

Organizational Attributes and Implementation of Enterprise Resource Planning: A Case of Kenya Medical Research Institute, Kilifi County

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ABSTRACT

ERP technology has been embraced as an enterprise-wide package to integrate all necessary business functions into a single system with a shared database. It enhances decision making in business process and systemically harmonizes the activities of sales and marketing, manufacturing processes, operational management, product and service logistics, product purchasing, financial management, product development, and management of human resources. The study examined organizational attributes influencing implementation of enterprise resource planning in a medical research institute in Kenya. The study sought to explore the influence of top management support, implementation team, user support and resource availability on ERP implementation at KEMRI-Wellcome Trust research programme. The study used descriptive survey as research design. The target population was employees of KEMRI Wellcome Trust and Technobrain Kenya, the consulting firm. Data collection methods used were questionnaires. A preliminary study was carried out to test the rationality and reliability of the questionnaire. Considering the study was descriptive in nature, data was analysed using descriptive statistics like frequencies and tables. Linear regression model was also used to validate if the relationship between the independent variables and the dependent variable is statistically important. The regression indicated that ERP implementation (the dependent variable) was highly influenced by top managements support, implementation team, user support and resource availability (the independent variable). Conclusively, the findings suggested that user support, resource availability, and top management had a central role in implementing effective ERP plans.

Key Words: Organizational Attributes, Implementation of Enterprise Resource Planning, ERP, Kenya Medical Research Institute

DOI: 10.7176/ijcab.v3iII.20, URN urn:nbn:de:0000ijcab.v3iII.201

Cite this Article:

Kaaria, S., & Njuguna, R. (2019). Organizational Attributes and Implementation of Enterprise Resource Planning: A Case of Kenya Medical Research Institute, Kilifi County. *International Journal of Current Aspects*, 3(II), 231-242. <http://journals.ijcab.org/journals/index.php/ijcab/article/view/20>

1. INTRODUCTION

Previously, firms have been functioning in structures of separated functional fields or departments. In this way, every department operate independently. Thus, we might conclude that what happens in one department is not closely related to other departments. However, Monk et al (2009) cite that these departments are interdependent, each requiring data and information from others. Enterprise Resource Planning (ERP) is one of the latest technologies that many organizations have undertaken (Kumar, 2003). Cardoso, Bostrom and Sheth (2004)

define an ERP system as an enterprise-wide package that integrates all necessary business functions into a single system with a shared database. Wallace and Kremzar (2001), define ERP as a systematic arrangement of management procedures that span an entire enterprise and that are meant to maintain an equilibrium between demand and supply by adjoining clients and suppliers into a single supply chain. Additionally, ERP is a decision-making business process that systemically harmonizes the activities of sales and marketing, manufacturing processes, operational management, product and service logistics, product purchasing, financial management, product development, and management of human resources. The basis for this integration is to enable people run businesses with prime focus being on improved customer service and higher market productivity while lowering costs and inventories. Wallace and Kremzar (2001) also pay homage to the role of ERP in providing a firm basis for effective e-commerce. The ERP gamut exists within highly customized extremes to suit the needs of each organization based on existing parametric and resource-based limits. Pragmatic business-based evidence points to ERP as the most ground-breaking innovation in corporate technology over the past two decades. Business model experts indicate that a significant failure rate has scourged most ERP implementation programs in the modern business scheme due to ineffectiveness and ambiguity of program outcomes.

