



Effective Business Process Automation through Process Reengineering: Case of Public a University in Kenya

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ABSTRACT

Investment in ICT resources is no longer an option for organizations in these modern times. The challenge has been to make these resources to contribute effectiveness in business processes and yield improved service delivery to clients. In a study undertaken in a public university in Kenya, it was found that acquiring ICT resources without reworking the business processes to diffuse ICT in the processes did not yield automation. Consequently, improved service delivery, which is the primary objective of ICT investments, was not significantly affected. Process reengineering and user capacity enhancement is recommended to realize improved service delivery.

Keywords: *business process, service delivery, business process automation*

1. INTRODUCTION

According to Emmanouil & Sotirios, (2009), organizations invest in Information and Communication Technology (ICT) resources with a hope of improving their productivity in terms of better, efficient service delivery at lower costs. Unfortunately, for some traditional organizations, it remains a hope that cannot be guaranteed in what Hammer refers to as the 'productivity paradox'. Looking at this paradox from a business processes perspective, Hammer found that, ICT resources were only used to automate the existing processes, which were not properly designed to face the challenges of a contemporary, global and competitive economic environment, thus not leading to a desired increase of productivity (Hammer M. , 1990). ICTs were used to speedup some processes and not for producing innovation and quality, namely the fundamental requirements of the new environment. Through the analysis of non-value-adding activities, controls that slow down the processes are eliminated and replaced by less effective "deferred or aggregate" control. Therefore, deployment of ICT resources may not yield the desired productivity, even if the current processes are automated, unless other critical ingredients are factored in the process.

In a best case scenario, ICT resources automate business processes which have been reengineered and unnecessary activities eliminated. The remaining value-adding processes are restructured where multi-layered controls are collapsed to leave a few essential ones. For instance, Rank Xerox was able to reduce its contract re-financing process from a cycle time of 112 days to just over a day while, Mutual Benefit Life, in a more drastic move, reduced the original 57 job levels to just four after reengineering (Hammer & Champy, 1993). Other controls

can be flattened out and redistributed in the automated processes to be implemented by the empowered users. From a management perspective, when processes are properly automated, it becomes easier to monitor employee performance, business processes execution and service delivery remotely. Service delivery naturally will be enhanced when process times are drastically reduced, and low level staffs have an opportunity to make decisions that enhance customer experience at their level.

1.1 Process Reengineering

In their landmark book, "Re-engineering the Corporation: a manifesto for business revolution", Hammer and Champy (1993) proposed a radical departure from the old business designs and the implementation of a new creative and innovative approach to conducting business. They put substantial emphasis on innovative departure from the 'normal' or traditional ways of doing things and the facilitative role of ICT. Though Business Process Reengineering is illuminating in providing answers to what was ailing organizations that otherwise had tremendous potential for growth and success, there were challenges in its implementation. According to Siha & Saad, (2008), an inappropriate choice of the reengineering process can lead to failure of appreciating its corporate benefits. The suitable process should have enough breadth and depth: a broadly defined process should include more activities so the improvement can span the entire business. The depth is measured by the change in six elements, i.e. role and responsibilities, measurements and incentives, organizational structure, information technology, shared values, and skills (Hall, Rosenthal, & Wade, 1993) as cited by Siha & Saad, (2008).

Business process automation plays a key enabling role in BPR. According to Hammer and Champy (1993), ICT is



critical to organizations that would like to gain competitive advantage due to its powerful capacity to disrupt the entrenched traditional approaches to work and breaking established retrogressive rules. They can effectively disperse centralized information resources, make generalists work like experts, and make everyone in the business process a decision-maker (Sia & Neo, 2008). Effective automation makes face-to-face contact with customers unessential; plans can be revised instantaneously, and information can be accessed ubiquitously.

