Influence of Integration of ICT on Academic Management in Kenyan Public Universities

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Abstract:
ICT has become an important tool in modern management of universities. This is because information is a critical ingredient in facilitating decision-making and therefore, ICT is being seen as a crucial tool that can help ease information management in the institutions. Despite the many efforts and initiatives that have been put into place by the Kenya government, the private sector and the institutions themselves to leverage the use of ICT in public universities, little is known on how this integration has enhanced the provision of effective and efficient institutional management services. The purpose of this study was to investigate the influence of integration of ICT on academic management in public universities in Kenya. The study adopted a descriptive survey research design. The target population comprised of all the students in the 2012/2013 cohort, lecturers and senior administrators in public universities in Kenya totaling to 47,112. The three oldest public universities in the country namely: University of Nairobi, Moi and Kenyatta Universities were purposively sampled to participate in the study. All the registrars' academics participated in the study. The determination of sample sizes for the lecturers and students was done using the Cochran's (1977) formula. Proportionate random sampling was used to obtain samples as follows: 132 students from the University of Nairobi; 123 from Moi and 119 from Kenyatta. The same was applied to obtain 167; 77 and 100 lecturers from the three universities respectively. Data were analyzed using the Statistical Package for Social Sciences (SPSS) version 22 computer programme. The study established that integration of ICT had a positive influence on academic management processes based on students' and lecturers' responses.

Keywords: ICT, Integration of ICT, Academic management

1. Introduction

Information communication technology (ICT) is currently permeating every aspect of human life. It is playing salient roles in work places, business, education and entertainment. In higher educational institutions (HEIs), ICT has become an important tool in modern management. This is because information is a critical ingredient in facilitating decision-making and therefore, ICT is being seen as a crucial tool that facilitates acquisition, use and management of this information. Manual and mechanical systems can no longer cope with the current demands of management processes in HEIs due to the fact that accurate and timely information is critical in planning and decision-making (Acosta, 2004).

University education on the other hand is of paramount importance to economic and social development of a country. Universities have the responsibility of equipping individuals with advanced knowledge and skills required for positions of responsibility in government, business and the professions. These institutions produce new knowledge through research, serve as conduits for the transfer, adaptation and dissemination of knowledge generated elsewhere in the world and support government and business with advice and consultancy services. They also play important social roles by forging the national identity of the country and offering a forum for pluralistic debate (World Bank, 1994).

Despite the clear importance of investment in university education for economic growth and social development, the sector is in a crisis throughout the world. Universities are caught up in a time of rapid political, socio-economic and

technological change. The numerous internal and external pressures on them demand a careful examination of educational practices from a new perspective to face challenges that lie ahead in knowledge-based societies (Pittinsky, 2003). These pressures include: need for a greater number and variety of higher education places without corresponding increases in funding (Phillips, 2005); a large population of learners from varied backgrounds, needs, motivations, abilities, learning preferences, availability of time and course content requirements (Bates, 2000); a demand for more 'client' responsive and flexible courses (Ryan & Stedman, 2002); and the drive to use ICT in teaching and management (Challis, Holt & Rice, 2005). In facing such challenges, higher education needs to rethink organizational structures, operational strategies, and policies appropriate for the changing educational scene (Duderstadt, Atkins & Van Houweling, 2002).

Effective management of the higher education institutions has become one of the most challenging issues facing higher education in Kenya today. Failure to sufficiently address the emerging management challenges impacts negatively on the growth of the institutions. Consequently, most of the country's higher education institutions have suffered and continue to suffer financial losses, poor academic performance, staff dissatisfaction and high turnover, loss of students and erosion of public confidence. The upshot of this has been a diluted quality of education and production of half-baked graduates; a direct threat to the attainment of the national development of the country (Ngumbi, 2010).

Ngumbi (2010) further notes that the existing management practices in some universities are not adaptable to the 21st century higher education system which is characterized by massive technological expansion and development and cannot therefore propel the institutions to the full realization of their objectives. Ngumbi (2010) continues to argue that poor management is manifested in such ways as breakdown in communication between the administrators of institutions, academic staff, students and other stakeholders. This breakdown often results to crises that usually culminate into student unrests which lead to damages that could otherwise be avoided by availability of accurate and timely information, a product of effective integration of ICT in management processes.

