ORGANIZATIONAL WASTE AND THE COST OF OPERATIONS IN KENYA`S HIGHER INSTITUTION

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A RESEARCH SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE AWARD OF THE DEGREE OF MASTER OF BUSINESS ADMINISTRATION, SCHOOL OF BUSINESS, UNIVERSITY OF NAIROBI

NOVEMBER 2015

DECLARATION

This research project is my original work and has never been submitted for examination in any college, University or any other institute of higher learning.

Signature…….. Date……

Domnic Gesocho Miruka

REG. D61/79064/2012

The research project has been submitted for examination with my approval as University Supervisor.

Signature…… …… Date……

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DEDICATION

I dedicate this research work to my wife Leah Gesare, my son Cassey, daughter Kena and brothers for their love, prayers and moral support during the period of research and compilation of this project and all through the entire MBA course. To all of you thank you very much.

ACKNOWLEDGEMENT

I would like to thank all those who helped me throughout the project phase of my MBA programme. My first and sincere appreciation goes to my supervisor, Dr. Owino Agaya Okwiri for his enlightenment and guidance in the design of the study and focus on key concepts of the study. I am profoundly grateful to have been enriched from his insights on the concepts under study. Secondly I thank my research project's moderator Mrs. Zipporah Kiruthi for sparing his valuable time to further guide me on the study. Lastly, thanks to all respondents who participated in the study and whose input was critical for analysis, findings and conclusion.

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CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

The goal of every organization, whether profit or nonprofit oriented is to work towards achieving the corporate objective for its existence; a measure of how these objectives are met has been described as performance. Organization performance may be looked at in terms of financial performance, sales volume, and customer satisfaction (Spanyi, 2004). Organizations are continually under competitive pressures and are forced to re-evaluate their business models and underlying business processes to suit their desired levels of organization performance and reduce on cost of operation. However, business run short of their projected performance owing to wastes in their business processes. A company primarily consists of processes, not products or services. Managing a business means managing the processes (McCormack & Johnson, 2001). The manner in which an organization manages its process influences its cost per unit and customer satisfaction level. This is through minimization of waste leading to enhanced productivity and reduced cost.

1.1.1 Organizational Waste

Waste in organizations includes waste of materials on- site and several activities such as overproduction, waiting time, material handling, processing, inventories, scrap, repeat work and movement of workers (Alarcon, 2004). According to Koskela, (2004), there are two aspects in all production systems: Conversions and Flows. Conversions were identified as value-adding activities, whereas flows were identified as non value-adding activities. A value-adding activity is one that converts material and/or information towards that which is required by the customer (Koskela, 2004). All those activities that produce costs, direct or

indirect, and take time, resources or require storage but do not add value or progress to the product can be called non value-adding activities or waste.

The process-based practices entail process management so as to achieve work consistency, reduction of ambiguities, and to help in employee performance management (Okwiri, 2012). Activities include process definition, simplification and measurement. The process definition is the study to enable identification of actual activities that we handle. Identification of the rework, scrap as well as resources that go into is the only way to identify this waste. The goal is to reduce cost, cycle time and achieve work consistency.

During production process, waste come as a result of reworks/repairs, defects, material waste, delays, waiting, poor material allocation, unnecessary material handling and material waste (Alwi, 2005). Reducing organization waste and therefore enhancing organizational performance requires efforts. According to Zhang (2001) points the need to reduce waste through application of internal process quality. Through this, an organization is able to reduce mistakes and errors, reduce rework and non- value adding activities, lower operational costs and increase consistency of outputs, which are largely objectively measurable.

1.1.2 Waste Identification

A value-adding activity is one that converts material and/or information towards that which is required by the customer (Koskela, 2004). All those activities that produce costs, direct or indirect, and take time, resources or require storage but do not add value or progress to the product or service can be called non value-adding activities or waste. Different kinds of wastes (non value added works) are the main cause of inefficiency and low productivity. These wastes will reduce production efficiency, quality of work as well as increase production lead-time. Waste in organization includes over-production, over-processing,

delays, reworks, inventory, movements of people, transportation of materials, non-conformity of products and people waiting (Ohno, 1988).

