

# Implementing Enterprise Systems for Management: A Case of Kenyan Universities

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**Abstract:** Kenyan universities, as other business entities, are implementing various information systems to facilitate their operations. The systems include enterprise systems which are implemented to enhance institutional management given their emphasis on standardisation, streamlining, and integration of business operations. In this study, the authors have established that Kenyan universities have mainly implemented systems for finance and accounting, student admissions, examinations management, and library services. The authors have also established that there are no significant differences in information systems needs among Kenyan universities, but there are significant differences in strengths and weaknesses among the private and public universities in the capabilities of systems they have implemented. The authors have further established that despite fears especially on delays in projects implementation and system costs, Kenyan universities are in a position to implement enterprise systems to facilitate their operations. However, the universities need to allocate more funds to systems implementation if they have to successfully implement enterprise systems which generally require more resources than ordinary software applications.

**Key words:** Enterprise resource planning systems (ERPs), information systems, university management.

## 1. Introduction

The purpose of business information systems is to facilitate work activities in the enterprise, be it a university. An information system is a combination of Information and Communication Technologies (ICTs)—hardware, software, and telecommunications, used to collect, create, store, and disseminate information to support decision making, coordination, control, and general management of an organization [1-2]. On the other hand, Ref. [3] points out those university information systems bring about faster and better decision making given their guaranteed access to high quality, accurate, well maintained and easily retrievable information.

Notable systems implemented in universities include Enterprise Resource Planning (ERP) systems

(popularly known as enterprise systems) which represent one of the largest investments of human and financial resources by many higher educational institutions [4]. Enterprise systems enhance standardisation, streamlining of operations, and integration of business processes as a large number of stand-alone applications are replaced by one system that is comprehensive and on a single information and technology architecture [2, 5-8].

ERPs have been widely used by large corporations around the world, with universities turning to ERPs to replace their legacy systems [9]. Further, Ref. [10] points out that although ERPs are mainly for manufacturing industry, universities have picked up the systems with their equivalent of 'manufacturing' being student administration, that is, finance, staff and customer management functions which broadly follow similar models across industries. ERP benefits to a university generally including increased efficiency and

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effectiveness of processes, reduced ICT costs, improved decision making, better resources management, building business innovation and supporting strategic change [5-6, 11-12].

However, due to the integration of various systems into one large system, enterprise systems implementation can be complex, costly and time consuming, and involving management, staff, consultants and vendors with possible conflicts between an established organizational culture and the “ERP” culture [13-14].

In this research, the authors have limited themselves to the use of information systems in universities management with special focus on enterprise systems. The research addresses two objectives, namely, to assess information systems implementation and usage among Kenyan universities, and to explore the Kenyan universities’ readiness to implement enterprise systems. The target audience for the research is university leaders who need to use information systems for management of their institutions. This study adds to the body of research focused on the higher education and ERP implementation experiences and contributes to the growing area of ERP implementation research, especially for university management.

Section 2 of this paper provides the methodology employed in the research while section 3 discusses the research findings. Section 4 covers conclusions and recommendations.

## 2. Methodology

In this section, the research methodology including the study design, hypotheses, and the data analysis and presentation techniques is discussed.

### 2.1 Study Design

The study design is a descriptive research type. Data to answer the specific problem is gathered by means of a questionnaire designed to define the actual condition of the universities’ current information systems, their strengths and weaknesses, and identifying critical

issues that are pertinent in implementation of enterprise systems in the universities. The descriptive method and technique is chosen because it allows qualitative description of the current state, traits, nature and characteristics of the institutions. The research focuses on Kenyan public and private universities with respondents being two categories, that is, senior management (vice chancellors/registrars) and ICT directors.

The study set to address the following Hypotheses (H):

- H1: There are no significant differences in information systems needs among Kenyan universities as perceived by respondents considering the moderator variables of size, ownership, and years of existence;
- H2: There are no significant differences in strengths and weaknesses among universities in Kenya in the area of information systems implementation;
- H3: Kenyan universities are not in a position to implement enterprise systems.

### 2.2 Data Collection, Analysis and Presentation

Primary data is collected using a questionnaire, tabulated and statistically analysed and findings presented using tables and charts. The level of compliance of the data collected is determined using a Likert scale of 1 to 5. An area is regarded as strength if it returns a mean score of 3.5 and above. Any mean score below 3.5 is a “weakness”. To determine the significance of the differences in the perceptions of the respondents, *chi* square and the F-test are used together with analysis of variance (ANOVA).