Though BPR has been found to be effective in turning around organizations in the private sector, there is limited evidence of it being carried out in public universities in developing nations and specifically to facilitate automation of business processes. According to Abdous & He (2008), there was interest in rethinking processes and procedures in higher education institutions which was driven mainly by budget shortfalls, information technology infusion, and external pressures for greater accountability and responsiveness. In their paper, “*A Framework for Process Reengineering in Higher Education: A case study of distance learning exam scheduling and distribution*”, they developed a framework for reengineering processes in higher education based on four sequential phases. The success of this framework relies on a deep understanding and familiarity with the organizational culture and its dynamics and politics; a clear vision, involvement, and support from senior management sustained by a “capacity for action”; and leveraging of ICT resources as enabling, dynamic, and scalable tools. However, their framework was biased towards software development and not business process automation.

Studies carried out by Afari-Kumah & Tanye (2009), Al-Mobaideen (2009), Gülbahar (2009), Nbina, et al (2011), and Sharma & Singh (2009) focused more on the use of ICT to support learning and teaching in universities but no mention is made on university business processes. Though Afari-Kumah & Tanye (2009) admit that ICT is an enabler that facilitates productivity and enhances quality of output, they only discuss its applications in teaching from the students’ point of view. According to the study by Nbina, et al (2011), it was found that the ICT facilities in the study were mostly in disuse because very few lecturers used them. It was also found that many of the lecturers were not conversant with the ICT facilities. The study done by Al-Moibadeen (2009) on ICT diffusion in Jordanian Universities, investigated the critical success factors that influenced the adoption of ICT and the obstacles that impeded it. He noted that, public universities lacked vision and comprehensive strategy for diffusing ICT as a long term strategy and that, the importance of ICT diffusion was not clear enough in order to achieve much benefit from ICT facilities. The study found that, strategies and policies, infrastructure and

networks, funding and sustainability and culture were the four critical success factors that determined the success of the implementation of ICT in public universities; however, he did not mention how process reengineering could affect the automation business processes. Sharma & Singh (2009) focused more on the performance of universities in terms of how they were ranked and attributed the better performers to the efficient use of ICT due to the sound vision, excellent ICT infrastructure and efficient ICT-based activities and fast adoption of innovation in the field of ICT without pointing out whether business processes were automated effectively.

However, one developing country that appears to have embraced the concept of process reengineering quite well is Ethiopia. According to Assefa (2009), BPR was identified as a key driver of reform in public sector institutions (government ministries, departments and Universities) to solve problems of hierarchical bureaucracy and redundant activities. In a three-month survey undertaken in two ministries in 2005, it was found that there was a notable transformation of service delivery in each ministry and “Very high levels of user satisfaction and spectacular improvements in performance were also recorded as a result of the introduction of business process reengineering” (Mengesha & Common, 2006). But these studies do not say anything about conducting BPR on public university processes and automation in particular. An unpublished draft BPR report attributed to Addis Ababa University indicates that BPR has been accepted as a solution to poor performance and service delivery of university processes (Addis Ababa University, 2009). However, the report is more of a diagnosis of the current state and a plan of intended action than a report on a success story.

1.2 Summary

This study was focused on the role of process reengineering as an enabler of automation of business processes. There was general information on BPR projects in universities, but it was the opinion of this researcher that this information was insufficient and specifically its contribution to automation in public universities in developing countries and Kenya in particular. This study is expected to bridge that gap.

2. RESEARCH METHOD

This study examined the contribution of business process reengineering 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, where they had been deployed, the demographic profiles of officers using them, and for what purpose with respect to business



processes. This study was done using a descriptive research approach.

2.1 Sampling Technique

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, necessitated the need to use the purposive stratified sampling technique. This study required potential participants to be individuals who served students directly and also used computers. Considering that not all officers amongst non-teaching staff serve students directly, most of the 210 administrative and support staff in the target population could not qualify. Mugenda and Mugenda (2008) propose the use of Fisher's formula for estimating a population sample where it is not possible to establish the target population. However, for a smaller target population size, 10-55 percent of N is considered appropriate (Mugenda & Mugenda, 2008). Therefore, the researcher found 30 percent of the population to be appropriate for this study.