Value stream mapping has been used to build graphic representations of a system, in order to help managers to describe, analyze and diagnose these systems. Its main objective is the representation of production and information flows, where some of the existing waste (*muda*) may become easily identifiable (Wilson, 2009). Once waste is identified, then it is easier to make plan to eliminate it. VSM will communicate the opportunities so they may be prioritized and acted upon. Hence, the prioritization and action must follow the VSM, otherwise it is just a waste like other wastes.

1.1.3 Organizational Waste and Performance

Non value-adding activities affect production in organization negatively including reduced profitability and financial stability. The identification of these factors, their causes, and a measurement of their level of importance, would provide useful information that would allow management to act to reduce their negative effects on organization performance in advance. In most cases managers do not know of, or recognize, the factors that produce waste, nor do they have measurements of their own performance, as most of the factors are not observable (Serpell, Venturi and Contreras, 2005). The performance in organization is hurt badly by rework occurrences mostly from the unnecessary redoing and rectifying efforts of incorrectly implemented processes or activities (Love, 2002). If the flow aspects in the manufacturing process have been ignored manufacturing processes will encounter a significant amount of waste, non value-adding activities, delays, idle time and ultimately loss in organizational performance.

Changes in activity time and cost will reduce waste and average service delivery cycle time (Okwiri, 2012). The outcome of the implementation of the quality management core practices

is improvement in work consistency, process compliance, and reduced mistakes. By reducing mistakes, and waste in terms of rework, scrap, delays the cost element of operational performance is affected positively

High performing organizations use "systematic approach to identify and eliminate waste (non value-adding activities, reworks, and scraps) through continuous improvement by flowing the product at the pull of the customer in the pursuit of perfection" (Brue and Howes, 2006). This results to reduced business cycle time thereby lowering costs, increasing productivity and profitability.

1.2 Operation Performance Measures in Higher Education

Institutions of higher learning offer value to customer through a number of services related to academic excellence. The performance is usually evaluated by estimating the values of qualitative and quantitative performance indicators which include; teaching venue identification, timetable preparation, examination setting and presentation, examination material production and examination records update which should have minimal mistakes and corrections.

In the pursuit of higher operational effectiveness and organizational performance, new approaches to improve service delivery and operational performance through waste reduction with a goal to reduce cost, cycle time and achieve work consistency is important. The allocation of courses taking into consideration the lecturers' areas of specialization while the teaching timetables shall indicate day, time, course units, year of study, lecturers and venues. Duty allocations and teaching timetables must also be in line with the curriculum and University calendar dates with appropriate teaching aids in place.

Measures to reduce the cost of waste at examinations timetables preparation stage and examinations papers submission for typing to the examinations centre is required to prevent

waste**.** The organization of examination typing, proofreading, corrections, photocopying, collating and packaging of examination papers and then submission of results by internal examiners should be efficient to reduce cases of missing grades where students sits for exams but the results are not reflected in their transcripts. These forces the students to go for rigorous processes of seeking for the grades or sitting for exams once again. This does not only delay student's graduation but also is expensive for the students who have limited funds, as they are required to pay for the exam once more.

1.3 Research Problem

Effective minimization of waste contributes to profit maximization which is the reason for the existence of most organizations. Despite the serious threat waste poses to the profit objective of most firms no serious attention was paid to identifying factors that contribute to the increase of waste in industries (Love, 2002). Waiting in organizations means loss in time that could be used meaningfully. Emergency and expensive procedures are often required to get the process back on line. Process management will help identify waste which affect performance through increased cost, reduced profit and customer dissatisfaction because of delays caused by long waiting time, over-manning, lack of progress, "lack of equipment and lack of materials and capacity (Koskela, 2004).

