RESEARCH ARTICLE

STRATEGIC DEPLOYMENT AND EMPLOYMENT OF ICT RESOURCES IN PUBLIC INSTITUTIONS

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ARTICLE INFO	ABSTRACT
	This study examined the application of three ICT resources (i.e. computer hardware, network and internet infrastructure and web resources) in university business processes. The study was undertaken at Masinde Muliro University of Science and Technology (MMUST). Primary data was collected by observation and interviews and from questionnaires to a stratified population sample while secondary data was obtained from reviewed university policy documents, surveys and reports and other relevant sources. The results of this study indicated that ICT resources, though available, were not applied in university's business processes and that no efforts were made to integrate the resources in university business processes hence the very low automation levels. The findings will contribute to knowledge on the effects of ICT resource deployment strategies on automation of business processes and service delivery in public universities.

INTRODUCTION

ICT resources are acquired to either automate business processes or office activities. It follows that, on acquisition, they are expected to be deployed in specific areas where they will affect productivity most. However, the application of these ICT resources has remained largely confined to basic desktop applications, email and social networking while critical performance-sensitive activities remain largely manual as they were prior to acquisition of the resources. Consequently, service delivery has not significantly benefited from these investments and can create a false impression that these resources are not useful. This has arisen out of the gap of knowledge between the acquisition of these resources, their deployment and how they are employed in the business processes. There is a gap between the investment in ICT and the capacity of users to utilize these technologies in a way that can actualize the effectiveness and efficiency in service delivery. ICT resources have the capacity to turn around the performance of an organization's operations when they are appropriately deployed.Studies elsewhere indicate that indeed ICT resources contribute to improved service delivery and customer satisfaction (Ku¨ng & Hagen, 2007). In a university, they can be deployed to serve in administrative business processes as well as in teaching applications. However, if they are not deployed on sites where business processes are carried out, they could end up being largely misused on diversionary activities such as playing games, watching movies, social networking and chat rooms during working hours. Even if the resources are appropriately deployed but no effort is made to review and integrate ICT in the business processes, there will be no significant effect as studies carried out in Ghana and Nigeria indicates. Afari-Kumah & Tanye(2009) and Nbina, Obomanu, & Vikoo(2011) found that, many students and lecturers did

not use computers for teaching or learning. Though studies carried out in Pakistan, Jordan and Turkey, showed an increase in computer use by teaching staff, they were unable to employ them in teaching (Gülbahar, 2009), and no mention was made on the utilisation of computers for university business processes.

According to (Latoza), introducing any type of technology (hardware, software, and telecommunication) that is significantly different from those an organization currently uses should be considered as new technology that will require careful deployment strategy. These strategies vary depending on the environment where the technology will be used. The writer proposes three deployment strategies, i.e. diffusion, test site and blanket or edict strategy. The diffusion strategy is suitable when a new software application is being introduced in an organization especially in areas that were not involved in systems development. It allows the technology to permeate through the organization by word of mouth. This strategy forces the technology to sell itself and makes the experienced users of the technology to be the salespeople. The diffusion strategy allows an organization to accept the technology on its own time-scale and to make choices about local deployment. Unfortunately, this strategy when employed in large organizations can take a long time and delay the benefits of the investment. The advantage is that the skeptics have an opportunity to see the new technology at work and get a first-hand account of its benefits from a colleague. Considering the cumulative cost of acquiring and maintaining ICT resources, the investment should yield apparent automation benefits wherever they have been deployed. Unfortunately, these benefits cannot be realized if no efforts are made to deploy the resource into the critical business processes before or after acquisition of the resources. Investing casually in ICT resources implies that the expected benefits may not be defined. When these resources are delivered, there is a possibility that they may not be deployed or applied appropriately as expected by university managers. In a service-oriented industry like a university, good

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customer services give an organization a good reputation and enhance its position as a destination of choice by potential clients. If ICT resources will not assist in building and bolstering this position, the false impression is that the investments are not worthwhile.

Therefore, there was need to establish how ICT resources in public institutions and universities in particular had been acquired and deployed and whether they affected services delivery rendered by the business processes. This study is significant because it investigated and uncovered the gaps that existed in the deployment and utilization of ICT resources in public institutions and how their performance and service delivery was affected. It will: (a) contribute to knowledge pertaining to deployment and utilization of ICT in public universities; (b) contribute to policy on acquisition, appropriate deployment and utilization of ICT resources in public universities and, (c) help public universities to establish effective ICT integration and automation strategies that can facilitate better service delivery to public university stake holders.