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. According to Blaxter et al, (2010), a sample of 10 to 20 percent is representative enough for a target population of over 400 respondents. From a target population of 357 teaching staff (as at 1st May 2011), a sample of 107 respondents was selected to participate in this study. This was 30 percent of the target population.

A sample population of 80 fourth year Undergraduate students was used to study the effect of ICT resources on service delivery to students. This was 10 percent of the fourth year students who had duly registered at the time of the survey. They were selected because, at fourth year, the student has been in the university for four years and can clearly compare the quality of service at the beginning and end of the four year stay in the university.

Table 1-1: Summary of the Study Population

Target Respondents	Target Population	Sample Population	Actuals
Teaching Staff	357	107	83
Admin. Staff	210	70	51
Final Year students	800	80	53
Total	1,367	257	187

2.2 Data Collection

To help answer the research questions, two main tools of data collection were used. The questionnaire was the primary tool. Two questionnaires were designed to collect

data from the two different types of people. The university 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. During the observation, the researcher interviewed respondents related to observed processes/activities to clarify the observations. Documentary sources were also used to collect data from past surveys carried out by the university.

2.3 Data Collection and Analysis Methods

Data was collected using questionnaires, observations and review of official documents. Observable data was collected to capture the extent of automation in the business processes and the efficiency of service delivery processes. Sites where students access services were visited to capture observations, according to the observation checklist, on how ICT resources are applied in service delivery. The questionnaires were administered to the randomly selected sample populations within the University. The Quality Management System work procedures and ICT inventory of equipment were reviewed. Data was analyzed using descriptive statistics. Pearson's correlation was used to evaluate the relationship between the ICT resources and service delivery.

3. ANALYSIS AND DISCUSSION OF RESULTS

A university is a service industry because its core products (i.e. the academic programmes) are offered to their clients in the form of services. These services are rendered through processes that are made up of a series of tasks or activities which must be accomplished for the process to be complete. Some of the processes are carried out exclusively in the same department while others have tasks that cut across a number of departments.

3.1 ICT Resources and Service Delivery

Data from the study indicates that the most popular software applications were MS Word and MS Excel as illustrated in Table 3-1.

Table 1-2: Percentage of respondents who used selected 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
Admin. staff	86.8	53.1	21.4	18.8



Amongst teaching staff, MS PowerPoint was also popular. It also revealed that most teaching staff had embraced processing of exam results using ICT resources. This result can be interpreted to mean that most of the teaching staff used these two applications (i.e. Word or Excel) to prepare learning material, internal communication and process exam results. However, a closer examination of the capabilities of these two applications reveal that using them for processing exam results may not qualify to be automation but simply maintenance of personal records electronically. Considering the nature of university programmes where courses are delivered by individuals across faculties and departments, it is not feasible to automate exam results processing using these two applications. Automation of exam results processing has to be done at faculty level and beyond to bring all the players on board besides standardizing all the tasks in the process.

Table 1-3: Teaching staff who used ICT resources in the teaching and evaluation process 50 percent of the time and above

Teaching process/activity	Frequency of use (%)			Total
	75-100	50-75		
Using internet for Communication	9.6	19.3		28.9
lecture notes in softcopy	14.5	27.7		42.2
Collecting students' assignments in soft copy	4.9	7.3		12.2
Collect assignments by Email	8.5	29.3		37.8
Using computers to compile exams results	51.8	26.5		78.3

Though presentation software was found to be popular amongst teaching staff (Table 3-1), the data from this study does not reveal its popularity as a resource for teaching which is the main business process for teaching staff (Table 3-2). Most likely, it was used when making special presentations in workshops, seminars and conferences. Therefore, the benefits that could have emanated from using these resources cannot be passed on to the clients because only the individual teaching staff benefits.

Table 1-4: Summary of frequency of use of preferred email service for administrative staff

Preferred E-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

The data presented also indicated that internet applications were widely used by all the respondents. However, the preferred mode of communication across all

the respondents was by notices on notice boards (Tables 3-3, 3-4). Obviously, the availability of the resource did not translate into automation of a business process. Instead, the users used the resources for their own benefits and clients could only get secondary benefits.