According to UNESCO (2009) the rapidly increasing student population in higher educational institutions accelerated the need for ICTs in order to process, store and retrieve data in a fast, systematic and accurate fashion. UNESCO further notes that on average, 57% of school-leavers in OECD countries went on to university in 2006, compared with 37% in 1995. The need to manage this increasing student number and monitor their progression through the education system required HEIs administrators to turn to ICTs solutions. Similarly, the growing power, effectiveness and potential of ICTs also meant that technology could provide possibilities that did not exist three decades ago. Some examples of new ICT applications that have become available to administrators include: online student registration, access to course outlines and materials, assignment submissions and discussion forums between students and instructors. HEIs could also engage in ICT-mediated management in areas such as student admission and records, examination results and transcripts, finance and human resource databases and management information. UNESCO(2009) further observes that as a result of applying ICTs in university administration and management, a dynamic new shift occurred in higher education where large and complex institutions could be created and function in a highly efficient and user friendly manner. One such example is the UK Open University with over 200,000 students.

Significant efforts to place ICT in the service of teaching, learning and management have been launched by most developing countries (Edmond, 2008). Kenya for instance drafted an ICT policy in January 2006. The policy objective sought to encourage the use of Information Technology in schools, colleges, universities and other educational institutions in the country so as to enhance institutional management as well as improve the quality of teaching and learning (Republic of Kenya (RoK), 2006). In addition, Kenya's Ministry of Education (MoE) articulated the role of ICT in education in documents such as Kenya Education Sector Support Program (KESSP). The KESSP provided a roadmap for investment in ICT in education and suggested provisional budgets to support educational activities. The proposed investment programme on institutional management systems for instance was intended to achieve efficiency and effectiveness on management of institutional data, decision-making and administration as well as planning (RoK, 2005).

In terms of ICT initiatives, the government as well as most of the Kenyan universities have invested heavily in ICT projects. Ndirangu and Kabira (2012) observe this by noting that key projects include the Kenya Education Network (KENET) Bandwidth Expansion Project at a cost of US$ 12 million and the East African Marine Cable System at a cost of about Ksh. 6 billion. These authors add that universities are buying computers, increasing bandwidth and connectivity, as well as enhancing their other infrastructure to harness the potential of ICT use in education activities. Public universities on their part have invested on computers, bandwidth and connectivity as well as other ICT related infrastructure with an aim of harnessing the potential of ICTs use in education activities. Despite all these, it has not been clear how the heavy investment in ICTs benefit Kenyan public universities in their management processes. This study thus sought to investigate the influence of integration of ICT on academic management in Kenyan public universities.

1.1. Objectives of the Study
   i. To determine the influence of integration of ICT on academic management in public universities in Kenya.

1.2. Research Hypotheses
   i. H_{01}There is no statistically significant influence of integration of ICT on academic management.

2. Literature Review

2.1. Integration of ICT in the Management of Higher Educational Institutions (HEIs)

Information and communication technologies have revolutionized management of HEIs bringing forth new ways of doing things innovatively, efficiently and more effectively. Acosta (2004) notes that quick and accurate decisions by HEIs managers require readily available and relevant information, a fact that makes ICT a vital tool in today's HEIs business world. The author further points out that HEIs must cope with the emerging trends of competing on the ICT platforms thus needing to continually assess their current statuses, and that of their competitors to formulate and manage their own strategies if they have to stay abreast of the latest challenges of the information age.

UNESCO (2009) observes that using ICTs in higher education management is fundamentally about harnessing technology for better planning, setting standards, effecting change and monitoring results of the core functions of universities. UNESCO further notes that more and more universities are looking into developing ICT applications that will do the following things: Improve on the quality and capacity of management information systems to support strategic decision-making and policy implementation; stimulate and facilitate free flow of information throughout the higher education system; and respond to the needs and demands of the academic community (especially the digital natives) for better and increased access to university services and information through the web.

According to Nyandiere (2007) information management in HEIs, like many other institutions, is shaped by the demands of the various entities that interact with the institutions both from within and from outside. Wanjohi (2006) notes that within universities, information management focuses on staff, students and resource management. The information products include both student details, that is, personal information of students and human resource (staff) information which includes records of employees in various cadres. Under the academics, there are details of courses on offer in various departments, examination details, lecturers teaching various courses, relevant books and journals and all relevant academic information necessary to enhance the core business of a university- teaching and research. In addition, there is financial information relating to fees payments, expenditures and donations.

University integrated information management 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 (Dewey &DeBlois, 2006). Enterprise systems enhance standardization, 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 (Sullivan & Bozeman, 2010).ERP benefits to a university generally include increased efficiency and effectiveness of processes, reduced ICT costs, improved decision making, building business innovation and supporting strategic change (Sullivan & Bozeman, 2010; Roman, 2009;Zornada&Velkavrh, 2005). However, due to the integration of various systems into one large system, enterprise systems implementation can be complex, costly and time consuming, and involving to management, staff, consultants and vendors, with possible conflicts between an established organizational culture and the "ERP" culture (Basoglu, Daim, Kerimoglu, 2007).

