

## **Enterprise Resource Planning Systems Considerations and Implementation in State Corporations in Nairobi City County, Kenya**

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### **ABSTRACT**

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*Enterprise Resource Planning (ERP) was a computer application package that automated processes in a business institution to make them easy to use, and also played a critical role in finance functions, human resource functions, supply chain management functions, administration management, ICT functions and project planning functions. There had been wide usage of ERP system in developed countries, while unindustrialized countries were slow in implementing ERP systems. The study sought to examine usage of enterprise resource planning systems in state corporations in Nairobi City County. The study observed the resource-based theory, the change management theory and the technological acceptance model. The research study attempted to explain how ERP characteristics, management support, expertise of employees and, user attitude impact on ERP implementation. Findings from this study would be useful to different levels of management, decision makers and procurement officers. The target population was 796 employees from KPLC, KenGen, NBA and KICC from which a sample size of 343 was obtained using the Slovin's formula randomly selected using systematic sampling method to obtain a representative sample from all the departments in each corporation. Data collection was done by dropping of questionnaires at the organizations and sending by email to each respondent, and letting the respondents fill them before the researcher picked them up, and received them back via email. The collected data was then be subjected to descriptive and regression analysis. Findings from the study revealed that all the four independent variables namely: ERP characteristics, user attitude, management support and employee expertise contributed positively towards influencing ERP implementation. The beneficiaries of this study were the management who were able to learn on the successful ERP systems considerations and implementations in their organisation.*

**Key Words:** *Enterprise Resource Planning Systems, ERP, Project Implementation, State Corporations, Nairobi City County*

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### **1. INTRODUCTION**

Enterprise resource management system is a computer application that functions in the incorporation of business information and activities to generate a sole system whose capability can be utilized collectively within an organization. The software allows the combination of several packages together to enable business management while at the same time allowing automation of other functions like as planning of products, processing, sales and advertising (Beal, 2015). The integrated system covers functions of an organization like logistics, finance, production, human resource and accounting by organizing and integrating business processes, operations and information to optimize exploitation of available resources such as labour,

finances and machinery (ICAI, 2008). The system enables the use of one database, where all the packages and information can be accessed. Businesses will ideally use a combination of different modules available on the ERP software to allow them to run and manage businesses. Some of the modules available function in supply chain management, distribution process management, management of human resources and payroll, accounting and financial applications, employee lifecycle automation, improvement of financial data accuracy, enhanced project planning and business needs assessment (NetSuite, 2015).

The optimal application of an ERP system like any large project is dependent on various considerations. The Standish Group surveyed approximately 8000 applications of an ERP system usage in different organizations and found that only 16 percent were successfully used. The significant risks attaching to technology investments discourage many firms from committing resources to enhance their performance into the future (Holsapple and Sena, 2008). This is understandable as most organizations fail to realize or to appreciate the value of investments in IT (Nelson et al 2009). Despite this, ERP systems are the system of choice in the complex environment of globalization and they currently represent a firm's largest IT investment (Chung and Snyder, 2010). The estimated annual expenditure on ERP systems is \$50 billion (Jessup, 2009). Such investments are more likely to result in competitive advantage if they result in the transformation of business processes rather than just in the automation of such processes (Lundegard, 2010). Firms in the USA appreciate that disconnected and stand-alone business information systems cannot support important business functions in firms (Sentell, 2009). This is considered a prime driver of the embrace of an ERP system (Davenport, 2009). The principal reasons why firms in Europe use ERP systems are to support and to unify their global operations to standardize business processes by using best business practices in the software (Boudreau and Robey, 2009). By 2009 a sum of 53,000 companies or corporations globally had confirmed the use of these systems. SAP, which currently boasts the largest market share of the software holds about 33 percent of the market (Holsapple and Sena, 2008). The other primary manufacturers include J. D. Edwards, PeopleSoft and Oracle.