For academic institutions in Kenya, delays cause procrastination in graduation and dissatisfactions among students. Pressure to admit more and more students with the system of work not matching the capacity demands. Over capacity especially with the recent double intake has stressed the available resources compromising the quality of service the students get and unnecessary resource demands. Inefficiencies such as equipment shortages, inefficiencies in using materials, limited funds, and underutilized human resource cost

organization billions of dollars every day. Therefore understanding how much of this resource demands is due to waste is key.

Several empirical studies have been done in area of organization performance; Oyeila, (2011) did a study on competitive strategies and performance of commercial banks in Kenya. Kamau (2011) conducted a study to establish the influence of corporate governance practices on organizational performance at Equity Bank in Kenya. Also, Ambetsa (2010) did a study to establish the relationship between performance management systems and organizational performance at the Standard Chartered Bank of Kenya Ltd. However, mostly these studies focus on performance. Studies on waste are limited perhaps because waste does not produce. This study will therefore use specific context in education to identify what could be achieved and identify areas that generate waste in high education institution.

1.4 Specific Objectives

Specific objective of the study were;

i). To map the process in a selected aspect of education provision

ii). To identify value adding and non-value adding activities

iii). To determine process efficiency in the area of operation

iv). To determine the waste in monetary terms

1.5 Significance of the Study

This study is important to managers in academic institutions and other service industries alike as it provided an insight in various organizational wastes that results in underperformance. Further, the study suggests possible remedies to reduce the wastes and associated cost to enhance performance. The results of the study also show the level of application and

effectiveness of the conceptual theory that could provide a solution to waste problems in these institutions. Therefore, the managers find this study important as it serves as benchmark for implementation of the 6 sigmas and other solutions to counter wastes in industries.

To academicians and scholars, the study contributes to the pool of knowledge in areas of organization performance and organizational wastes. Further, the study point out gaps in knowledge to be filled by future scholars.

To the managers of higher education, the study points out on areas that produce more waste and cost that needs to be addressed as a matter of priority. It also point out to the managers waste identification points and solutions to reduce waste and therefore provide recommendations for enhanced performance.

To the government and policy makers, the study provides an insight in various organizational wastes that result in underperformance and suggest possible remedies to reduce the waste and associated cost to enhance operation performance.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter presents literature review on areas of organizational waste and cost as well as organizational performance. It highlights literature on process mapping and its impact on process effectiveness

2.2 Process Mapping and its Impacts

A process is any activity or group of activities that takes an input, adds value to it, and provides an output to an internal or external customer. A map is worth a thousand procedures. Mapping is defined as a method of graphically describing an existing process or proposed new process by using simple symbols, lines and words to display pictorially the activities and sequences in the process (Harrington, 1991). Mapping the entire process, down to the task level, is the basis for analyzing and improving the process. A flowchart with different symbols is used to show different activities in a process.

In order to offer value to customers, it is prudent for organizations to understand what the customers really want. This defines value. Through the customer's eyes a process can be separated into value- adding steps and non-value-adding steps, also called waste Liker (2004). The organization should ensure that every activity within the business process contribute real value to the entire process. Value adding activities are those activities that, when viewed by the end customer, are required to provide the output that the customer is expecting. Activities that do not contribute to meeting customer requirements, and could be

eliminated without degrading the product or service functionality or the business are considered non-value- added activities.

Non-value- added activities exist because the process is inadequately designed or the process is not functioning as designed. These include moving, waiting, setting up an activity, storing, and reworks. These activities would be unnecessary to produce the output of the process but occur because of poor process design (Harrington, 1991). A block diagram, also known as a block flow diagram, is the simplest and most prevalent type of flowchart; it provides an overview of a process by use of rectangles and lines with arrows as major symbols in a block flow diagram. Rectangles represent activities and lines with arrows connect the rectangle to show the direction of information flow and relationship among activities.