2.2. Influence of ICT Integration on Organizational Management

According to Tusubira and Mulira (2005) the integration of ICT in organizational functions brings about three main benefits namely: Increased efficiency; cost effectiveness; and competitiveness. Consequently, it may be important to unpack these benefits to see how they impact organizations.

2.2.1. ICT and Organizational Efficiency

Efficiency refers to the performance of a task in the best possible way with the least wastage of time and effort (Oxford University Press (OUP) (2010). Management of information in the current business environment has become a powerful driver in performance of business processes as it determines organizational growth and sustainability (Siriginidi, 2007). With increased globalization, firms are facing unprecedented competition since they operate in a dynamic environment (Watanabe & Hobo, 2003). This has seen them invest heavily in information systems in the effort of integrating and coordinating their activities for efficiency and effectiveness.

In the provision of higher education for instance, information technology has helped transform the role of universities as trans-national institutions. Through the concept of Open and Distance Learning, an increased number of Open Universities are evolving in different parts of the globe to meet the needs of higher and tertiary education. Opportunities for working adults who are unable to attend regular timetabled classes to access learning have been increased (ADB, 2009). The internet allows students to enroll for courses in external universities rather than locally situated ones, thus increasing the diversity and choice of programs available to the learner (Oliver, 2002). The increased use of ICT to deliver instruction holds promise ensuring students isolated by geographical barriers can join together with others through video-conferencing facilities (Baruah & Handique, 2009). All types of learner support services, for example academic counseling and provision of study materials can be provided through ICT.

The efficiency which ICT may bring about into the universities' management can be achieved in areas of ease of access to students and staff records, data on assets of the institutions as well as in front office operations and management of key processes like admissions and examinations (Tusubira & Mulira, 2005).Katz (2001) asserts that the ICT infrastructure is likely to influence and even shape the nature of higher education institutions and the practices of faculty and administrators. The author notes that the faculty, parents, staff and students are demanding more information from the HEIs thus necessitating HEIs information systems to operate automatically, be integrated and accessible to users 24 hours a day, 7 days a week, 365 days a year. Katz further points out that information resources and tools can be invoked to help guide increasingly complex and consequential institutional decisions through tools provided by the systems. HEIs thus are investing in systems that make it relatively easy and cost effective to acquire, store and manage volumes of information about institution's stakeholders.

2.2.2. ICT and Cost Effectiveness in Organizational Management

Information communication technologies are now fairly priced and therefore more affordable to many institutions (Nyandiere, 2007). On his part, Wanyembi (2002)points out that the strong interest in the adoption of ICT emerged in Sub-Saharan Africa for three reasons. Firstly, there was revolution in ICT that has resulted into computer systems -hardware and software- becoming cheaper, and therefore, more widely affordable. Secondly, the substantial value added utility of ICT in the provision of and access to information services for improved planning and organizational management has become more widely recognized. Thirdly, international development agencies and donor countries have exerted significant pressure upon many governments, institutions of higher learning and other recipients of their aid to adapt extensive use of ICT to improve their work performance and organizational management. Golola (2005) points out that the speed of ICT developments, their increasing spread and availability, the nature of their content and their reducing cost, are major implications for teaching and learning, research, libraries and information services, and university management.

2.2.3. ICT and Organization's Competitiveness

Competition among various businesses is the main force behind strategic actions that each enterprise takes. Academic institutions are not spared from competition for excellence and therefore need to make strategic moves, especially taking advantage of information technology (Nyandiere, 2007). The author continue to posit that for HEIs to survive in this competition, they have to ensure that their processes are faster, less cumbersome and that the processes are designed in such a way as to facilitate faster data collection and dissemination for management decision-making. Alter (2001) supports this argument by noting that organizations invest in information systems because they believe the systems will make a difference in the way the organization conducts its business- processes and functions, basically giving the enterprise competitive advantage.

Glazer (1993) on his part argues that successful firms have invested in ICT like everyone else but have differentiated themselves by viewing the management of information produced by these systems as being of paramount importance. This author continues to note that as these organizations identify the relationship between corporate and ICT strategies, they use information to integrate and manage links between the two- the corporate and ICT. Such organizations succeed because of their ability to differentiate themselves from their competitors, especially on the ICT platform. Supporting this view, Parker et al. (1988) maintain that justification for an ICT application should be based on one of two conditions; either it improves the performance of the current organization or it improves the outlook for new business opportunities and strategies of the enterprise. In addition, Hammer (1990) points out that the best rationale for acquiring ICT is strategic alignment of the business and the resultant benefits.