METHODOLOGY

This study examined the contribution of ICT resources deployment on business process automation. This was established by collecting data on the current state of deployment and utilization of ICT resources; the number and type of ICT resources available, and where they had been deployed. When this data was analyzed, it revealed that the acquisition and deployment of ICT resources did not have any rational basis. It also exposed the effect on the success or failure of business process automation. This was achieved using a descriptive research approach. According to (Kirshenblatt-gimblett, Spring 2006), this is a study that seeks to discover what is going on in the selected area of study.She further states that good descriptive research establishes facts and dimensions of a phenomenon and provokes the desire to know why the current state is as it is. This study also took a case study approach.According to Yin (2003), a casestudy design should be considered when among other reasons: the focus of the study is to answer the "how"and "why" questions and when you cannot manipulate the behaviour of those involved in thestudy. This study did not seek to influence users' employment of ICT resources; rather, it sought to explore how they acquired, deployed and used the resources and explain why they did so.

Sampling Technique

This study focused on obtaining data on deployment of ICT resources where direct services to students are offered across the university. The heterogeneous nature of the study population comprising of teaching and non-teaching staff, and the need to make the population as representative as possible, necessitates the need to use the purposive stratified sampling technique. Administrative and support staff use the computer resources for developing official documents. The teaching staffs are expected to not only be computer-literate but active users of ICT resources in their academic endeavors, both private and official.107 respondents from among the teaching staff (30 per cent of the total population of teaching staff of 357 as at 1st May 2011) were part of the study population. The respondents from teaching staff were selected at random regardless of gender, age, qualifications or department across all faculties.

Table 0-1: Summary of the study population

	Target Population	Sample population	Actual Respondents
Teaching staff	357	107	83
Administrative staff	210	70	51
Total	567	177	134

However, not all officers in the target population of non-teaching staff serve students and also use computers. Data was collected from respondents in administrative roles who use computers and serve students directly.

Data collectionand analysis methods

To help answer the research questions, two main tools of data collection were used. The questionnaire was the primary tool, which was administered to the randomly selected sample populations within Masinde Muliro University of Science and Technology. Two questionnaires were designed to collect data from the two different types of people. The MMUST staffs were broadly designated either administrative or teaching to reflect their different modes of serving students. The second tool was an observation schedule/checklist designed to capture actual observable evidence of deployment and utilization of ICT resources in all the areas of the university under the study. Observable data was collected to capture the extent of automation in the business processes and the efficiency of service delivery processes. During the observation, the researcher interviewed respondents related to observed processes/activities to clarify the observations. Sites where students access services were visited to capture observations, according to the observation checklist, on how ICT resources are applied in service delivery. Documentary sources were also used to collect data from past surveys carried out by the university.The Quality Management System work procedures and ICT inventory of equipment were reviewed.

ANALYSIS AND DISCUSSION OF FINDINGS

The respondents in this study were of both genders. Though the proportions in the two groups of administrative and teaching staff varied, they represented a fair proportion of the total.In general, a substantial number of staff in this study was aged less than 40 years of age. These are people who are expected to have done their tertiary education between 1995 and 2010; this is a time when computer literacy and ICT awareness in general was high in institutions of higher education. Therefore, their appreciation of ICT resources and capacity to take advantage and integrate them in their daily activities is also expected to be higher. Due to the nature of their jobs, teaching staff do not usually stay in offices the way administrative staffs do. This study was conducted between May and August; this is a period of attachments and internships supervision and evaluation while others take their annual leave. It is also a period in the academic calendar of local universities when external examination of semester examinations is carried out. This is an exercise that is usually undertaken by Professors and senior lecturers. This explains why very few senior lecturers and professors participated in the study.

Deployment and utilization of ICT resources

According to Liu (2011), "Resources are the basis for the development of the colleges and universities and the essential guarantee forhigher education quality as well". He further notes that the implementation of university automation has resulted in the enhancement of teaching, research, management and service delivery and the general improvement of the universities' corecompetitiveness. However, the allocation of these resources can be a challenge unless there is a viable strategy based on the business needs. Acquiring ICT resources is an important step in an organization's quest to automate its business processes. Masinde Muliro University of Science and Technology has invested in a variety of ICT resources to support its operations and business processes. These include computer hardware and application software, local area network and internet infrastructure, and other auxiliary devices such as projectors, and scanners. They are located in offices both in main campus and the satellite study centers in various parts of the country. This study considered ICT resources that are required to facilitate basic automation of business process activities. These resources included desktop and laptop computers, printers and office automation

applications software. Table 3-1 is a summary of the computer hardware resources and how they have been deployed.