Value added assessment is an analysis of every activity in the business process to determine its contribution to meeting and customer expectations. The objective of Value added assessment is to optimize business value activities and minimize or eliminate non value added activities.

Process mapping aims to create value adding for the customer, measure the results and productivity, deliver a stable result and consider the cross-functionality of the process (Klotz, et al., 2008),. If a process is divided further, it is called sub-process and this then can be described in routines. The advantages of Process Mapping can be concluded that the work is managed from the customer's point of view. All work done in the process can be seen as a flow of value- adding actions. As a result, there are effective and coordinated improvement projects.

2.3 Process Effectiveness, Efficiency and Impacts on Waste

Process effectiveness is how well the process meets the requirements of its end customers. It measures the quality of the process. `Effectiveness is having the right output at the right place, at the right time, at the right price (Harrington, 1991). Efficiency is the extent to which resources are minimized and waste is eliminated in the pursuit of effectiveness. Hollingsworth (2008) indicates that process efficiency means avoiding waste, including waste of equipment, supplies, ideas, and energy. Love (2003) indicated that efficiency is a measure of cost of care associated with a specific quality level. To ensure that the process is effective you must define the customer needs and expectation and then meet those needs and expectation. Customer needs and expectation include; timeliness, accuracy, performance, reliability, responsiveness and cost.

Effectiveness of every process, no matter how well the process is designed, can be improved (Harrington, 1991). Effectiveness characteristic are indicators of how well the process is functioning. Lack of effectiveness indicators are; unacceptable services or product, customer complain, backlog, reworks, incomplete output, high warrant cost, decreased market share, late output and delays. For an entire process these are the key measure of effectiveness.

Process cycle time will enable the process improvement team to discover the non value adding and value adding activities existing within a process. Cycle time is the total length of time required to complete the entire process. It includes not only the time taken to perform the work but also the time spent moving documents, waiting, storing, reviewing and reworking. Reducing the total cycle time frees resources, reduces cost, improves the quality of the output and can increase sales.

The process improvement team should meet with the primary customer to determine what they require from the process. Customers always have a hard time expressing their desires in

terms that can be used to measure effectiveness. Often it is heard in general terms like “i want quick services,” “error free reports,” or things that work.

2.4 Sources of Organizational Waste

According to Magee (2007), different kinds of wastes in a process can be categorized in following categories. These wastes reduce production efficiency, quality of work as well as increase service lead time. Overproduction will constitute organizational waste. Offering services not required at given point of time, as well as transportation etc. Also, Workers waiting for raw material, the machine or information etc. is known as waiting and is the waste of productive time. The waiting can occur due to unmatched worker/machine performance, lack of work knowledge, stock outs etc. Carrying of work in process (WIP) a long distance, insufficient transport, moving material from one place to another place is known as the unnecessary transport. This also constitutes waste.

Further, working on a product or service more than the actual requirements is termed as over processing. The over processing may be due to improper tools or improper procedures etc. The over processing is the waste of time which does not add any value to the final product or services.

Unnecessary movement leads to waste of time and therefore leads to low production. Any wasted motion that the workers have to perform during their work is termed as unnecessary movement. Liker (2003) identified that unused employee creativity also constitutes waste. Loosing of getting better ideas, improvement, skills and learning opportunities by avoiding the presence of employee is termed as unused employee creativity.

2.5 Wastes in Institutions of Higher Learning

As noted by Womack and Jones (2006) waste in institutions of higher learning include waste and inefficiency emanating from work processes that have no effect on customer experiences or service quality. Lean methodology has been applied in higher education institutions to reduce waste, streamline processes, and re-engage a workforce fatigued. This is especially important as universities and colleges operate in a climate of uncertainty and face an increased scope of mission, unstable enrolments, costs that are outpacing inflation, and diminished government support

Universities and colleges have experienced waste in a number of service areas including admissions, the administration of research funds, hiring, and nearly any functional area where multi-step processes can be simplified and focused on the needs of the users served by the organization. Waste in universities has reduced quest for efficiency in academic programs and service delivery areas.