Regionally most organizations including universities have embraced integrated information systems to automate their business processes in order to decrease costs, enhance efficiency and gain competitive position over their competitors (Nour & Mouakket, 2011). With the advent of electronic business and increased importance to leveraging of various sources of information within an organization, information solutions such as Enterprise Resource Planning (ERP) software has come out as a major area of interest to most organizations (Hendrickson, 2010). This author further notes that successfully implemented ICT integration can benefit an organization tremendously even though expensive to acquire. For instance, an organization benefits from it by having increased customer service and reduced manufacturing or production costs.

Wanyembi (2002) notes that colleges and universities in Kenya have felt the pressure to invest in computer-based information systems to manage their academic processes and more so manage the vast amounts of data they handle. Accordingly, information and communications technology resources in Kenya continue to increase in numbers, value and sophistication as more and more institutions invest in the new technology. Ahmad (2009) cautions that integrated information solutions give higher education institutions competitive advantages thus institutions which might not switch to them will find it difficult to retain their market share of students. This is because students will sooner or later demand services offered by other institutions.

3. Methodology

This study adopted a descriptive survey research design. The target population comprised of all the students in the 2012/2013 cohort, lecturers and senior administrators in public universities in Kenya totaling to 47,112. The three oldest public universities in the country namely: University of Nairobi, Moi and Kenyatta Universities were purposively sampled to

participate in the study. All the registrars' academics participated in the study. The determination of sample sizes for the lecturers and students was done using the Cochran's (1977) formula. Proportionate random sampling was used to obtain samples as follows: 132 students from the University of Nairobi; 123 from Moi and 119 from Kenyatta. The same was applied to obtain 167; 77 and 100 lecturers from the three universities respectively. The study population was thus 721 respondents. Instruments' validity was determined by expert judgment. Based on data from a pilot study, a Cronbach alpha coefficient of 0.79 was obtained for students' questionnaire; 0.73 for lecturers'; and 0.82 for registrars' academics. Data were analyzed using the Statistical Package for Social Sciences (SPSS) version 22 computer programme. All tests of significance were done at a confidence level of 95%.

4. Results and Discussion

4.1. Influence of Integration of ICT on Academic Management

This study sought to determine the influence of integration of ICT on academic management in public universities in Kenya. This objective was measured at three levels: The levels of perceptions by students, lecturers and registrars respectively. The findings are presented in that order.

4.1.1. Students' Perceptions on the Influence of ICT Integration on Academic Management

Students were requested to indicate on a 5 point likert scale, their perceptions on items designed to measure the influence of ICT integration on academic management. Their responses were as indicated on Table 1:

Function	Responses (%)					
	N	SD	D	U	A	SA
Support online application	268	4.1	15.7	0.0	19.0	61.2
Manage readmission of students who had discontinued their studies	268	6.0	10.8	1.1	69.4	12.7
Capture details of students' personal information	268	6.3	4.1	1.5	65.3	22.8
Raise invoices based on selected courses which are then used to facilitate fees payment	268	2.2	13.4	4.9	66.0	13.4
Students check their debtor status online	268	12.3	12.3	4.9	59.0	11.5
Students view their academic transcripts online	268	8.6	6.0	3.0	49.6	32.8
Students query and receive academic management related information via SMSs on their mobile phones	268	20.1	38.4	10.8	22.8	7.1

Table 1: Students' Perceptions on Influence of ICT Integration on Academic Management
Source: Field data

Results on Table 1 indicate that students' in the participating universities were able to apply for admissions online(80.2%) while those who had deferred their studies would as well seek readmission through the same platform (82.1%).Administrators could also retrieve personal information about any student because the same was captured during the online registration process and stored in the integrated system (88.1%). Table 1 also indicates that students could raise invoices on their selected courses wherever they were, the invoices could then be seen by cashiers (on the system) who in turn facilitated fee payments (79.4%).Similarly, students could access information about their account balances (70.5%) as well as academic performance (82.4%)from wherever they were by logging into their university students' portal. These results are a clear indicator that the participating universities had integrated ICTs in their academic management processes and students were accessing services online.