Table 0-1: Computer hardware resources and where they are deployed

	ICT Resource	Administration offices	Teaching departments	Student Labs	Total
1	Desktops	165	64	251	483
2	Laptop	52	12	0	64
3	Printers	77	39	0	116
4	Scanners	9	3	0	12
5	Servers	5	0	1	6
6	UPS	22	1	5	27
7	Projectors	4	7	0	11

Source: Directorate of ICT, MMUST (2012)

From the data provided in Table 3-1, it is evident that most of the hardware resources were located in administrative offices where they are used by clerical staff, secretaries, chairmen of departments and other administrators. Science and Computer labs only had desktop computers and a few UPS (5units). With an average of between 2.5 computer systems in each academic department, it is obvious that the university has not invested adequately in ICT resources specifically for academic staff of over 300 people. The few available (64 units) are likely to serve the chairmen of teaching departments and their secretaries only. Having a deeper understanding of the operations of an office after spending such a duration of time in a station with access to ICT resources, it is expected that the officers would be in a position to employ ICT resources in their operations. However, there is a possibility that they had access to these resources but did not have a say on how the resources were employed because their access was not exclusive. Table 3-2 presents data on accessibility of the computer systems to individual respondents.

negative impact on those who would have wished to automate their processes because of insufficient access. Definitely, such applications as email, instant messaging and paperless office automation will be frustrated. Teaching staff were equally affected by this deficit in computer systems. With an average of 2.5 computer systems per department, it is evident that only the chairman of department and the secretary would be able to access and use these resources adequately. This is confirmed by the data presented in Table 3-5 which shows that those who used desktop computers (likely to be available in the department) only were 3.9 percent. It is likely that these computer resources are private. With such an acute shortage of computer systems, it is exceedingly difficult to implement any meaningful automation. It is also hard to enforce regulations or policies that would make use of ICT resources mandatory if the staff is not facilitated adequately. The above scenario raises questions of how and where the ICT resources are deployed. Was there a specific rationale for deploying them in one office and excluding another based on the corporate needs? It is possible that there is none. Computers were just bought without any user involvement and installed!

Analysis of the data collected indicates that many of the respondents had not embraced these resources for use in their respective business processes. However, the same data indicates that computer literacy was generally high considering the popularity of computer applications such as MS Word, Facebook and Yahoo mail service. It is an indicator that there was a gap between literacy and the utilization of ICT resources on business processes. It is not enough to acquire and deploy ICT resources for process automation to be realized. One of the strategies of addressing this gap is to undertake a business process review with the objective of identifying which activities and the processes that need automation.

Table 0-2: Availability of computer resources to administrative staff

	Availability of computer systems	Frequency	Percent	Valid Percent
Valid	I have a computer to myself	8	15.7	16.3
	I share my computer with a colleague	5	9.8	10.2
	I share a computer with two colleagues	3	5.9	6.1
	I share a computer with more than two colleagues	33	64.7	67.3
	Total	49	96.1	100.0
Missing	99	2	3.9	
Total		51	100.0	

It is evident that the computers were inadequate as only 16.3 percent of the respondents had exclusive access to a computer while the rest (83 percent) either shared or had none. As for teaching staff, Table 3-3 shows that all the respondents had access to computer systems of various kinds.

Table 0-3: Types of computer resources available to teaching staff

	Frequency	Percent	Cumulative Percent
Desktop only	3	3.6	3.6
Desktop + Laptop	15	18.1	21.7
Desktop + Laptop + Printer	36	43.4	65.1
Laptop + Printer	18	21.7	86.7
Laptop only	11	13.3	100.0
Total	83	100.0	

Majority (96.4 percent) had access to laptop computers while 43.4 percent had used a desktop, laptop computer and a printer. Considering the inadequacy of the available resources (Table 3-3), it is likely that many of these staffs were using personal resources. Data presented in Table 3-2 shows that the computer systems were not sufficient for the administrative staff who participated in this study. 66.7 percent shared their access to computers with more than two colleagues. This implies that for these officers to use computer resources, another officer has to make way or suspend whatever they are doing to allow the resource to be shared. This scenario has a