Waste in institutions of higher learning is realized in processes that are inefficient. These include student enrolment, move-in process for student residences, changes to the physical plant. Further, Comm and Mathaisel (2005) highlighted that a common waste in institutions of higher learning is under utilization of facilities and resources. They noted that universities have high investment with state or art equipment and high caliber personnel that are rarely optimally utilized. Universities have failed to use internal capacity to oversee projects instead, external consultants are often hired..

2.6 Summary of study

As a result of fierce competition between companies, increased customer expectations and volatile environment, there has been a growing interest in new management paradigms that promise performance improvement. Process improvements have attracted considerable

attention to enhance effectiveness. Love, (2002) notes that performance in organization is hurt badly by rework occurrences mostly from the unnecessary redoing and rectifying efforts of incorrectly implemented processes or activities, delays and inefficiency. According to Liker, (2004) non-value adding activities contributes to waste in the industry

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter presents research methodology on the effect of organizational waste on the cost of operations performance. Objective of the study includes; mapping a selected aspect of education provision, identify value and non value adding activities, and determine process efficiency and waste. It therefore presents research design, data collection methods, instruments of data collection and finally the data analysis.

3.2 Research Design

This research is exploratory and was conducted through a case study since it was a research on one organization. A case study is an in-depth investigation of an individual, institution or phenomenon (Mugenda and Mugenda, 2003). The primary purpose of a case study is to determine factors and relationships among the factors that have resulted in the behavior under study. Since this study sort to establish the effects of organizational waste on cost performance, a case study was chosen because it enables the researcher to have an in-depth understanding of the organizational waste in higher education. The importance of a case study is emphasized by Kothari, (2000) who both acknowledge that a case study was a powerful form of qualitative analysis that involves a careful and complete observation of a social unit, irrespective of what type of unit is under study.

3.3 Target Population

The target population was composed of employees in management and operations in the University of Nairobi. This population was chosen since these people are the ones involved in

the day to day operations of the university and thus were well conversant with the effects of organization waste and cost performance. Mugenda and Mugenda, (2003), explain that the target population should have some observable characteristics, to which the researcher intends to generalize the results of the study.

3.4 Sampling

The study used purposive sampling targeting heads of departments and operations staff in two campuses of the University of Nairobi. According to Oso and Onen, (2005), purposive sampling starts with a purpose in mind and the sample is thus selected to include people of interest and exclude those who do not suit the purpose. This method is therefore suitable in selecting respondents for the study. Saunders and Thornhill, (2003) also posited that purposeful sampling is useful when one want to access a particular subset of people.

3.5 Data Collection

For the purpose of this study, the researcher used primary data. This involved mapping of a selected process in education provision and a work analysis to follow up and identify work activities scraps and delays in the process was be done. An interview guide with open-ended questions was used to collect in depth information from students', non management staff and the heads of departments. This enables oral administration of questions in a face-to-face encounter therefore allowing collection of in depth data.

Using a data collection proforma, data was collected on activities, there purpose and outputs. Using one of this data collection proforma data on material usage was collected relating to one semesters of examination based on random sampling of 30 examinations and teaching process (Appendices 1 and 2)

3.6 Data Analysis

The data collected using interview guides which is qualitative in nature, was analyzed using conceptual content analysis which was the best suited method of analysis. Content is defined by Creswell, (2003) as a technique for making inferences by systematically and objectively identifying specific characteristic of messages and using the same approach to relate trends. According to Mugenda and Mugenda, (2003) the main purpose of content analysis is to study the existing information in order to determine factors that explain a specific phenomenon.