The findings on Table 1 are indicative of the ability of public universities in Kenya to leverage ICTs in their academic management just like other modern universities elsewhere in the world. UNESCO (2009) posits that HEIs all over are engaging in ICT-mediated management in areas such as student admission and records, examination results and transcripts, finance and human resource databases and management information. For instance, Hong Kong University (HKU) a high ranking international university uses its Students Information System (SIS) to provide real-time information regarding student registration, personal particulars, course enrolment, and examination timetables. Once students are enrolled in the system, they can navigate through a series of screens to find the information they need. They are able to update their information whenever necessary on the system without the need to fill and or submit any paper forms. This system also calculates standard scores of the exams, analyses the results and manages the transcripts(UNESCO, 2011). In addition, UNESCO (2011) further notes that there are a number of functional modules accessed through the university web portal for administrative staff to use in handling academic/student matters, such as: Course Approval System; Course Database Enquiry; Departmental Student Load; Enrolment Information; Marks Entry System; Provisional Class Lists and Transcript Data Entry System.

Table 1 however shows that the universities were doing badly in one area: students' ability to query and receive academic management related information via SMSs on their mobile phones (29.9%).This means that the universities have been slow in adopting short messaging service (SMS) platform in their academic management. Mavuso, Makana and Anbu (2012) argue that when used correctly, SMS technology can offer immediate response, more engagement and interaction

between organizations and their clients. In addition, bulk SMS messaging enables instantaneous sharing of information by a target group of people, regardless of their location, on an issue of common interest. Raju (2011) points out that when sending the bulk SMS, there is the assurance that it reaches the inbox of the correct recipient and in most cases, it will be the intended recipient who will open it. Further, it has been noted by Lenhart et al. (2010) that one in every three teens among future students is likely to send more than 100 text messages a day or 3,000 texts within a month. Smith (2011) moreover observed that 9 in 10 Smartphone owners used text messaging with about 95% of 18 to 29 year olds sending or receiving text messages. Considering these trends, public universities administrations could consider taking advantage of this technology already in the hands of students and use it for academic management of their institutions.

A simple linear regression analysis was conducted to determine the influence of integration of ICT on academic management based on the perceptions of students. The regression analysis model summary showing the correlation coefficient (R) and the coefficient of determination (R square) is as presented on Table 2:

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.754[a]	.568	.567	.52902
a. Predictors: (Constant), ICT Integration				

Table 2: SPSS Output for Regression Analysis Showing Model Summary

The correlation coefficient of simple linear regression model was 0.754 as indicated on Table 2. This illustrates that there was a high and positive correlation between ICT integration and academic management. The coefficient of determination (R square) was 0.568 indicating that the independent variable (ICT integration) accounted for 56.8% of the cause of variation in dependent variable (academic management).

The overall viability of the regression model was checked by undertaking Fisher's one way Analysis of Variance (ANOVA). This was informed by the fact that the data under consideration was likert scale items which is a group of related items utilizing a similar scale measurement (Young, 2009). The regression analysis showing ANOVA is as indicated on Table 3:

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	97.992	1	97.992	350.147	.000[b]
	Residual	74.442	266	.280		
	Total	172.434	267			
a. Dependent Variable: Academic Management						
b. Predictors: (Constant), ICT Integration						

Table 3: SPSS Output for Regression Analysis Showing ANOVA[a]

Data is considered good fit for model if the p value of ANOVA is less than .05 (Young, 2009). In this context, as illustrated on Table 3 the observed p value was .000 which is less than .05 indicating that the available data was good fit for the regression model. This showed that the regression model was reliable to give accurate predictions on the relationship between ICT integration and academic management.

To determine the predictive effect of the independent variable (ICT integration) on the dependent variable (academic management), the regression coefficients were used as indicated on Table 4:

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.789	.166		4.766	.000
	ICT Integration	.819	.044	.754	18.712	.000
a. Dependent Variable: Academic management						

Table 4: SPSS Output for Regression Analysis Showing Coefficients[a]

The results on Table 4showed a constant of 0.789 and a regression coefficient of 0.819 in respect to ICT integration. This is mathematically represented below:

$y = 0.789 + 0.819x_1$; where

y= Academic management

x_1 = ICT integration

The regression model on Table 4indicates that a unit increase in ICT integration will lead to a 0.819 increase in academic management. This implies that there is a high positive influence of ICT integration on academic management as illustrated by regression coefficient of 0.819. The hypothesis stated below was tested using the t statistics shown on Table 4.

H_{01}: There is no statistically significant influence of integration of ICT on academic management as perceived by students.