Table 1-5: Administrative staff's preferred modes of communication

Preferred mode of communication	Freq.	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	

Notably, some respondents from the Registrar – Academic Affairs seemed happy with AMIS software and one respondent mentioned it in the questionnaire. They applauded it for making their work of serving students easier after some of the activities they did manually were automated. This is evidence that a degree of automation had been achieved and could be the reason behind the positive opinion on semester registration and course registration. The same could not be said of the departmental offices where the use of AMIS was limited.

Therefore, considering the fact that the resources benefited the users more at a personal level, it is possible to conclude that service delivery was affected marginally. This is illustrated in Table 3-5 where the availability of computer systems and the effect of resources on service delivery were not strongly correlated.

Table 1-6: Correlation between availability of resources and effects on services

Correlations	Availability of Sufficient of Computer Systems	ICT impact on service delivery
Availability of Sufficient of Computer Systems	1	-.110
Pearson Correlation		.450
Sig. (2-tailed)		
N	49	49
ICT impact on service delivery	-.110	1
Pearson Correlation		
Sig. (2-tailed)	.450	
N	49	51



Considering that the value -0.110 in Table 3-5 is closer to 0, it can be concluded that the relationship between the availability of computer systems and the effect of ICT on service delivery is very weak. Therefore, it follows that the availability of computer systems in itself was not sufficient to create a significant effect on the services rendered to students

3.2 Process Automation and Service delivery

In a subsequent study carried out in 2013, it was found that the university has implemented an open source library services management system (KOHA) and a students' records management system (AMIS). These two applications have been used to automate a number of business activities (either fully or partially, according to Table 3-8) that provide services to students.

Table 1-7: Summary of the evaluation of sample activities

Department	Service	agree	others
1	Library Using Electronic Catalogue	34	66
2	Library Faster reserve section service	45.3	54.7
3	Library Faster book search	35.8	64.2
4	Library Faster book borrowing	37.7	62.3
5	Academic division Faster semester registration	62.3	37.7
6	Academic division Faster course registration	67.9	32.1
7	Academic division Faster exam registration	37.7	62.3
8	General services Faster response to inquiries	32.1	67.9
9	General services In general, services improved	37.7	62.3
Average		43.4	56.6

The summarized data presented in Table 3-6 showed that the effect of KOHA on library services was marginal while the effect of AMIS on semester and course registration was significant. For instance, over 60 percent of the students surveyed said that the processes of semester and course registration had become faster. However, they were not happy with examination registration where a spreadsheet is used to check fee balances, maintain fee payment details and clear those eligible to sit examinations.

Table 1-8: General quality of university services

University services are better they were 4 years ago	Freq.	Percent	Cumulative Percent
Strongly agree	3	5.7	5.7
Agree	17	32.1	37.7
Neutral	21	39.6	77.4
Disagree	6	11.3	88.7
strongly disagree	6	11.3	100.0
Total	53	100.0	

When business processes are automated, research shows that service delivery will be affected in various ways. Some of the effects include reduced cost of service, duration of service, and the number of human resources required to render the service and ultimately the improved bottom line (Hammer & Champy, 1993), (Emmanouil & Sotirios, 2009)). The number of activities required to complete a process will also be affected as some may be merged while others are eliminated altogether. This was not the case in this study as illustrated by the table below. Table 1-9: Evaluation of university business processes (2013)

Business process	No. of automated activities in the business process			Total
	fully	Partly	none	
1 Admission of new students	0	0	14	14
2 Registration of new students	1	0	7	8
3 Registration of continuing students	1	0	7	8
4 Management of exams	0	2	14	16
5 Provision of Library services	2	0	5	7
6 University fees collection	0	1	4	5
7 Teaching	0	1	9	10
8 Hostel administration	0	0	11	11
Total	4	4	71	79
Percentage	5.06	5.06	89.9	100

However, data presented from this study (Table 3-8) shows that the availability of ICT resources on its own did not yield automation. At best users opted to capture their hardcopy data using applications such as word processing and spreadsheet and store it in softcopy while the business processes continue unchanged, manually. In essence, ICT will have created new tasks that do not add value to the

existing processes. Clearly, an intervention is required to align the business processes with the ICT resources and enable automation and enhance service delivery (Sousa, Mendonça, Lievyns, & Vanderdonck, 2011). Some of the possible interventions that can be applied include Business process redesign, business process improvement (BPI), business process reengineering (BPR) and business process management (BPM).