In Australia, Dagher and Kuzic (2011) observes that many companies, large and medium have adopted ERP systems while 50% of the small firms have also engaged in adoption with many other implementing ERP systems. Most of these companies implement ERP systems due to business factors, need to coordinate their various operations, and need for efficiency moreover, this information age has made it critical for firms to be able to manage its knowledge effectively in decision making and in operational planning. However, the ERP implementation by various Australian firms is affected by various organizational and external factors. The critical organizational attributes affecting implementation include user engagement, top management support, resource (human and financial) availability and knowledge management. In Germany, interviews with ERP systems consultants and managers of several SMEs revealed that though ERP implementation does not have a direct link to firm performance, adoption of ERP provides the business with efficiency in planning and strategic management which provides it with competitive advantage in the long term (Leyh, 2014). On the factors influencing implementing of ERP systems, Leyh (2014) posits that though there are various critical success factors (CSFs), ERP systems tests and organizational fit of the ERP system seemed to be of more importance in the German context than even competence in project management and top management support. In India, advancement in technology, people and production technology has necessitated various manufacturing companies to adopt ERP systems. Upadhyay, Jahanyan and Dan (2011) posits that various micro, small and medium enterprises (MSMEs) had adopted ERP systems despite facing various challenges related to cost, organizational as well as external factors. Four critical factors have been advocated as significantly affecting implementation of ERP systems in MSMEs. These include organizational climate, project execution competency, ERP product fit to the organization, vendor competence, and technical competencies in the organization and the implementation team. Shatat (2015) observed that there were some critical success factors in ERP system implementation in Oman. These factors included having a framework for performance monitoring and evaluation, having an ERP project champion, top management support, having clarity of goals and objectives of the ERP system, user Involvement and strategic IT Planning. Other critical factors in the implementation noted were user training and education, having effective teamwork and composition of the ERP implementation team, vendor support and educating the organization members on new business processes. This was comparable with the factors that were considered in Vietnam by Le and Han (2015) to be critical in ERP implementation including resources, employee competence, organization culture and vendor support.

Panga (2014) indicated that various government agencies had adopted ERP systems to enable them deliver good services to the people. He noted that “the ERP system implementation in government was positively affected by user training, vendor experience and effective use of external consultants.” However, implementation was adversely affected by poor communication, poor coordination among different departments, inadequate top management support, non-supportive organizational culture and inadequate provision of human and financial resources. Shatat (2015) attests to a relatively high cost incursion in a typical ERP implementation prospect. ERP implementation therefore requires that any attempt be successful and be lucrative enough to support a short return on investment period. The critical success factors for an ERP implementation project thus become imperative pre-project tools. In-depth knowledge about organizational attributes that favour ERP implementation becomes crucial for guaranteed system implementation. These attributes include, top management, communication structures, organization culture, organizational infrastructure, implementation team and training. Most of the research on ERP implementation focusses on profit making organizations and few researches has focussed on public entities or the non-governmental organizations (NGOs or PBOs) (Khanna & Arneja, 2012). The aim of the study is to help government affiliated enterprises successfully implement ERP systems by demonstrating the influence of organizational attributes on implementation of ERP in the public sector and categorizing them in relative order of significance.

KEMRI is expected to liaise and collaborate with other relevant local and foreign bodies in carrying out research and related activities. Such local bodies include National Commission for Science, Technology and Innovation (NACOSTI), Ministry of Health and the Medical Sciences Advisory Research Committee. Foreign bodies that collaborate with KEMRI include World Health Organization (WHO), Wellcome Trust, Japan International Cooperation Agency (JICA), US Centers for Disease Control and Prevention (CDC), and United States Agency for International Development (USAID) among others (KEMRI, 2017). To enable the organization to collaborate and integrate its functions effectively, KEMRI has adopted ERP systems. KEMRI’s Wellcome Trust Research Programme (KWTRP) is one of the research centres in Kenya that has successfully adopted the use of technology by implementing ERP to enhance efficiency in its program operations (KEMRI, 2017). KWTRP is an internationally recognised health research centre born in 1989 out of a partnership between KEMRI, the Wellcome Trust, and the University of Oxford. Staring out as a small program composed of 12 members, KWTRP has expanded to a current membership of about 100 research scientists and 700 support staff distributed across Kenya, Uganda and the Eastern African region. The programme has excelled in its cutting-edge innovations focused on working with local communities to promote better healthcare in Africa while nurturing authorities in the fields of research and science. This research forms a good case study to help develop a conceptual framework of the organizational attributes that influence ERP implementation in research organizations.