The hypothesis was tested at .05 level of significance with a rule to reject H_{01} if the p value ≤ .05. The p value for this study was .000 which was below .05 hence leading to a conclusion to reject H_{01} and accept H_{a1} (Hahn & Doganaksoy, 2011).This implies that there was a statistically significant influence of integration of ICT on academic management as perceived by student.

Studies have shown that integration of ICT in academic management in HEIs helps to improve information access for planning and managing the institution. It also enables users to access students' information, academic records and other data needed to complete their daily work (King, Kvavik & John, 2002; Davis & Huang, 2007). This in turn leads to improved business processes and services provided to the faculty, students and other staff (Davis & Huang, 2007). A study to investigate the impact of ICT integrated systems on business process and performance in higher education in Australia also found that the said systems potentially improved business performance in higher education institutions by enhancing services offered to students, faculty and staff (Judith, 2005).

4.2.2. Lecturers' Perceptions on the Influence of ICT Integration on Academic Management

Lecturers were also requested to indicate on the same 5 point likert scale, their perceptions on items designed to measure the influence of ICT integration on academic management in their institutions. Responses were as indicated on Table 5:

Function	Response (%)					
	N	SD	D	U	A	SA
Support online admission processing of applicants	243	5.8	16.0	2.5	46.5	29.2
Capture details of students' personal information	243	4.5	22.2	5.3	37.0	30.9
Raise invoices based on selected courses which are then used to facilitate fees payment	243	11.5	7.4	11.9	44.9	24.3
Students check their debtor status online away from campus	243	6.6	10.7	8.2	45.7	28.8
Lecturers update class attendance and view statistics on the same	243	14.0	16.5	28.4	23.9	17.3
Lecturers record and process assessments and examinations results	243	4.0	9.5	12.7	39.2	34.6
Students view academic transcripts online	243	9.5	13.2	4.1	36.6	36.6

Table 5: Lecturers' Perceptions on Influence of ICT Integration on Academic Management
Source: Field data

Table 5 shows that the integrated academic management systems in public universities in Kenya enable prospective students to apply for admissions online (75.7%).In addition, details of students' personal information are captured during the online registration process, stored in the system and may be retrieved whenever need arises (67.9%).The system also raise invoices based on selected courses which are then used to facilitate fees payment (69.2%). Moreover, students may check their debtor status online (74.5%) as well as view their academic transcripts (73.2%).These findings corroborate the results presented on Table 1 about students' perceptions on influence of ICT integration on academic management. Students had indicated that ICT integration was enabling them to apply online for admissions, register their details, access their fees invoices and payment receipts, and view their provisional academic transcripts via the same online platform.

Seventy three point eight percent (73.8%) of the lecturers also indicated that the integrated academic management systems enhanced recording and processing of students' examination results. These results agree with Nyandiere et al. (2012) who established that Kenyan universities have as well invested in integrated systems that manage examination processes from the time students enroll to the time they graduate. Balasubramanian et al., (2009) and UNESCO (2009) point out that ICT can aid in processing voluminous data, produce reliable and consistent records as well as make it easy to search and find required information quickly. The same authors argue that ICT can monitor students' progress and maintain an account of students 'performance and results.

Table 5 nonetheless indicates that lecturers barely used the integrated academic management systems to update class attendances and view statistics on the same (41.2%). This means that public universities in Kenya are slow in using ICT to monitor students' class attendance. Boggs (2010) argues that electronic management systems make it easy to track, update and manage learners' records.

To determine the influence of integration of ICT on academic management as perceived by the lecturers, a simple linear regression analysis was conducted with ICT integration as the independent variable and academic management as the dependent variable. The regression analysis model summary showing the correlation coefficient (R) and the coefficient of determination (R square) is presented on Table 6:

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.580[a]	.336	.333	.87221
a. Predictors: (Constant), ICT integration				

Table 6: SPSS Output for Regression Analysis Showing Model Summary

Table 6 shows that the R indicated there was a moderate and positive correlation between ICT integration and academic management (0.580). The coefficient of determination (R Square) of 0.336 indicated that ICT integration accounted for 33.6% of the variation in academic management.

ANOVA was used to test whether the available data was good fit for regression model. The results are presented on Table 7:

	Model	Sum of Squares	df	Mean Square	F	Sig.
1	Regression	92.829	1	92.829	122.024	.000[b]
	Residual	183.340	241	.761		
	Total	276.169	242			
a. Dependent Variable: Academic management						
b. Predictors: (Constant), ICT integration						

Table 7: SPSS Output for Regression Analysis Showing ANOVA[a]

According to Young (2009) data is considered good fit for model if the p value of ANOVA is less than .05. In this context, Table 7shows that the observed p value was .000 thus indicating that the available data was good fit for the regression model. This implied that the regression model could be relied upon to give accurate predictions on the relationship between ICT integration and academic management.