BPI is an evolutionary continuous process that companies employ to keep pace with the changing business environment. It entails adapting their business processes to persistent technological (which includes ICT), organizational, political and other changes in its business environment (Zellner, 2011). Unlike BPR, BPI employs incremental improvements that increase the effectiveness and efficiency of business processes that provide output to internal and external customers (Harrington, 1991) as cited by Zelner, (2011). Effectively, BPI is not likely to eliminate inefficiencies inherent in poorly designed business processes. Without dealing with the built-in

inefficiencies in processes, the effect of automation, besides false impressions, will be marginal. BPR projects on the other hand provide streamlined business processes through waste elimination, simplification, and integration (Samaranayake, 2009). When processes are eventually automated, there will be significant effect on services rendered. By introducing new ways of doing things, BPR also provides an opportunity for senior management to reduce staff and to reshape the organizational culture.

Figure 4-16 presents a scenario where an institution acquires ICT resources and deploys them in business processes. When business process reengineering combine with user capacity enhancement through training, the result will be automated business processes that will yield efficient services and enhanced customer experience. Capacity enhancement usually targets lay users who, even with guided automation, will be incapable of effectively using ICT resources. Capacity enhancement is done in the context of business objectives, business processes and additional ICT skills.

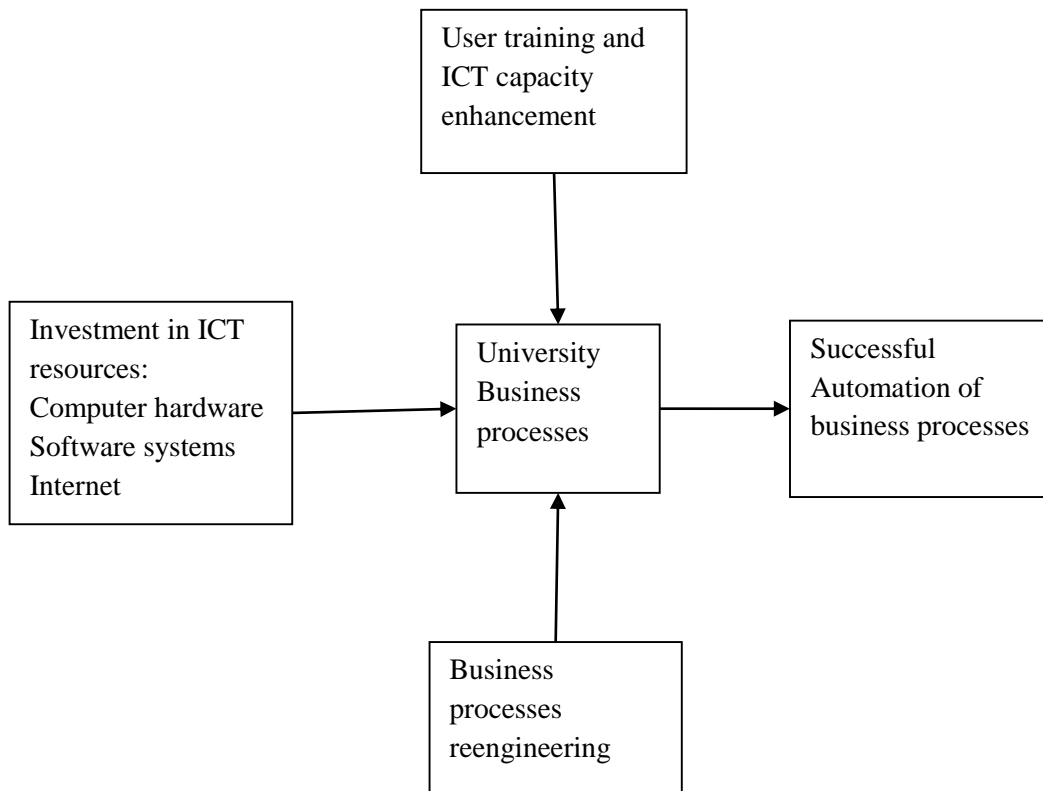


Figure 1-1: Relationship between ICT resources, business processes and service delivery
(Source: Researcher)



In this study, the two additional components (BPR and user capacity building) were notably insufficient or missing altogether. ICT resources had been acquired and deployed but they were not applied to the business processes. Though users had some capacity to use some of the resources such as Internet and email, they opted to use them for private benefit. Consequently, the number of automated business process activities was very few.

Successful business process automation leads to better service delivery that comes from shorter process cycles (because there are fewer activities in the process), shorter queues, and faster customer services.

4. CONCLUSION & RECOMMENDATIONS

4.1 Summary

The study found that, it was not enough to acquire and deploy ICT resources. Reengineering was required to facilitate integration of the resources with the business processes. In the university, the resources had been acquired and deployed in various offices but automation had been left to individuals to work out. The result was that the resources were useful for personal needs but of little relevance in the business processes. Consequently, service delivery was not affected significantly with the availability of the resources.

Process reengineering has the effect of mainstreaming and integrating ICT resources into the business processes. All players in the business process would appreciate the role and contribution of the resources to the services they render to clients.