Bogdan and Bilken, (1982) defined qualitative data analysis as working with data, organizing it, breaking it into manageable units, synthesizing it, searching for patterns, discovering what is important and what is to be learned, and deciding what you will tell others. Raw data was presented to provide meaningful information, examine them in a holistic fashion, and find ways of communicating this interpretation to others. Data organization involved systematization and analysis of raw data based on interviews, transcripts, field notes and other documentation.

$$\text{Process Effectiveness} = \frac{\text{Total value added activities}}{\text{Total value activities}} \times 100$$

The chosen method of analysis is the "developing of a case description" (Yin, 2003:114) whereby a descriptive framework for the organization of the case study is developed. Although Yin, (2003) comments that the analytical methods of theoretical propositions or rival explanations are preferable, these were somewhat difficult given the explanatory nature of the research.

CHAPTER FOUR

DATA ANALYSIS, RESULTS AND DISCUSSION

4.1 Introduction.

This chapter presents analysis and findings of the study as set out in the research methodology. The study findings are presented on mapping the process in a selected aspect of education provision, identifying value adding and non-value adding activities, and determining the waste in monetary terms. The data was gathered exclusively from the questionnaire as the research instrument. The questionnaire was designed in line with the objectives of the study.

4.1.1 Response Rate

The study targeted the employees in management and operations in the University of Nairobi. All the targeted respondents were reached and this makes a 100% response rate.

4.2 Mapping the Process in Selected Aspect of Education

The study sought to find out the respondents' feedback on mapping of the two procedures. Respondents mapped the process out as indicated in table 4.1 and 4.2. The examination process has 20 steps with a total of 3420 minutes. 14 steps did not add value to the process

4.1: Task Analysis: Examination process

Steps	Activity	Time on average	Type of activity	Remarks
1	Schedule of semester	1	Decision	No change
2	Register for courses and examination	0.5	Decision	No change
3	Nominate the Internal and External Examiners	0.5	Operation	No change
4	Approved External examiners setting out terms of the appointment	2	Inspection	No change

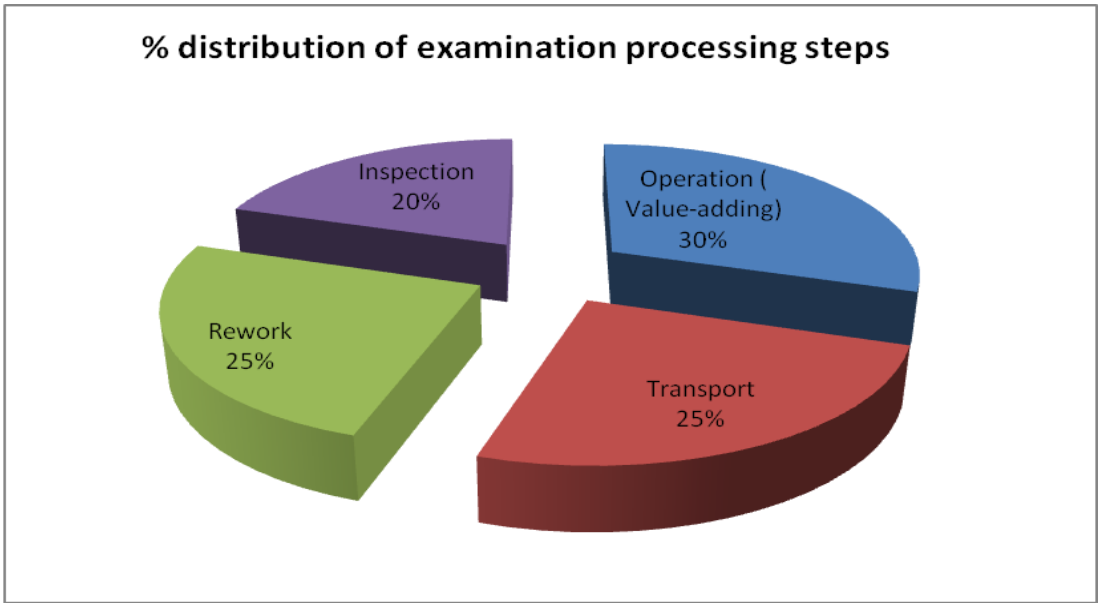
5	Internal Examiners submit the set examination papers to the Chairman	1	Transport	No change
6	Chairmen/Directors forward the examination papers to the External Examiners	2	Transport	No change
7	Directors submit examinations timetables and examinations papers for typing by the Examinations Centre	8	Operation	Change from hand written to typed examination
8	Issuance of examination cards, answer booklets and other examination materials to the departments	1	Transport	No change
9	Examination Officer organises for the typing, proofreading, corrections, photocopying, collating and packaging of examination papers	7	Operation	Change from draft to final examination
10	Chief Invigilator collects examination papers from the Examination Centre to be administered at the scheduled venues	2	Transport	No change
11	Chairmen of Departments supervise the marking and submission of results by Internal Examiners after the end of semester examination	4	Inspection	No change
12	Chairmen of Departments organize for external moderation of the examinations	3	Inspection	No change
13	Departmental Examination Boards consider examination results after end of examinations	1	Decision	No change
14	Schools/Institutes Boards consider examination results after end of examinations.	1	Decision	No change
15	College Academic Board considers examination results and releases provisional results to the students	1	Decision	No change
16	Submission of results in Senate rubric form and consolidated mark sheets to Academic Registrar/Deputy Registrar Examinations	2	Transport	No change
17	Approval of results by Senate	2	Inspection	No change
18	Examination results are communicated to students and copies given to the relevant offices.	2	Operation	Change from examination to results
19	Academic transcripts are prepared and issued to students	8	Operation	Transcripts issuance
20	Upon clearance by all the Departments of the University of Nairobi, Senate certifies final year students to graduate.	8	Operation	Graduation after examination
	Total Time in hours	**57**		