According to Sousa, et al(2011), when employees are not aware of business procedures (because they were excluded when decisions were made and no effort was made to assimilate them in the automation process), they consequently may not follow the established policies and laws. In addition, organizations also face problems when the evolution of enterprise systems (i.e. software applications) is faster than the evolution of the business processes (which employees are familiar with) supporting those systems. Further, the authors assert that, the organizations that face these kinds of issues have not employed any alignment strategy or they apply simplistic strategies that do not cover different organizational contexts. Aligning business processes with enterprise systems (i.e. ICT resources) enables organizations to execute changes with flexibility. Inclusive business process reviews have an effect of alligning the existing processes with the acquired enterprise systems besides giving potential users a sense of ownership and an opportunity to participate in crafting strategies of successful automation. During the reviews, users get an opportunity to see how to accomplish their roles in the context of the automated systems. They are able to interrogate the viability of this new approach of doing their work and how to make it succeed.

Internet and network availability

The university had also invested in a campus-wide local area network and Internet infrastructure which accords it the capacity to share data,

information, hardware and application systems resources. Data from this study also indicated that the university had invested in a website and email service that some staffs actively used.The university website was a source of information and contained links to electronic library resources and electronic communication facilities. Students could use it to download application forms for various programmes, administrative staff could upload notices to students and teaching staff could upload course outlines, lecture notes and assignments. Academic staff could use it to upload study material in soft copy and save on printing expenses.Figure 3-1illustrates how the respondents in administrative offices accessed the Internet.

(i.e. more than 50 percent of the time) were only 26.5 percent while those who used it less were 60 percent of the respondents. 12 percent never used it. Considering the fact that the university email service is built into the website, it is possible that this lack of interest in the website also affected the mail service. Though data in this table indicates that the university website was not very useful to most of the administrative staff, data in Table 3-5 says otherwise. Though 88 percent of the respondents said they had interacted with the university website (Table 3-4), findings in Table 3-5 indicates that only 56 percent could comment on its usefulness while a big number of the respondents (43.1 percent) did not respond to this question on how
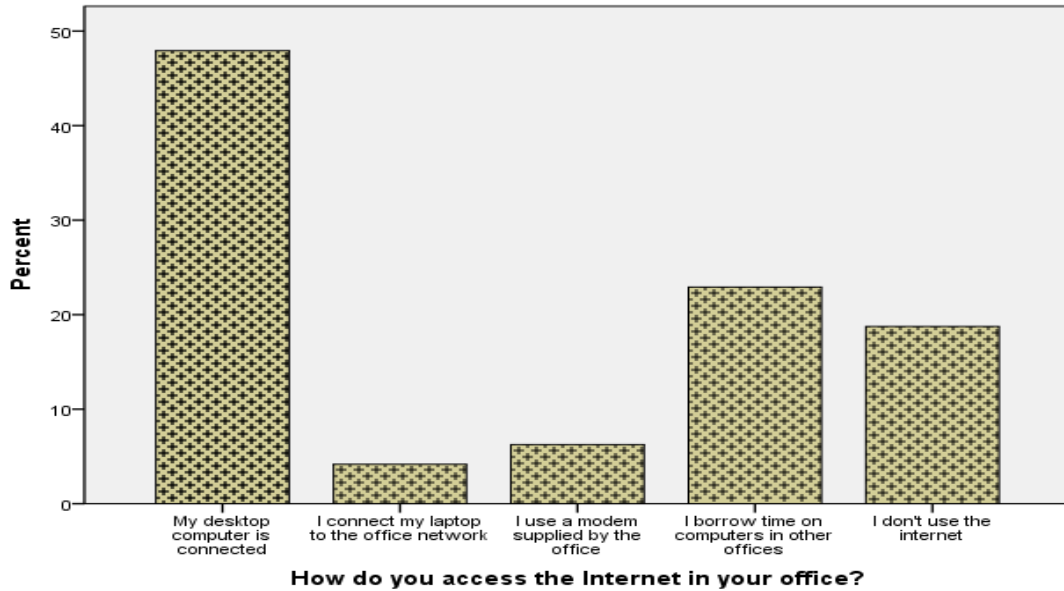