4.2 Conclusion

Though ICT resources were inadequate, they were not appropriately employed. Business processes continue to be performed without the benefit of automation. Generally, no effort was been made to diffuse ICT resources into the business processes

- i. Users were not consulted or adequately involved before or after the acquisition of ICT resources. When users own a system they strive to ensure its success.
- ii. There was little or no effort to integrate ICT into university business processes by reviewing them.
- iii. The level of process automation was low. Majority of the users in the study performed their duties manually though ICT resources were available.
- iv. Users were not adequately prepared to take advantage of the ICT resources in their departments. Very few users

were aware of any specific objectives of acquiring the resources besides perceived general office modernization.

4.3 Recommendations

4.3.1 Process Reengineering

Though Process reengineering is a painful process given its tendency to result in job losses, it is a path that organizations that desire cost-effective and efficient service delivery need to take. BPR enables an organization to collapse the many layers into fewer cost-effective levels that are easy to automate effectively. The resultant casualties can be redeployed in other non-core areas of the university operations if they must keep their jobs. The core business processes need to be reviewed to identify the core activities within each process and how they can be automated. This will help determine whether the process objectives can still be achieved with fewer tasks and fewer participants with a view of increasing the scope of automation, efficiency in service delivery and reducing the cost of serving students.

4.3.2 Process Automation

Increasing the scope of automation has the knock-on effect of eliminating intermediate data entry tasks between processes, reducing the number of process tasks, process duration and the manpower involved. Embracing paperless offices and advanced messaging systems will reduce the number of secretaries, eliminate the need for office assistants and save the university the cost of stationary and procuring more filing cabinets. With video conferencing technology, lectures can be delivered simultaneously equally to all the university students wherever they are and lecturers will not need to be shuttled between the study centers. The bill for part-time lecturers will also be substantially reduced or eliminated if possible.

4.3.3 Automation Policy

There is need to implement a policy on encouraging teaching staff to use ICT resources (such as e-learning, projectors, email and internet). It should also include incentives such as payments to lecturers who prepare self-paced web-based learning material, ready accessibility to university office computers, internet through internet 'hot-spot everywhere', laptop loans, among others.

4.4 Further Research

A comparative study of both private and public universities to compare and contrast the levels of business process automation and how service delivery is affected in both cases is recommended.



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