A significant number of organizations in Kenya were recorded to have implemented ERP systems. ERP had become a critical tool for national and individual empowerment, enhancement, growth and realization of services. Debela (2009) highlighted that automation of activities in business setups had been affecting the workers in the blue collar sector. Employment of an ERP system at the workplace resulted in improvement in the delivery of services in civil service because of the heightened processing quality, service delivery and utmost efficiency in all fields involving computer knowledge. ERP was also relevant to individuals in addition to its use in private and public organizations. It had been used to support additional functions in organizations including coordination, reporting and staffing, planning, directing, controlling and budgeting. In the last 15 years, ERP has remained Kenya's top development agenda as evident in the country's National plans and other government initiatives such as the E-Government Strategy (2004-2009) which provide a roadmap on ERP usage. In 2012 the Minister of State for Civil service in Kenya said automated office systems are a representation of designed approaches of operating businesses and interactions via networks ranging from packages such as fax transmission, teleconferencing services, generating correspondence for word processing and emailing systems from person-to-person interaction. The greatest consequence resulting from upgrades to ERP is not enhancement of secretarial and managerial duties but taking control over handling business operations (Canning, 2008).

In November 2016, the Kenya revenue authority partnered with SAP to implement enterprise resource planning. According to the partnership deal, KRA is expected to benefit through improved reporting and data quality reduced operational costs, scalability and enhanced customer relations. This partnership aimed to maintain a dynamic, proficient and uncorrupted e-government whose judgments and choices are based on verifiable data (Rehorn, 2016). Additional expectations from the use included accelerated and revolutionized decision making. Each government procedure would be reliant on a SAP HANA program that simplifies IT environment through the integration of data into a single platform thereby making it possible for better data management. This implementation was a vital step toward the achievement of the vision 2030 goals set by the government to convert Kenya into a mechanizing middle-income economy by 2030.

The inspectorate of Kenyan's state corporations as legislated under the stated Corporation act of Kenya indicates that there are more than 220 state corporations in Kenya (Inspectorate of State Corporations, 1997). This research study shall focus on four state corporations in Kenya namely: National Biosafety Authority, Kenyatta International Convention Center, Kenya Power and lighting Company and KenGen. These four corporations have different properties and characteristics making them the ideal choice for the study. KenGen is a leading electric power generating company that produces three quarters of the country's electricity from different energy sources such as geothermal, hydro, wind and thermal. Recent developments have seen consumption of energy from this plant to be geothermal 47 percent, hydro 39 percent, thermal 13 percent and wind energy 1 percent. The National Biosafety Authority is an organization created by the government of Kenya in 2009 to exercise general supervision and control over the handling, transfer and usage of genetically modified organisms produced through manipulation of genetic materials of organism. The organization therefore attempts to regulate research and any commercial activities involving genetically modified organisms. KICC is a state corporation established to promote business Meetings, Incentives travel, Conferences and Exhibitions. Kenya Power and lighting company KPLC is a government controlled stake with 50.1 percent shareholdings and 49.9 percent of private sector; KPLC is the sole controller of electricity transmission, distribution and sells power to over 6.2 million customers in Kenya.

## **2. STATEMENT OF THE PROBLEM**

Modern companies have vastly invested in complex IT infrastructure such as ERP systems. Despite having a myriad of benefits, over two-thirds of projects under the support and operation of ERP systems do not succeed (Chang, Cheung, Cheng, & Yeung, 2008). Further examinations of the factors that are likely to cause these problems indicate that they are of technical and behavioural nature. These problems include: employee retention (many employees leave the organization after implementation of ERP), insufficient testing (as a result of high testing costs that discourage proper testing of the system), inadequate training (staff may not be properly trained on use of the system), implementation time (may take too long to implement and therefore raises operation costs), and low investment in internal hardware (resulting in a slow and unproductive system). It was therefore imperative that organizations were aware of the challenges likely to be faced during use of ERP systems, and consequently, understand how to prevent them. This study therefore attempted to address the influence of various factors towards the application of ERP systems in state corporations and potentially identify ways to avoid such problems.

ERP systems could be distinguished from other technological innovations as they were more complex and were usually accompanied with a myriad of social-technological hurdle encountered during their use and application. Different factors ranging from organizational characteristics, managerial staff influence and individual characteristics contributed differently towards effective operation of an ERP system. These aspects of the ERP system had different weights on how they impacted ERP considerations and implementation. Unfortunately, no studies had been conducted to show the order of precedence of these aspects in terms of their importance. In other words, we were not aware which considerations or aspects should have been given the most significance and which aspect should have been given the least significance. As a result, organizations did not know which areas of the ERP systems required greater allocation of funds as compared to others. This study therefore, provided insight on which aspects of the systems to give more attention as their contribution to successful implementation of the ERP system is more.

### **3. OBJECTIVES**

To determine influence of the ERP systems considerations and implementation in state corporations in Nairobi City County.

