with system success features (system, service and information) qualities and with organisational performance. Therefore an increase in either of the system success features qualities will see an increase is usage and organisational performance of the Deposit-Taking SACCOs. Thus the Deposit-Taking SACCOs should focus more on Service Quality when attempting to increase the organisation performance through the usage of the open source ERP, this is because service quality has the biggest effect across all the organisational performance factors compared to other two system success features (system and information) qualities combined when each quality is tested individually. This study results supports previous research findings (Tsai *et al.,* 2015) who confirms that enterprises should focus

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on service quality factor more when attempting to predict ERP performance this is because service quality will affect system quality and system quality will affect information quality. While the results of this study advances on previous research on information systems success and performance by (Makau *et al.,* 2017; Naser and Suzana 2016; Awolusi and Onigbinde 2013; Simeon, 2014; Ramayah and Jason 2012; Ashrafi, Xu, Kuilboer, & Koehler, 2006; McGill *et al*., 2003; Bharatia and Chaudhury 2004) who considered the effect of system quality, information quality and service quality factors on the success of information system and its impact on organisational performance.

5. CONCLUSION AND RECOMMENDATION

The study concluded that the system success features mediated the usage and performance of the open source ERP. Therefore to achieve long-term success and performance of the system there is a need of continuous improvement of the system feature namely system quality, service quality and information quality inherent within the open source enterprise resource planning software and more emphasis on service quality as it has overall effect to other two system success features namely system quality and information quality.

Based on the study findings, several policies aimed at enhancing the performance of the Deposit-Taking SACCO subsector using open source enterprise resource planning can be formulated; Firstly, the management boards of Deposit-Taking SACCOs in Kenya should formulate strategies aimed at increasing utilization of open source ERP as they have been shown to contribute positively towards enhancing SACCOs' performance. Forums for awareness of open source ERP by SACCOs' management should conducted to encourage buy-in by SACCO staff. In addition, management of Deposit-Taking SACCOs should offer specialized training for the ICT staff to learn more about open source ERP development and implementation. Increased adoption and use of open source ERPs within SACCOs should be encouraged by the SACCO's management to enhance their performance.

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