2. STATEMENT OF THE PROBLEM

Although ERP implementation has proved to be a success in some organizational establishments, several instances suffice where the implementation has not succeeded, especially with regard to the parameters of time and cost. Consequentially, such instances lead to cumulative loss that denies affected firms the benefits that come with implementation of ERP. Whilst there is no official data available on ERP implementation effectiveness locally, there has been a consistent flow of benchmarking exercises by many organizations within the region at KWTRP to understand ERP implementation process. Internationally, a Standish Group report revealed that on average, ERP projects were 178 per cent over budget, took 2.5 times as long as projected and delivered only 30 per cent of promised benefits (Le & Han,

2015). Shatat (2015) posits that upwards of 90% of ERP implementations experience delays and hence need additional budgetary input.

A pertinent concern arises subject to the status quo of ERP projects: What is the principal cause behind ERP implementation failure? Various, scholars have made insightful and sometimes technical attempts to pinpoint the attributive factors leading to success in ERP implementation (Panga, 2014; Leyh, 2014; Shatat, 2015; Le & Han, 2015). However, these studies did not focus organizational attributes influencing ERP implementation in a public research institution. In 2010, KEMRI-Wellcome Trust research programme fostered ERP implementation as a way of acquiring more control over events in its internal environment by converting the prevailing flaws into advantage points that could be used in fortifying the organization's external threats through handling eminent threats. Notwithstanding the complex and difficult implementation process, KWTRP is one of the research centres in Kenya that have successfully adopted the use of ERP and achieved approximately 80% efficiency in management of research programs and operations. The current study will therefore explore the organizational attributes that influence the implementation process in a public research institution.

3. OBJECTIVES OF THE STUDY

The general objective of this study was to explore the organizational attributes that influence implementation of ERP in research institutions.

The study sought to achieve the following specific objectives:

- i. To explore the influence of top management support on ERP implementation at KEMRI Wellcome Trust Research Programme.
- ii. To determine the effect of the implementation team on ERP implementation at KEMRI Wellcome Trust Research Programme.
- iii. To examine the role of user support on ERP implementation at KEMRI Wellcome Trust Research Programme.
- iv. To establish the effect of resource availability on ERP implementation at KEMRI Wellcome Trust Research Programme.

4. THEORETICAL FRAMEWORK

This study is based on three theories, the diffusion of innovations theory (Rogers, 1962), social technical systems theory (Bostrom & Heinen, 1977) and theory of constraints (Goldratt, 1986). These three theories explain the relationship that exists among the study's independent and dependent variables.

4.1 Diffusion of Innovations Theory

Diffusion of Innovations theory (Rogers, 1962) makes inquiries into the rate at which new forms of technology diffuse into firms or cultures. The theory also explains why and how technologies and innovative ideas are adopted in diverse cultures and societies. According to this conjecture, diffusion is described as the way in which a novel form of idea or technological innovation is shared, assimilated, and accepted in a social setting. The diffusion of innovations theory attributes three regimes of decision making to adoption of new ideas and technologies within social systems. First is the decision made at the individual level where a person chooses whether to adopt a new form of technology or not. Secondly, a collective decision-making process is carried out by all individual entities in a social system. Finally, a hierarchical form of decision-making is made by a select number of individuals within the social system as an item of social standing and power; typically, such individuals are members of senior management in organizations. The distinction of various regimes of decision making partly explains why ERP implementations succeed in certain situations and fail in others.