To determine the predictive effect of the independent variable (ICT integration) on the dependent variable (academic management), the regression coefficients were used as indicated on Table 8:

	Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.323	.216		6.126	.000
	ICT Integration	.635	.058	.580	11.046	.000
a. Dependent Variable: Academic management						

Table 8: SPSS Output for Regression Analysis Showing Coefficients[a]

Table 8 shows that the regression coefficient of the ICT integration was 0.635 while the constant of the regression model was 1.323 as illustrated in the equation:
$y = 1.323 + 0.635x_1$; where
y = Academic management
x_1 = ICT integration
This regression model indicates that a unit increase in ICT integration will lead to a 0.635 increase in academic management. There is thus a positive influence of integration of ICT on academic management as illustrated by regression coefficient of 0.635. The hypothesis stated below was tested using the t statistics on Table 8.

H_{02}: There is no statistically significant influence of integration of ICT on academic management as perceived by lecturers.

The hypothesis was tested at .05 level of significance with a rule to reject H_{02} if the p value ≤ .05. The p value for this study was .000 which was below .05 hence leading to a conclusion to reject $H_{02}$and accept H_{a2}. This implies that there was a statistically significant influence of integration of ICT on academic management as perceived by lecturers. This finding corroborated the result of the regression model presented on Table 4showing the same perception by students.

Zornada and Velkavrh (2005) argue that ICT integrated systems use in HEIs incorporates administrative functions that had been supported by separate legacy systems in the past. Separate legacy systems are disparate and often lead to duplication of resources and services (Allen & Kern, 2001). Today ICT integrated systems enables HEIs to consolidate disparate data and legacy systems and adopt best-of-breed processes. As different departments across an institution share an integrated database, end users are able to access data in real time. Best-of-breed information technologies such as web technologies, mobile phones and on-line services offer additional benefits not only to the administration within an institution, but also to people who constantly interact with the institution – faculty, students, and staff (Murphy, 2004; Zornada &Velkavrh, 2005). According to King (2002), the main advantages of ICT integrated systems in HEIs are: improved information access for planning and managing the institution; improved services for the faculty, students and staff; lower business risks; and increased income and decreased expenses due to improved efficiency.

4.3.1. Registrars' Perceptions on Influence of ICT Integration on Academic Management

Registrars in charge of academic affairs in respective universities were also requested to indicate on the same 5 point likert scale, their perceptions on items designed to measure the influence of ICT integration on academic management in their institutions. Their responses were as indicated on Table 9:

Function	Response (%)					
	N	SD	D	U	A	SA
Support online admission processing of applicants	3	0	0	0	0	100
Manage readmission of students who had discontinued their studies	3	0	0	0	33.3	66.7
Capture details of students' personal information	3	0	0	0	33.3	66.7
Raise invoices based on selected courses which are then used to facilitate fees payment	3	0	0	0	0	100
Students check their debtor status online	3	0	0	0	0	100
Lecturers update class attendance and view statistics on the same	3	0	0	0	66.7	33.3
Lecturers record and process assessments and examinations results	3	0	0	0	0	100
Students view their academic transcripts online	3	0	0	0	0	100
Students query and receive academic management related information via SMSs on their mobile phones	3	0	0	0	33.3	66.7

Table 9: Registrars' (Academics) Perceptions on Influence of ICT Integration on Academic Management
Source: Field data

The ability to make informed decisions quickly is the hallmark of every successful organization. University integrated information management systems have been noted to bring about faster and better decision making, given their guaranteed access to high quality, accurate, well maintained and easily retrievable information (Sullivan & Bozeman, 2010). Table 9 shows that the participating universities were experiencing an enhancement in their academic management after integrating ICTs.It is evident from the Table that the universities prospective applicants were getting admitted and enrolled in courses of their choice online thus saving them time and expenses that they would have incurred if they had traveled to campuses for manual admissions. During the process of online registration, details of students' personal information could be captured and stored in the integrated systems for retrieval anytime they would be required. In addition, the integrated systems could raise invoices based on selected courses which would then be used to facilitate fees payment thus enhancing efficiency in financial records management. Students would also be provided with ability to check their debtor status online as well as view their academic transcripts from wherever they could be. Recording as well as processing of examinations results was also facilitated by the integrated systems. All these findings corroborate the results on Tables 1 and 5 which represent students' and lecturers' perceptions on influence of ICT integration on academic management. The two groups had also noted that integration of ICTin academic management by the participating universities enabled students to apply online for admission, register their personal details, access their fees invoices and payment receipts, as well as their provisional academic transcripts.