Figure 0-1: How respondents accessed internet in the office

Cumulatively, 74.4 percent of the respondents enjoyed internet connectivity available on the university LAN: 45.1 percent of them had direct access on desktop computers in their offices; 22 percent borrowed time on computers in other offices that had connection and 4 percent used their laptop computers to connect to the university network. 16 percent did not use internet while 4 percent failed to respond to that question. This is an indicator that if the university business processes required the use of the internet, then it was available at the point of use. Figure 3-1 indicates that most of the respondents in administrative offices (83 percent) had access to the internet. It is expected that some official communication would take advantage of the internet connectivity but, the available data on usage paints a different picture. From the data in Table 3-1, there were 5 servers in administrative departments and a single server for the teaching departments. Internet connectivity was available 24 hours a day, seven days a week. A website incorporating an Intranet mail system was also available. The most common activity that administrative staff could have done was to communicate with clients through notices on the website and use email for communication. Tables 3-4 and 3-5 present data on the administrative staffs that used the university website and email service.

useful the website was to them. It is possible that those who did not respond may not be familiar with it.

Table 0-5:Administrative staff who found the website to be useful

Respondent's opinion on website's usefulness		Percent	Valid Percent	Cumulative Percent
Valid	Not useful	3.9	6.9	6.9
	useful	39.2	69.0	75.9
	somehow useful	13.7	24.1	100.0
	Total	56.9	100.0	
Missing	99	43.1		
Total		100.0		

Among those who responded, 71.4 percent found the university website to be useful, 21.4 percent found it somehow useful while only 7.1 percent did not. Therefore, 56 percent of the respondents responded to this question on the usefulness of the university website and Table 3-6 presents an analysis of their opinion.From Table 3-6, those who did not find the website useful either used it rarely or did not use it at all. Notably, whilst 40 percent of the respondents found the website useful, only 26 percent of the respondents used it frequently (more than 50 percent of the time). The email service is a component of the university website and it is expected that those who visit the site may also use the free mail service. It is also expected that all official email communications should be done using the University official mail service. Table 3-7 presents data on how frequently administrative staffs used the university mail service.

Table 0-4: Administrative staff that used the university website

		Percent	Cumulative Percent
Valid	Always	12.0	12.0
	Usually	14.0	26.0
	Sometimes	30.0	56.0
	Rarely	32.0	88.0
	Never	12.0	100.0
	Total	100.0	

From the data presented in Table 3-4, 88 percent of the respondents used the university website. Those who used the website frequently

Table 0-6: Opinions of respondents who used the website

Frequency of using the university website	Number of respondents and how they regard Website's Usefulness			Total	%
	Not useful	Useful	somehow useful		
Always (75-100%)	0	4	0	4	12
Usually (50-75%)	0	2	1	3	14
Sometimes (25-50%)	0	9	3	12	30
Rarely (0-25%)	2	4	2	8	30
Total	2	19	6	27	86
Percentage	4	40	12	56	

Table 0-7: Administrative staff respondents who used MMUST mail

		Percent	Valid Percent	Cumulative Percent
Valid	Always(75-100%)	7.8	12.1	12.1
	Usually(50-75%)	13.7	21.2	33.3
	Sometimes(25-50%)	5.9	9.1	42.4
	Rarely(1-25%)	9.8	15.2	57.6
	Never(0%)	27.5	42.4	100.0
	Total	64.7	100.0	
Missing	99	35.3		
Total		100.0		

Those who used the service more than 50 percent of the time were 33.3 percent while those who used it occasionally (i.e. between 1 to 50 percent of the time) were 15.7 percent. Those who never used it at all accounted for 40.6 percent. The respondents who never responded to this question were 35.3 percent. There is a possibility that those who did not respond to this question also did not use the MMUST mail facility. Therefore, respondents who never used the service and those who never responded accounted for 62.8 percent of the respondents. These results show that the MMUST mail service is not popular among the staff in administration. Communication with students is an important aspect of service delivery by the university administrative staff. Table 3-8 presents data on the variety of methods they used to communicate to their primary clients.

Table 0-8: Administrative staff's preferred modes of communication

Preferred mode of communication	Frequency	Percent	Cumulative Percent
Postal mail	1	2.0	2.0
Telephone	10	19.6	21.6
Notices on notice boards	30	58.8	80.4
Messenger-delivered memo	2	3.9	84.3
e-mail	5	9.8	94.1
others(Specified)	3	5.9	100.0
Total	51	100.0	

The respondents were asked to indicate how frequently they used the selected modes of communication to interact with their clients. The data shows that the most popular mode of communication was by using notice boards (58 percent) and telephone (20 percent). ICT-based communication by email accounted for only 9.8 percent. This result shows that ICT resources (specifically email) were not preferred for communication. According to Figure 3-1,46 percent of the respondents had direct access to the internet using their desktops but, in Table 3-8, their preferred modes of communication were by notices on notice-boards and telephone. The explanation may not be the capability (or lack of it) of individual officers to use email for communication. Data in Table 3-9 shows that the same staff who did not like using email to communicate with their clients, used it for personal communication.