Diffusion of innovations theory provides depth and pristine detail about how the socio-political, cultural and socioeconomic factors can facilitate or hinder implementation of ERP systems in firms. The theory posits that “firms assimilate and implement new forms of technology largely based on authoritative decision making and collective social system decisions,” (Rogers, 2003). The collective innovation decision in the context of this study is where top management and employees in an organization facilitate the adoption of ERP systems. In this case, the decision is not formal and both the management and employee informally consider the benefits and costs of the ERP system. The authority-innovation decision comes to play where the decision to adopt the ERP system is made by the top management of the institution. Implicatively, the few individuals who have the most senior authority within an organization suffice as the only determinants towards whether a certain form of technology is to be adopted (Rodgers, 2005). Arriving at the decision of adoption or abortion of a new technology also relies on the extent of cost incursion vis-à-vis the benefits accrued from choosing either roadmap. The top management also leads in the adoption process providing the requisite resources, leadership and motivation for the adoption and implementation. This theory therefore underscores the importance of top management support in planning and implementation of ERP systems in organizations.

4.2 Social Technical Systems Theory

The social technical systems theory by Bostrom and Heinen (1977) explains how any ICT based system implementation in an organization influences employees’ job characteristics and job outcomes. Social technical systems theory is a technical platform dedicated to understanding the interoperability and relationships between people and technological systems within modern organizational contexts. The social technical systems theory was established in response to the problem of organizational misalignment whereby firms could not derive the expected benefits from new technological innovations. The social technical systems theory acknowledges the existence of two types of systems that govern firm-technology interaction outcomes: a social and a technical system (Mumford, 2000). The social sub-system consists of structures and details about human intervention within an ICT environment. The technical subsystem, on the other hand, includes technologies and undertakings prompted by individuals using ICT. Technical systems are meant to optimize task success, while social systems emphasize on the dynamics of human comfort and proactivity during the process of task fulfilment.

Social technical systems theory emphasizes that during the process of technological implementation, the ultimatum should be harmonization and improvement of both systems – social and technical. This joint optimization process is only achievable if the interests of all human entities involved in the implementation process is taken into consideration. How well the dynamics of a social subsystem and the aspects of a technical subsystem intermarry determines how successful a technological implementation process becomes. Optimum subsystem fit is realized when a technological implementation design procedure optimizes both aspects. On the other hand, design-based discordance leads to an imbalance between the subsystems thus leading to a negative result including inferior work performance (Holman et al., 2005). Bostrom and Heinen (1977) demonstrated ways in which this theory is applicable to the implementation process in select organizations. They observed that there are interfaces prevalent within social systems, people, technology, and organizational undertakings. The theory illustrates how incorporating a new technology creates influence on other subsystems. Technology provides a convenient tool for performing tasks and in case a novel technological structure is introduced, employees should, on top of learning means of communicating with the system, be adept in performing normal tasks utilizing the new technological system (Sykes, Venkatesh & Gosain, 2009). The organization should engage in educating and training

employees to enable them work with the modern technology to bridge the gap between the technical and the social system. Failure to ensure that employees have the requisite skills to use ERP systems will bring negative outcomes such as reduced satisfaction and employee performance. This theory will be used in this study to explain the importance of user support in the ERP system implementation. It indicates how having the requisite competencies enables the employee to perform well using the new ERP system while lack of competencies or having skills gap reduces acceptability of the system which can lead to failure. This theory also explains the importance of having a competent team to ensure that the transition from the old to the new is smooth.

4.3 Theory of Constraints

Theory of Constraints (TOC) clarifies the linkage between business constraints and its performance (Goldratt, 1986). The theory of constraints indicates that a business or any economic entity should consider the benefits and costs of any system before adopting it. The idea should be to ensure that the benefits in the long term surpass the costs. Moreover, a business should ensure that it considers its context before planning to incur any capital costs that can have a significant effect on its sustainability. The TOC posits that in decision making on capital expenditure, an organization should consider its throughput, inventory and operational expenses (Cox & Schleier, 2010). Benefit of any capital expenditure is justifiable if it results in reduced inventory, increased throughput or reduced operating expenses. In making any decision on ERP implementation, the organization should therefore consider the key aspects of its business and assess whether the ERP implementation will lead to an improvement in its key parameters. Moreover, the organizations should ensure that it has a solid financial base before starting the implementation as interruptions of the ERP implementation would lead to enormous costs and losses. TOC advocates for the firm to analyze its constraints before making a key decision like an ERP system. Having identified the company's constraints, the organization should then search for an ERP system that would provide an integrated, real-time view of its business processes. The company should select the system that best addresses its business objectives at a price they can afford (Cox, & Schleier, 2010). This theory will be applied in this study to explain the link between financial resources availability and ERP implementation success.