Specific objectives were:

- i. To investigate the influence of ERP characteristics on its implementation in State Corporations in Nairobi City County.
- ii. To find out the effects of ERP management support on implementation in State Corporations in Nairobi City County.
- iii. To evaluate the relationship between ERP expertise and its implementation in State Corporations in Nairobi City County.
- iv. To assess the effect of ERP user attitudes and implementation in State Corporations in Nairobi City County.

### **4. THEORETICAL REVIEW**

#### **4.1 Change Management Theory**

Organizational change occurs when organizations make transitions from one state to another focused on achieving a future target. Introduction of change in organizations must be done in such a manner to minimize the resistance of employees while concurrently maximizing the effectiveness of this change (Ian, Richard, & Gib, 2009). Changing technology in organizations, therefore, requires elaborate strategic changes and smooth incorporation and engagement of the management for successful implementation. Change management is a key element during introduction of an ERP system in organizations. Kotter's management theory outlining an eight steps by Kotter in 1995 states that employees accept change after their leaders have created a campaign that convinces them of the importance of change. In this model, for change to be effective, several steps have to be followed including: enhancing urgency for change, building a team devoted to change, developing a vision for change while effectively communicating this need, training and capacity building of employees thereby empowering them to accept change and eventually making the change permanent (Kotter, 1995). These steps are progressive and begin by creating an environment for change, followed by engaging the relevant organization and finally implementing and sustaining the change (Martin, 2014). Creating a conducive environment for change includes creating a sense of urgency about certain tasks to create change

owing to an existing crisis or problem such as rising costs, budgets, unsatisfied customer etc. This urgency would then result in putting together of a committed team focused on delivering the transformational change. This team creates a vision for the organization, and develop strategies showing how it can be achieved step-by-step. All logistics are also prepared beforehand. Kotter illustrated further that this was followed by enabling and engaging the whole organization by communicating the idea to all other employees, empowering the employees through training, creating favourable structures and policies. Finally, the process was complete when the system was implemented and all employees accepted the change and were ready to stick with the change. Use of ERP systems are mainly prompted by such problems as high operation costs within companies and this would encourage their use. Such problems become the urgent change that should be solved. This creates a progressive course of action from the management which has to include managing the implementation of this change within the organization. Without change management achieved through Kotters' action, ERP use can prove to be futile and non-beneficial to the company. Introducing an ERP system in an organization is a big change that brings about lots of changes in organizational operations. Such changes may affect how employees perform their duties and roles in the workplace. This theory, therefore informed how managing change could be effected within the organization to reap maximally from the new system.

#### **4.2 Resource-Based Theory**

An ERP system is a “key resource” in any institution (Houtzeel, 2012). The resource-based theory proposes that the approach with which resources are utilized in a company determines creation of a competitive advantage (Barney, 2010) in an organization and improve performance. This theory is explained along two attributes in terms of management of resources in organizations: resource diversity and resource immobility. Resource diversity implies that if a company or organization owns a resource possessed by other several competing companies, then that resource cannot give the firm a competitive edge. Resource immobility is a resource hard to acquire by other competing firms due to high development, acquiring or its associated costs. The competitive advantage of a company is determined using these two assumptions (Mata, Fuerst, & Barney, 1995).

According to this theory, a firm’s practices in the management of human capital can impact meaningfully to maintaining a competitive advantage through forming unique skills and knowledge and culture difficult to copy (Afiouni, 2007). Therefore, by ensuring resource diversity (through improvement in range of knowledge and skills) and resource immobility (culture of the working environment), it creates a viable competitive advantage can be crafted and preserved. According to resource-based theory, the insubstantial assets form main source for enhancing the growth of an enterprise. Therefore, intellectual capital has been researched by many to inspect the effect of intangible assets on operations of a business. However, majority of these investigators concentrated on the impact of intangible assets by individuals on performance while at the same time overlooking the effects of specific elements of the assets. In conclusion, resources within any organization are crucial elements that need to be carefully planned so as to improve, develop and preserve its competitive advantage. Resource-based theory formed a fundamental concept of enterprise resource planning through the creation of value addition and a sustainable competitive advantage of any firm by allowing growth of human capital.

### **4.3 Technology Acceptance Model**

In this model, Davis (1985) stated that use of technology is influenced by apparent importance, ease of use and the perspective towards using new technology. In his model, Davis explained that the most influential factor towards acceptance or rejection of technology was the user's attitude. This attitude is in turn induced or manipulated by importance of that technology or ease of use as perceived by its users. In his model, he defines perceived usefulness as the level to which a person is convinced that an application improves their job performance. He further terms perceived ease of use as the level to which a person imagines that an application would be free of physical effort (Davis, 1985). The technology acceptance model offers a crucial explanation to identify the influence of user beliefs, attitudes and intentions in acceptance and technology use in an organization.