A data summary chart for examination process

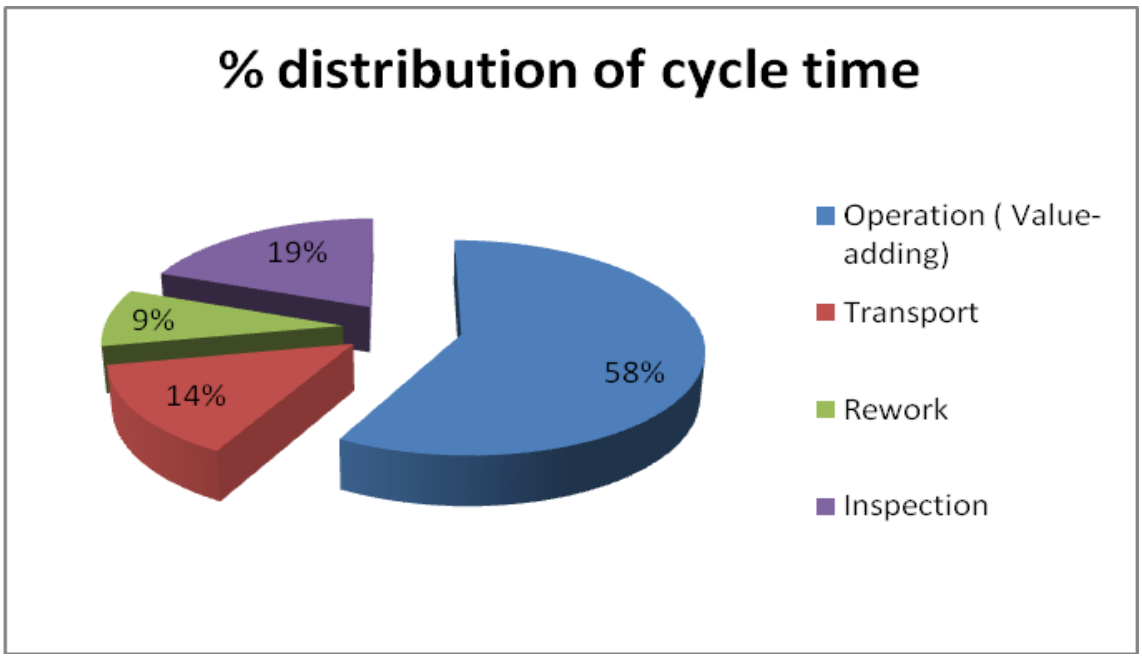
Type of Activity	**# of Steps**	**Hours**
Operation(Value-adding)	6	33
Transport	5	8
Decision	5	5
Inspection	4	11
Total	**20**	**57**