5. CONCEPTUAL FRAMEWORK

The focus of this study was to explore the organizational attributes influencing implementation of ERP systems in organizations with a focus on KEMRI's Wellcome Trust Research Programme. The study conceptualizes that the factors that may influence implementation of ERP in the organization includes top management support, the implementation team, user support and resource availability in the organization. The conceptual framework that guided the study is presented in Figure 1.

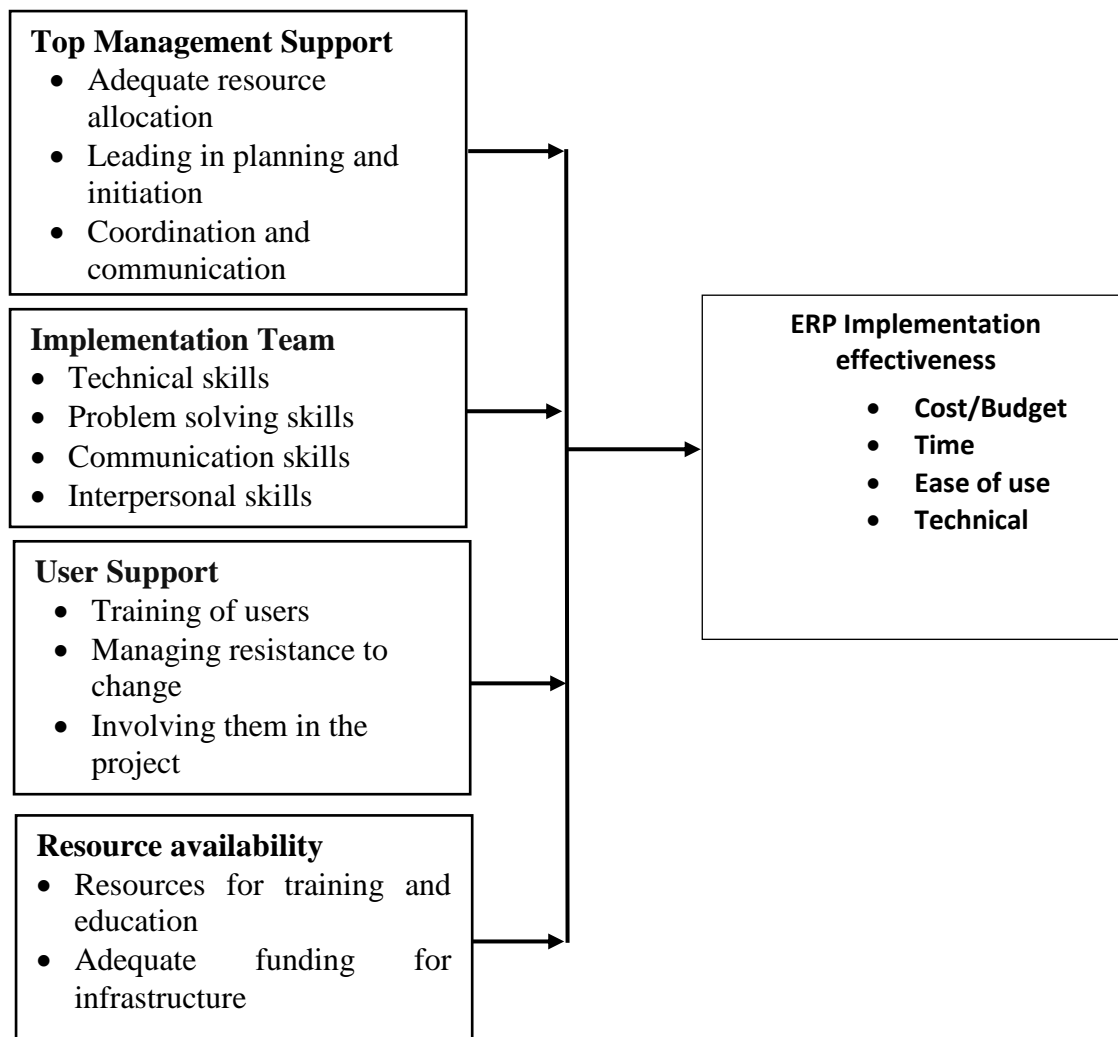
Independent Variables**Dependent Variable**