## 3. Analysis and Presentation of Findings

This section captures the findings of the study undertaken through the examination of overall frequencies of selected variables, results of cross-tabulations of independent variables and dependent variables. Out of a total of 20 universities that are targeted, 15 (75%), that is, 8 private and 7 public universities respectively respond. The full list of

Kenyan universities is available on [www.che.or.ke](http://www.che.or.ke). Extracts from findings are presented below.

### 3.1 Strategic Planning for Systems/ICTs

On this element, the authors seek to know whether the universities have strategic plans that guide their investment in information systems/ICTs, including budgeting for the systems. All the public universities and six private universities indicate they have ICT strategic plans which include such ingredients as: ICT infrastructure acquisition (100%); technology platform and ICT department staffing, 11 (84.6%); ICT financing, 10 (76.9%); service delivery and ICT replacement policy, 9 (69.2%); and ICT staff skills development 6 (46.2%). Contents of the strategic plans vary significantly across the years of existence with universities in the age bracket of 1-10 years emphasizing ICT infrastructure acquisitions (5/13), and ICT staff skills development (4/13).

Cross tabulation is applied to assess budget allocation to ICT. The overall budget allocations to ICT indicates that 12 (80%) of the universities have allocations of less than 10% of their budgets allocated

to ICT. This appears that budgetary allocation to ICT is low in the universities.

### 3.2 Information Systems Usage in the Universities

The findings reveal that 13 (86.7%) of the universities use information systems for finance and accounting operations; 10 (66.67%) for library systems while 9 (60.0%) use information systems for student admissions and examinations. Details of system usage are shown in Fig. 1.

### 3.3 Rating of Systems to University Functions

A Likert scale is used to assess responses regarding system operation by the universities. The procedure for analysis is that the average score of the system is determined and compared between the types of institutions. A second procedure, factor analysis, is used to identify underlying factors that explained the pattern of correlations within a set of observed variables. Results from the analysis indicate that the admissions and examinations functions, in both public and private universities, are regarded as critical in the overall operations of the universities.

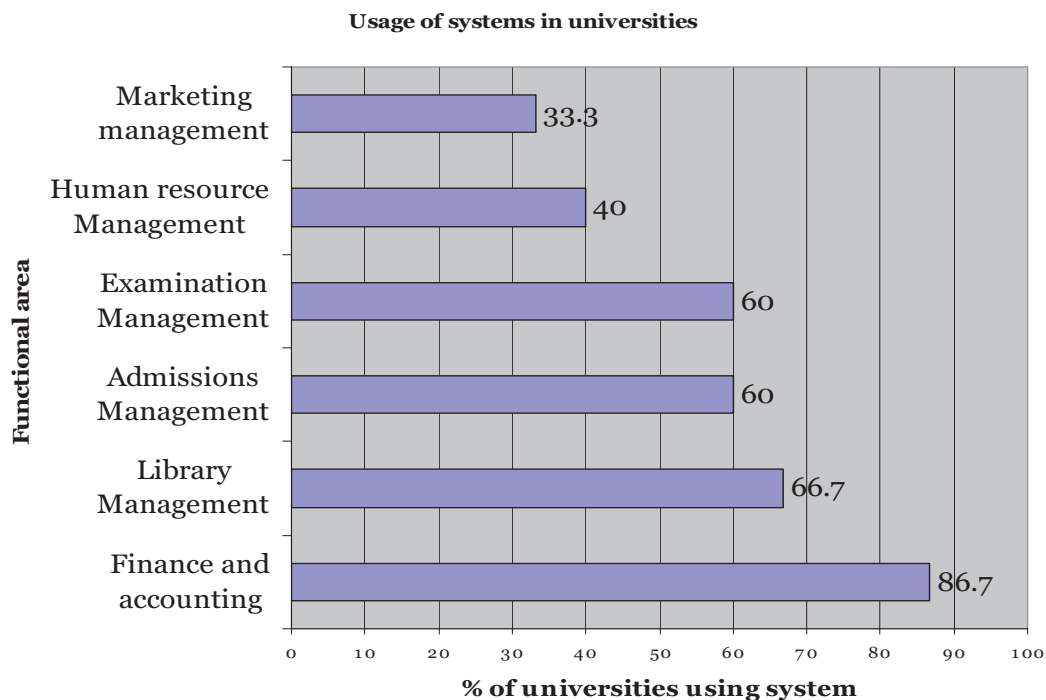


Fig. 1 Representation of current usage of systems in universities (Source: research data).