However, the findings on Table 9showing that lecturers updated class attendance and viewed statistics on the same; and students' queried and received academic management related information via SMSs on their mobile phones contradict the results on Tables 1 and 5 respectively on the same functions. While all the registrars indicated that ICT integration supported these two functions, only 29.9% students' indicated that they queried and received academic management related information via SMSs on their mobile phones. At the same time, only 41.2% of the lecturers indicated that they usually updated students' class attendance and viewed statistics on the same through the integrated management systems. These results may imply two things: firstly, the universities integrated systems could be having some potentials that are not benefiting the institutions due to their under use. Strohmeier (2001) argues that the main factors that cause failure of information technology systems in organizations are mainly human as opposed to technical or malfunction of the actual systems. From this assumption, there is need for university administrators to closely monitor the actual implementation of the ICT systems integrated by their institutions for them to be assured of maximum benefits. Secondly, the contradiction may also be explained by what Fisher (1993) terms as social desirability bias. This refers to the attempt by respondents to portray themselves or their organization in a more favorable light especially when responding to survey items. If this was the case, the registrars were then agreeing with the above two statements that students and lecturers had disputed just to portray their institutions as being techno-savvy probably for the purpose of appealing to prospective clients.

A further concern of the study was on the perceived benefits of ICT integration in academic management by this category of respondents. The responses given are indicated on Table 10:

Benefit	Response (%)					
	N	SD	D	U	A	SA
Affords greater management control over the academic processes	3	0	0	0	0	100
Increases customer satisfaction due to faster processing and accurate data capture and analysis	3	0	0	0	0	100
Better performance in fees collection, management and reporting of student debtors	3	0	0	0	0	100
Cost-effectiveness in operations (e.g. users view information/data via web-browser rather than maintaining bulky physical documents)	3	0	0	0	0	100
Improves communication of the university management with academic departments	3	0	0	0	33.3	66.7
Improves efficiency for lecturers by enabling them to enter examination marks electronically as soon as they are available	3	0	0	0	0	100
Improves graduation rates due to enhanced efficiency in the university	3	0	0	0	33.3	66.7

Table 10: Registrars' (Academics) Perceptions on Benefit of ICT Integration on Academic Management
Source: Field data

Generally, the benefits of ICT integration to universities management have been noted to include increased efficiency and effectiveness of processes, reduced management costs, improved decision making, building business innovation and supporting strategic change (Sullivan &Bozeman, 2010; Roman, 2009; Zornada &Velkavrh, 2005).Table 10 shows that all the registrars (academics) who participated in the study indicated that ICT integration afforded greater management control over the academic processes at their universities that had resulted into higher performances in academic work. ICT integration also increased customer satisfaction due to faster processing and accurate data capture and analysis. In addition, the participating universities did better in fees collection as well as saved on operational costs. Moreover, ICT integration improved the efficiency for lecturers who were now able to enter examination marks electronically as soon as they were available.

Nevertheless, the investment in ICT integration in the participating universities had not yet entirely enhanced communication of universities management with academic departments (66.7%) as well as the graduation of more students (66.7%). Niederman and Beise (1999) argue that ICT-enabled communication which range from telephone to the Internet and cellular technologies enhances quality of decision making, reduce time taken to reach decisions and increases degree of focus on tasks. This in turn increases efficiency, productivity, improves collaboration, and makes easier coordination of activities. Thus, proper integration of ICT in intra-universities communication may enable them reap the benefits of timely quality decisions, participation and a high degree of efficiency in coordination of activities. Enhanced efficiencies in universities could in turn lead to improved graduation rates. This is because ease of access to crucial information such as students' marks, course registrations and attendance as well as fees clearance records would be sorted out quickly to enable deserving students to graduate without undue delays.

5. Conclusion

This study concluded that integration of ICT has had a positive influence on academic management processes in public universities in Kenya. Students today are able to apply for admissions online, register for their courses of choice, make and track their fee payments and account balances as well as obtain their provisional academic transcripts remotely. The leveraging of ICT in academic management has led the universities to get the following benefits: higher performances in academic work because of enhanced management control; increased customer satisfaction; enhanced fees collections; cost-effectiveness in operations; and improved lecturers' efficiency.

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