Figure 1: Conceptual Framework

6. RESEARCH METHODOLOGY

Based on the nature of the study variables and research methods applied, this study adopted the descriptive study design approach. This study collected appropriate information from 79 employees engaged in the KEMRI-Kilifi KWTRP program, including those in top management, middle management and lower management, and employees without management responsibility were involved in the study. These employees were selected since they understood the implementation process within the research programme and factors that have contributed. Likert-type questionnaires was used as the principal tool for data collection. The questionnaire used for this study was structured based on a thorough theoretical evaluation of data in relation to financial management in decentralized government and public service delivery. The final questionnaire design was categorized into five sections. The first section contained rudimentary information about employees in the sample population and ERP implementation effectiveness. The four remaining sections contained questions that assessed the four independent variables of interest to this study. Data analysis for this study was conducted in form of descriptive statistics for setting up hypotheses based on respondent information and inferential statistics to acquire patterns of relation. Inferential statistics (chi square and regression) created in-depth meaning of data classified in the descriptive statistics section

7. RESEARCH FINDINGS

Regression analysis was used to test the relationship between the levels of effective ERP implementation (Dependent variable) against the independent variables. The model summary results obtained is presented in Table 1.

Table 1: Model Summary

| R | R Square | Adjusted R Square | Std. Error of the Estimate |
|-------------------|----------|-------------------|----------------------------|
| .558 ^a | .312 | .268 | .6892 |

Predictors: (Constant), Resource Availability, User Support, Implementation Team, Top Management Support

R-square suggests that the independent variables explain 31.2% of the variability in the dependent variable.

Table 2: ANOVA Analysis

ANOVA^a

| | Sum of Squares | df | Mean Square | F | Sig. |
|------------|----------------|----|-------------|-------|-------------------|
| Regression | 13.546 | 4 | 3.386 | 7.130 | .008 ^b |
| Residual | 29.925 | 63 | .475 | | |
| Total | 43.471 | 67 | | | |

Dependent Variable: Organizational attributes and Effectiveness of the ERP project implementation.

Predictors: (Constant), Resource Availability, User Support, Implementation Team, Top Management Support

From ANOVA table P-value of 0.008 indicate the data analysed fit the regression equation.

Table 3: Coefficient Analysis

| Model | | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
|-------|------------|-----------------------------|------------|---------------------------|-------|------|
| | | B | Std. Error | Beta | | |
| 1 | (Constant) | -.435 | .689 | | -.632 | .530 |
| | TMS Mean | .153 | .296 | .111 | .519 | .606 |
| | IT mean | .136 | .288 | .085 | .473 | .638 |
| | US mean | .390 | .250 | .261 | 1.561 | .123 |
| | RA Mean | .228 | .156 | .197 | 1.462 | .149 |

Dependent Variable: Rate the effectiveness of the ERP project implementation in relation to the listed factors provided below: [Meeting objectives set by KWTRP]

Regression equation to forecast how the independent variables affect the effectiveness of ERP implementation is expressed as below.

$$Y = \beta_0 + \beta_1 TMS + \beta_2 IT + \beta_3 US + \beta_4 RA + \varepsilon$$

With the above coefficients therefore:

$$Y = -0.435 + 0.153TMS + 0.136IT + 0.390US + 0.228RA + 0.689$$

Where; B_0 = Constant, β_i = Independent variable coefficients, TMS = Top management support, IT = Implementation Team, US = User Support, RA = Resource Availability, ε = Error term