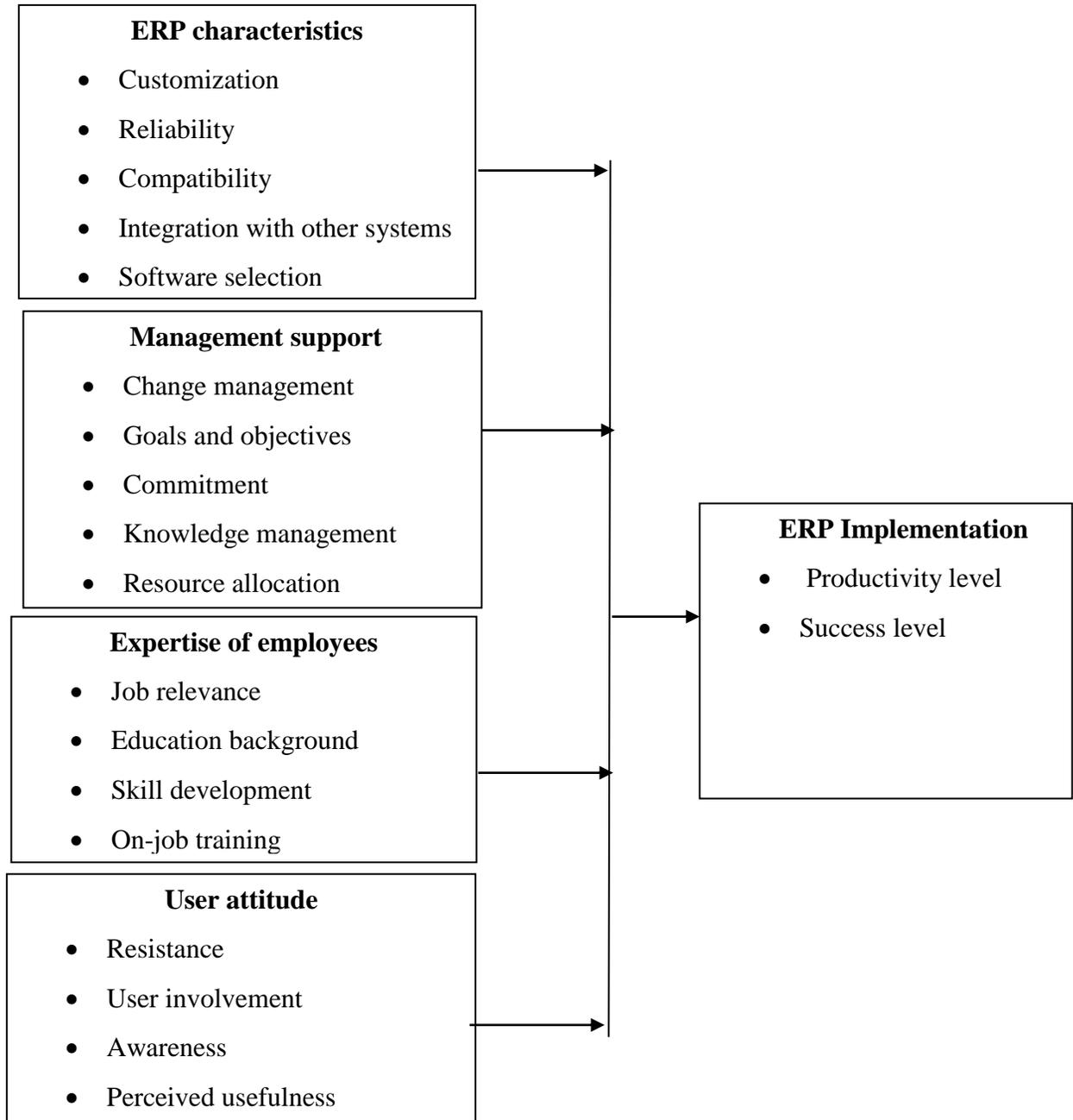
Studies have identified that ERP failures in organizations have partly been attributed to hesitancy and opposition by users to embrace and use the ERP system (Bradley & Lee, 2007). Perception and attitudes of users in organizations are shaped by an individual's level of experience, competence and proficiency in using computers, personal innovativeness and anxiety towards computers (Sternad & Bobek, 2013). In this study, therefore, the attitude of staff performed a critical duty in acceptance and usage of technology, which in turn influenced the employment and use of the ERP systems in an organization. A poor attitude towards ERP systems was a reason for unsuccessful implementation, whereas a good attitude towards the system has an influence towards successful usage and implementation of the system.