From the principal component extraction the communalities for systems for admission management (92.8%), examinations management (90.9%), library services (86.1%), finance and accounting (75.6%) are high indicating that the systems are of critical and used in the institutions. Table 1 provides outcomes of factor analysis on the rating for systems in the universities.

As indicated in Table 2, a further analysis shows that there is no significant difference in information systems needs among the universities considering the moderator variables ( $p$ -value > 0.05).

### 3.4 Assessment of Current Systems Capabilities

Private universities indicate that their systems are strong (score of 3.5 and above) in all measures as captured in Table 3 except resilience, modularity, and integration with other systems. Conversely, the public universities report weaknesses (score below 3.5) in all measures except for access to information and system friendliness.

### 3.5 ERP Implementation Considerations

It is established that three universities have implemented enterprise systems and seven are planning implementations. The authors ask for responses to a set of predetermined criteria to assess perceptions on ERP implementation process. On average, the universities agree that customization of the enterprise systems to the university may take too long (3.8) and the cost of the system might be too high (3.6).

However they are indifferent regarding other factors as shown here in a score out of 5: System might be incompatible with other functional systems (3.4);

vendors could be unreliable (3.3); staff may be inadequately prepared for new system (3.3); system may take too long to be operational (3.3); resistance (from users) to the system may be high (3.2); quality of enterprise system may not be standard (3.1); System may lead to major organizational changes (3.1); users might not be well trained to use the system (3.0); integration of different types of data could be a big problem (3.0).

On the other hand, respondents do not have any problem with such factors (scored below 2.7 out of 5), such as security of the system may be easily compromised, complexity of the system, recognition of benefits, and system leading to staff lay (enterprise system could be too complex; benefits of the system may not be recognizable; system may lead to layoff of many staff. This indicates a high level of interest by the universities to implement enterprise systems.

### 3.6 Benefits of ERP to the Universities

Universities are asked to evaluate (on a score of 5) what they consider as important gains of implementing ERPs for their environments and they strongly agree that the systems will enable integration of functions and lead to improved information management (4.5), improved organisational management (4.4), easy access to information from all departments (4.3), increased worker productivity (4.2), improved management and control (4.1), competitive advantage over other institutions (3.9), good customer care (3.9) and reduced costs of operation (3.8). The scores show Kenyan universities have high appreciation for ERPs for their functions.

**Table 1** Factor analysis of systems needs (Source: research data).

System type	Initial	Extraction
Admissions	1.000	0.928
Examinations	1.000	0.909
Library services	1.000	0.861
Finance & accounting	1.000	0.756
Human resources	1.000	0.605
Marketing management	1.000	0.543

Extraction method: Principal Component Analysis (PCA).

**Table 2 ANOVA for systems needs among the universities (Source: research data).**

		Sum of squares	df	Mean square	F	Sig.
Ownership/sponsorship	Between groups	1.900	7	0.271	1.036	0.482
	Within groups	1.833	7	0.262		
	Total	3.733	14			
Years of existence	Between groups	10.267	7	1.467	0.531	0.789
	Within groups	19.333	7	2.762		
	Total	29.600	14			
Number of students	Between groups	21.900	7	3.129	0.718	0.663
	Within groups	30.500	7	4.357		
	Total	52.400	14			

**Table 3 Rating systems capabilities (Source: research data).**

Factor (of the systems in use)	Private universities	Public universities
Access to information	4.0	3.8
Storage capacity	3.8	3.3
Quality of output	3.8	3.3
Functionality	3.8	3.3
Up-time of the systems	3.6	3.2
Processing speeds	3.6	3.3
Security features	3.6	2.8
Management control	3.6	3.3
User friendliness	3.6	3.5
Integration with other systems	3.5	2.8
Resilience	3.4	3.2
Modularity/scalability	3.4	3.0
Integration with other systems	3.4	2.6
Averages	3.6	3.2

### 3.7 Interpretation of the Hypotheses

The researchers provide below an indication of the treatment of the hypotheses captured in section 2.1.

- H1: As shown in sections 3.2 and 3.3, the universities have needs of differing degrees in areas of financial management, library, admissions, examinations, and human resources management. It is noted that they consider systems to be critical for their operations. The hypothesis is upheld.