From the analysis, we find that 1% change in top management support attribute leads to a 15.3% increase in effective ERP implementation, a 1% increase in extent implementation team involvement leads to a 13.6% increase in effective ERP implementation, a 1% increase in user support leads to 39% increase in effective ERP implementation, a 1% increase resource availability leads to 22.8% increase in effective ERP implementation. In general, regression model (Chi square) and the coefficient of analysis point out that ERP implementation (the dependent variable) was highly influenced by top managements support, implementation team, user support and resource availability (the independent variable. The figures established in the above regression are in line findings in Dezdar and Sulaiman's (2014) that investigated the importance of properly constituting the implementation team. This study was conducted in the manufacturing sector in Saudi Arabia and was a survey of ERP project managers. From this study and Alsamarai and Almashaqba's (2012) it is evident that team competence and also how well the implementation team acted as a link between the vendor and the organization members influenced implementation effectiveness. In addition, a comparison between the graphs above and Dezdar and Ainin's (2011) investigation, it can be inferred that operational managers of organizations and companies have noteworthy influence in terms of ERP performance. Therefore, the top management support is a key factor in influencing effective implementation of ERP systems. The implication of the above findings is that the top management must offer complete commitment and support to the ERP project for it to be successful. One of the factors that evaluates top management's roles show that Shatat and Udin (2013) explored the factors affecting ERP system effectiveness in post-implementation stage within Malaysian manufacturing companies. The study was a survey of project leaders and employees in a Kenyan-based research institute. It has been noted that ERP system had become a key pre-requisite enabling many companies to compete in the global as well as local market by providing them with competitive advantage.

8. CONCLUSION

The results indicate that a greater population of the participants confirmed that the ERP implementation plans meet and exceeds the minimum standards. While some responded on neutral grounds and claims that the ERP plans, it has been determined that the implementation plans are fairly integrating corporate activities and human resources. In general, the programme has excelled in its cutting-edge innovations focused on working with local communities to promote better healthcare in Africa while nurturing authorities in the fields of research and science. This research forms a good case study to help develop a conceptual framework of the organizational attributes that influence ERP implementation in research organizations. The advent of technology and due to the dynamic nature of business operations in the world in addition to ever-growing global business prompt top managers and stakeholders to innovate and consistently advance in service provision and delivery, ERP systems are practical practices

that KEMRI have used to enhance corporate operations. This is not different from the firm of choice in this study because as indicated in the results section, a significant percentage of the workers expressed satisfaction with the top management's involvement in ERP project. Enabled by relevant skills within the workers, the top managers have been able to effectively communicate ERP implementation plans to the workers and the entire organization in a manner that enhanced cooperation and working together for the realization of organizational goals.

9. RECOMMENDATIONS

Having determined that KEMRI, through its KWTRP plan, has effective ERP implementation plans that have been well addressed for the benefit of corporate operations and human resources, it is important to focus on streamlining the ERP activities. However, from the participants' responses, it is evident that the implementation has not reached its potential. For effective implementation ERP project plans and using the responses provided during the survey, it can be recommended that the system should be improved to meet budget, time, quality and objectives' threshold. Despite, while the top management is highly involved in completion to ERP project, more than to half of the employees strongly agreed that the top management allocated adequate resources to ERP project, it is evident that significant number of employees were in the middle management and senior management. This means that the employees had interests in the ERP project and from the responses obtained from the survey, it is apparent that most of them were aware and conversant with the ERP system. Similarly, most of the employees were undergraduates while a few held diplomas and masters in different fields. Post-graduates were also part of the team that was responsible for ERP implementation. In general, the knowledge in most of the employees can be associated with the fact that most of the employees had sufficient training on the ERP system. This suggests that the implementation team should empower employees through training, education and empowerment. The implementation team should also focus on the budget allocation for the project consideration the anticipated benefits of the ERP plan.

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