Table 0-9: Administrative staff that used email for personal communication

How often do you use email for personal communication?		Percent	Valid Percent	Cumulative Percent
Valid	Always(75-100%)	29.4	36.6	36.6
	Usually(50-75%)	13.7	17.1	53.7
	Sometimes(25-50%)	15.7	19.5	73.2
	Rarely(1-25%)	7.8	9.8	82.9
	Never(0%)	13.7	17.1	100.0
	Total	80.4	100.0	
Missing	99	19.6		
Total		100.0		

Table 3-8 shows that only 10 percent of the respondents used email on official mail while 55 percent of the respondents used internet for personal email more than 50 percent of the time (Table 3-9). Data in Table 3-9 shows that 53.7 percent of the respondents used the internet on personal emails more than 50 percent of the times they were online. 19.6 percent did not respond to this question while 13.7 percent said they never used email at all. This is an indicator that majority of the respondents (73.2 percent) were aware and did use email for personal communication frequently but did not like using it for communication with their clients. The fact that 72 percent of the respondents had access to the internet provided freely by the University implied that if they desired and had the capacity, the staff would have integrated these resources in their respective business processes. The data also showed that some of the respondents were active on social media such as Facebook and Tweeter while most had an active email account. However, the university email and website were not popular with most of the respondents. Table 3-10 summarizes the frequency of use of the preferred email services for administrative staff.

Table 0-10: Summary of frequency of use of preferred email service for administrative staff

Preferred Electronic Mail service	Frequency of use (%)		Cumulative percentage
	50-75	75-100	
Yahoo	29.5	52.3	81.8
MMUST Mail	21.2	12.1	33.3
Gmail	15.6	25	40.6
Hotmail	3.2	9.7	12.9

While 52 percent found the website useful, only 34.4 percent used the built-in mail service more than 50 percent of the time. From this data

it is evident that the most popular email service among administrative staff was Yahoo with 81.8 percent followed by Gmail (40.6 percent) and MMUST-mail (33.3 percent) respectively.

The findings in Table 3-11 present data on the use of email serviceby teaching staff.

Table 0-11: Summary of frequency of use of preferred email service for teaching staff

Preferred Electronic Mail service	Frequency of use		Cumulative percentage
	50-75%	75-100 %	
Yahoo	15.7	73.5	89.2
MMUST Mail	16.2	9.5	25.7
Gmail	21.4	27.1	48.6
Hotmail	13.2	8.8	22.1

Comparing Table 3-10 with Table 3-11, the situation is slightly different among teaching staff where Yahoo is still the most popular with 89 percent while MMUST-mail is a distant third with a paltry 27.9 percent next to the unpopular Hotmail. The data presented in Table 3-11 brings into question the utilization of MMUST mail service by the teaching members of staff. The reasons that motivated them to shun it were outside the scope of this study. However, if they turned around and embraced it, it would free the bandwidth for other users who need to access content that is not available locally.

The most common applications

This study also looked at the availability of relevant application software and in this regard, the popularity of four basic desktop applications that support office automation: word processing (MS Word), spreadsheet (MS Excel), presentation (MS PowerPoint) and database management (MS Access). Table 3-12 shows the percentage of respondents who used these applications more than 50 percent of the time.

Table 0-12: Percentage of respondents who used these applications more than 50 percent of the time

Respondents	Percentage of users and applications used			
	Word	Excel	Access	PowerPoint
Teaching staff	96.3	51.9	29.9	68.3
Administrative staff	86.8	53.1	21.4	18.8

From Table 3-12, word processing, spreadsheet and presentation applications were popular amongst both teaching and administrative staff. This is an indicator that the ICT resources were being employed in basic office activities such as text editing and general documentation, basic data analysis and presentations. However, the low usage of database management systems implies that the major task of records management across most of the university processes was still manually done.