## **5. CONCEPTUAL FRAMEWORK**

A conceptual framework is an elaborate relationship among variables. Independent variables in this study shall be ERP characteristics, management support, expertise of employees and user attitude and the dependent variable shall be successful ERP Implementation and, increased productivity. In the study, the dependent variable was successful considerations and implementation of ERP while the independent variables were ERP characteristics, user attitude, management support and employee expertise

**Independent Variables**

**Dependent Variable**



**6. RESEARCH METHODOLOGY**

A descriptive research design was used in this study since it utilized questionnaire that were used to capture all the demographic characteristics of respondents as well as their responses on the variables measuring both dependent and independent variables. The target population of the study was staff from all leadership capacities, ICT experts and staff who are the end users. The

total population of each of the three state corporations was obtained, and sampling was done in each respective corporation respectively.

A target sample size used was based on statistical calculations which took into account 95 percent confidence, a margin error of 5 percent using the Slovin’s formula (Cochran, 1977). This provided an adequate number of participants to allow for meaningful explanatory insights and conclusions to be drawn. Random sampling was used to determine the respondents to be interviewed. Data collection was done using questionnaires. The questionnaires sought to collect both qualitative and quantitative data. Questions were mostly of closed-ended and they were recorded on a Likert-type scale of 1 to 5. Descriptive statistics and regression analysis was used to analyse data.

## 7. DATA ANALYSIS RESULTS

Regression and correlation analysis was used to estimate the relationship among variables. ERP implementation will be regressed against four independent variables namely ERP Characteristics, Management Support, Expertise of employees, and User attitude.

**Table 1: Correlation analysis**

		ERP success	Management support	ERP characteristics	Employee expertise	User attitude
<b>Pearson Correlation</b>	ERP success	1	0.276	0.261	0.28	0.253
	Management support	0.276	1	0.26	0.254	0.251
	ERP characteristics	0.261	0.26	1	0.272	0.299
	Employee expertise	0.28	0.254	0.272	1	0.266
	User attitude	0.253	0.251	0.299	0.266	1
<b>Sig. (1-tailed)</b>	ERP success	.	0.00	0.00	0.00	0.00
	Management support	0.00	.	0.00	0.00	0.00
	ERP characteristics	0.00	0.00	.	0.00	0.00
	Employee expertise	0.00	0.00	0.00	.	0.00
	User attitude	0.00	0.00	0.00	0.00	.

Correlation analysis in table 1 revealed that all independent variables had a positive correlation towards the dependent variable. The strength of the relationship of each independent variable was observed to be between 0.10 and 0.29, an indication that the strength of each independent variable to the dependent variable was small.

**Table 2: Model Summary<sup>b</sup>**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.400 <sup>a</sup>	0.16	0.15	0.42469

*a. Predictors: (Constant), User attitude, Management support, Employee expertise, ERP characteristics*

*b. Dependent Variable: ERP success*

From table 2 for model summary, R squared value of 0.16 was an indication that our model which included user attitude, management support, employee expertise and ERP characteristics explained about 16 percent of the variance in ERP success.

**Table 3: ANOVA<sup>a</sup>**

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	11.608	4	2.902	16.09	.000 <sup>b</sup>
	Residual	60.962	338	0.18		
	Total	72.569	342			
a. Dependent Variable: ERP success						
b. Predictors: (Constant), User attitude, Management support, Employee expertise, ERP characteristics						

The variance explained in table 3 is further supported by table 4.10 that tests the null hypothesis that multiple R in the population equals 0. The model indicates a statistical significance (sig=0.000) which is an indication that  $p < 0.0005$ .