- H2: The findings (section 3.4) reveal a significant difference in strengths and weaknesses on the systems usage in both public and private universities. The hypothesis is thus negated.

- H3: The universities surveyed appear ready for ERP implementation. Findings (section 3.5) show that the fear universities have is the customization of ERPs to their environment may take long and that system costs could be too high for them to afford. The hypothesis is therefore negated.

### 4. Conclusions and Recommendations

This section gives conclusions and recommendations arising from the study:

- Information systems strategic planning is considered key among the Kenyan universities given that majority of them (87%) undertake strategic planning for ICTs, covering areas such as infrastructure, technology platform, staffing, financing, service delivery, and ICT skills training for users. Thus, the universities need to strengthen their ICT strategic planning and ensure that the ICT budgets are increased from the current 1-10% to facilitate operations and improve the quality of systems, including ERPs, being implemented;
- Over 60% of the universities use information systems in the areas of admissions, library, finance and accounting, and examinations management. However, there is little usage of systems in the areas of human resource and marketing. It will be helpful for the

universities to invest in systems in other areas of operations including human resource and marketing;

- Kenyan universities strongly agree that there is need to implement enterprise systems to manage their information resources, improve services to staff and students, increase efficiency in their operations, modernize university operations and to achieve competitive advantage and innovation. In view of this, it is recommended that Kenyan universities be assisted to fully appreciate the requirements for successful implementation of enterprise systems which will lead to effective ERP implementation with projects that are cost effective, that meet user demands, and help the institutions deliver their educational mandate. An implementation framework for enterprise systems that captures critical success factors for the ERPs implementation for each university could be a useful tool to guide the Kenyan universities leadership as they implement enterprise systems for their operations.

## References

- [1] L. Jessup, J. Valacich, *Information Systems Today: Why It Matters*, 2nd ed., Prentice Hall, 2008.
- [2] K.C. Laudon, J.P. Laudon, *Management Information Systems: Managing the Digital Firm*, 10th ed., Pearson Prentice-Hall, Upper Saddle River, New Jersey, 2007.
- [3] C. Nyandiere, Increasing role of computer-based systems in the management of higher education institutions, in: M. Kashorda, F. Acosta, C. Nyandiere (Eds.), *ICT Infrastructure Developments and Applications in Business and Education*, Strathmore University Press, 2007.
- [4] B.I. Dewey, P.B. DeBlois, Current IT issues survey report, *EDUCAUSE Quarterly* 29 (2) (2006) 12-30.
- [5] L. Sullivan, W. Bozeman, Post-implementation success factors for enterprise resource planning (ERP) student administration systems in higher education institutions, in: *College & University Journal of the American Association of Collegiate Registrars and Admissions Officers* 86 (2) (2010) 22-31.
- [6] K. Roman, Benefits of implementing an ERP: Top 10 benefits an ERP implementation can bring to your institution, *Collegiate Project Services*, 2009.
- [7] A. Ndede-Amadi, What strategic alignment, process redesign, enterprise resource planning, and e-commerce have in common: Enterprise-wide computing, *Business Process Management Journal* 10 (2) (2004) 184-199.
- [8] T.J. Davenport, Putting the enterprise into enterprise systems, *Harvard Business Review* 76 (1998) 121-131.
- [9] N. Pollock, J. Cornford, ERP systems and the university as a "unique" organisation, *Information Technology & People* 17 (1) (2004) 31-52.
- [10] G. Ferrell, Enterprise systems in universities: Panacea or can of worms, *JISC infoNet*, Northumbria University, 2003.
- [11] D. Robey, Learning to implement enterprise systems: An exploratory study of the dialectics of change, *Journal of Management Information Systems* 19 (2002) 17-46.
- [12] S. Shang, P.B. Seddon, A comprehensive framework for classifying the benefits of ERP systems, in: *Proceedings of AMCIS 2000*, Paper 39.
- [13] R. Sharma, P. Yetton, The contingent effects of management support and task interdependence on successful information systems implementation, *MIS Quarterly* 27 (4) (2003) 533-555.
- [14] N. Basoglu, T. Daim, O. Kerimoglu, Organizational adoption of enterprise resource planning systems: A conceptual framework, *Journal of High Technology Management Research* 18 (1) (2007) 73-97.