Office automation

Office automation refers to all tools and methods that are used in office activities which make it possible to process written, visual, and sound data in a computer-aided manner. It is intended to provide elements which make it possible to simplify, improve, and automate the organization of the activities of a company or a group of people (management of administrative data, synchronization of meetings, among others). Office automation is confined to the use of ICT resources to perform basic office functions such as typing and word processing, basic bookkeeping, office organization and messaging, meeting planning and the management of work schedules which are normally performed manually. From the findings of this study, MMUST had succeeded in modernizing its offices by automating text editing activities using word processing application. However, the findings show that it has not extended this modernization to office organization and messaging, meeting planning and management of

work schedules. The findings indicate that posting of hard copy information on notice boards was a primary and preferred means of communication, while the usage of email for official mail communication and the website was minimal. The findings also show that while staff used internet facility for personal email communication and social networking, they rarely used it for official communication. Most of them preferred to use hard copy notice boards and phone calls. This can be attributed to poor preparation of the staff in utilizing ICT resources as indicated by the findings of this study. Most of the staff was not involved in preparations prior to and after delivery of the resources. Majority did not know of any specific objectives of acquiring ICT resources and hence had no idea if any objectives could have been achieved by having computer resources.

The Academic Management Information System (AMIS) application was available online for secretarial and administrative staff in the faculties to use in maintaining students' personal records. KOHA had been implemented in the library but was still being tested prior to an official launch. Standard Microsoft Office desktop applications were universally available on all desktop computers and findings from this study (Table3-12) indicate that respondents used them. Data in Table 3-12 shows MS Word was the most popularwhile MS Access is the least popular of the four applications in MS Office. By not listing both AMIS and KOHA as one of the software applications that they used in their business processes can be interpreted to imply that either the respondents did not use any, or the amount of work accomplished though these applications was not significant.

Summary of Findings and Conclusion

Summary of findings

The study found that MMUST had acquired ICT resources that included desktop computers, printers, servers, laptops, scanners, LCD projectors and network and Internet infrastructure.Data from the study also confirmed the availability of Internet connectivity to staff. The university had also acquired an open source Library management system (KOHA) and a custom-developed students' records management system (AMIS). However, these computer hardware resources were inadequate for those who needed them while some of the respondents who had access to the resources did not utilize them for the business processes. Most of the respondents in administration shared computers. The teaching staffs were not adequately catered for when the distribution of computer systems was done. Though the university had invested in software development for library management and students' records management, the expected users amongst the respondents did not mention them which implied that their impact on business processes was minimal.Briefly, the findings of this study indicate that:

i.   There was no rational approach to acquisition and deployment of ICT resources in the University. It appears that users asked for the resources without any specific plan of how they will contribute to their processes

ii.   The computer resources were either inadequate for all the staff that needed them or were inappropriately deployed. Especially teaching staff are in dire need as most of them rely on personal resources. Many of them do not have access to computers provided by the university. A number of Administrative and support staff shared computer systems with more than two other officers.

iii. Most of the respondents were not involved in acquisition of ICT resources or decisions affecting their utilization. This was bound to lead to apathy towards these resources and may adversely affect future attempts at automation.

iv.   The study also indicates that though the university had deployed these ICT resources, they were not being used in business processes. Most of the business process activities were still manually executed. For instance, email service was frequently used for personal communication but hardly used for official communication.

Conclusion

The university in the study had made substantial investments in acquiring ICT resources. Though they are inadequate, these resources were not appropriately employed. Business processes continued to be performed without the benefit of automation. No effort has been made to diffuse ICT resources into the business processes. Users were not consulted or adequately involved before or after the acquisition of ICT resources. In systems development life cycle, obtaining requirements specifications from users is a critical component in the success and ownership of automation efforts. When users own a system the strive to ensure its success

Recommendations

Acquisition and Deployment of ICT resources

There was need to acquire more computer systems and related resources for teaching staff and administrative and support staff. There was need to review the current state of deployment of the resources in order to align them with business processes to automate specific tasks or activities. Embracing paperless offices and instant messaging require each officer to have access to a computer individually. The strategy of deploying and implementing software need to be reviewed to include consultation with low level staffs who are expected to be beneficiaries. Their goodwill, support and acceptance are critical to the success of the automation process.

Further research

That ICT resources are acquired but have no significant effect on business processes is a cause for concern on how the resources are employed. There is need to find out the critical factors that affect the employment of ICT resources in public universities and the measures that can be used to ensure that the investment in ICT resources is not in vain.

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