**Table 3: Coefficients<sup>a</sup>**

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0 percent Confidence Interval for B		Correlations			Collinearity Statistics	
	B	Std. Error	Beta			Lower Bound	Upper Bound	Zero-order	Partial	Part	Tolerance	VIF
1 (Constant)	1.818	.229		7.926	.000	1.367	2.269					
Management support	.139	.044	.167	3.135	.002	.052	.226	.276	.168	.156	.875	1.143
ERP characteristics	.113	.046	.134	2.470	.014	.023	.202	.261	.133	.123	.847	1.181
Employee expertise	.141	.045	.168	3.130	.002	.052	.230	.280	.168	.156	.864	1.157
User attitude	.109	.046	.126	2.336	.020	.017	.200	.253	.126	.116	.853	1.173

a. Dependent Variable: ERP success

From table 3, collinearity statistics indicated by tolerance and VIF explain the variability of each independent variable not explained by other independent variables in the same model. High tolerance values greater than 0.8 for all independent variables is an indication that multiple correlation between independent variables is low. VIF values are also low (<10) suggesting that there is no multicollinearity between independent variables. Similar findings were obtained in studies by (Stahl, 2006; Scorța, 2009; Finney & Corbett, 2007; Vandaie, 2008; Hawari & Heeks, 2010). Standardized B values in coefficients table revealed that employee expertise had the strongest contribution to explaining the dependent variable with a B value of 0.168 while user attitude had the least contribution in explaining the dependent variable with a B value of 0.126.

Using unstandardized B values in table to construct a regression equation, the equation below is constructed:

$ERP\ success = 1.818 + 0.139\ Management\ support + 0.113\ ERP\ characteristics + 0.141\ Employee\ expertise + 0.109\ User\ attitude$ . Evaluating the column marked Sig. explains whether each variable provides a significant contribution to the equation. At 5 percent significance, all variables had  $p < 0.05$  meaning that all variables had a significant contribution to the equation.

## 8. CONCLUSIONS

Characteristics of an ERP system were revealed to play an important role in selection and implementation of an ERP system. ERP characteristics ranged from hardware capabilities, software customized according to company specifications, reliability of the software during its use, compatibility of the software with other existing software or applications already in use within the company and the ability to integrate the ERP system seamlessly into the company. On overall, respondents revealed that ERP systems characteristics influenced implementations with majority indicating that it affected to a great extent and a very great extent. Regression analysis also revealed ERP system characteristics had a small positive correlation with ERP success. The strength of relationship when evaluated in the coefficients table revealed that contribution of ERP characteristics at 95 percent confidence was significant in explaining the dependent variable, ERP success. Management support in the organization has a direct effect on how an ERP system is implemented since decisions made by the management affect implementation of the system. Implementation of ERP becomes easily successful when the management fully supports it while inadequate support consequently leads to failure. On overall, most respondents indicated that management support played a key role in implementing ERP with most revealing that it impacted to a great and very great extent. Regression analysis revealed there was strong and positive relationship between the ERP system characteristics and ERP success. Results also revealed that at 95 percent confidence, the contribution of ERP characteristics towards explaining the dependent variable, ERP success was significant.

Employee knowledge and experience was measured by evaluating various aspects affecting and employee performance at the workplace including job relevance, on-job training, education background and skill development. On overall, more than half of the respondents indicated that employee knowledge and experience influenced ERP implementation with most indicating it did to a great extent and a very great extent. Regression analysis revealed that employee expertise had small positive contribution with ERP success. At 95 percent confidence, this contribution was revealed to be significant as shown by  $p\text{-value} < 0.05$ . Standardized B values indicated that employee expertise was the greatest contributor to ERP success. User attitude determines an employee's interest in using an ERP system. A positive attitude will positively influence system usage while a negative attitude will negatively influence implementation of an ERP system. In general, most respondents indicated that a user's attitude influenced implementation of ERP system in an organization, as shown by the respondents stating that user attitude impacts to a great extent and a very great extent. Regression analysis revealed that user attitude had a positive correlation towards ERP success. This relationship when evaluated using  $p\text{-value}$ , it was found to be less than 0.05 indicated that at 95 percent confidence, the contribution by user attitude to ERP success was significant. Further analysis revealed that user attitude provided the least contribution to ERP success as compared to the other three independent variables.

## 9. RECOMMENDATIONS

It was revealed that all independent variables used in study contributed positively towards usage and implementation of ERP systems in the workplace. It would therefore be recommended that employee knowledge and expertise needed to be concentrated upon as it was the greatest contributor of ERP implementation. Some of the key aspects of employee knowledge included job relevance, on-job training, education background and skill development. All these factors if well managed to improve capacity of staff, would significantly result in improved ERP usage. On the other hand, improving on the other aspects such as user attitude, ERP characteristics and management support would also improve usage of ERP in organizations.

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