Percentage distribution of processing times

Type of Activity	**% of steps**	**% of Operation time**
Operation(Value-adding)	30	58%
Transport	25	14.0%
Rework	25	8.8%
Inspection	20	19.3%
Total	**100**	**100**



The examination process has 20 steps and only 6 steps which make up 30% of the process were value adding with the rest being non -value adding.



Implication

Cycle time was made up of processing time + transport time + reworks time + inspection time.

It is used to differentiate total duration of a process from the processing time. And for the case of examination process 58% was processing time with transportation time at 14%, rework time 9% and inspection time at 19 %. This meant that only 58 % of the cycle time was required effectively to deliver the examination process to the customer.

The teaching process has 17 steps with a total of 2820 minutes. 10 steps did not add value to the process

4.2: Task Analysis: Teaching process

Steps	Activity	Time on average (hours)	Type of activity	Remarks
1	Allocation of course by CODs in consultation with academic members of staff	6	Decision	No change
2	The CODs ensure that teaching timetables indicate day, time, course units, year of study, lecturers and venues	6	Transport	No change
3	The CODs confirm that duty allocations and teaching timetables are in line with the curriculum and University calendar dates	1.5	Inspection	No change
4	The CODs issue teaching timetables to lecturers and technical staff (where applicable) at least two weeks	2	Transport	No change
5	Uploaded timetable to the relevant website	1	Transport	No change
6	Appropriate teaching aids are available	4	Transport	No change
7	Lecturers prepare teaching materials for their respective courses in line with the course content.	12	Operation	Material preparation
8	For courses using log books for recording of procedures carried out by students, the lecturers witness the procedure by the student and sign for it	0.5	Inspection	No change
9	Lecturers in conjunction with tutorial fellows/laboratory technologists/workshop technologists (where applicable) deliver lectures/tutorials/clinicals and supervise group work/practicals/clinicals/field work, farm/industrial attachment, demonstration/rotation, and mailing of reading materials for distance education	3	Operation	Students get knowledge
10	A facility for students to register their attendance shall be provided and shall indicate name, registration number and signature	0.5	Decision	No change
11	Lecturers periodically prepare and administer Continuous Assessment Tests	1	Operation	Assessment of understanding

12	Students unable to attend lectures/tutorials/practicals/clinicals for genuine reasons such as ill health, bereavements etc seek permission from the COD using the prescribed Student Permission Sheet	1	Decision	No change
13	If a lecturer misses a lecture/practical, the class representative reports the matter to the COD on the same day, using the prescribed Student Report on Missed Lectures Form. The COD gives a copy of the form to the lecturer concerned and files the original form for record purposes. The COD ensures the missed lecture is recovered.	0.5	Operation	Students misses to get knowlegde
14	Course Lecturer evaluation by the students is conducted using the prescribed form for Course/Lecture Evaluation by Students	0.5	Operation	Gaps indentified for improvements
15	Feedback on course lecturer evaluation is communicated to the lecturers by the COD.	2	Transport	No change
16	Examinations are done as per the Procedure for Management of Examinations	2	Operation	Assessment of understanding
17	Portfilio examinations are done at the end of the academic year by a panel of examiners, appointed by the Chairman of Department	2	Operation	Assessment of understanding

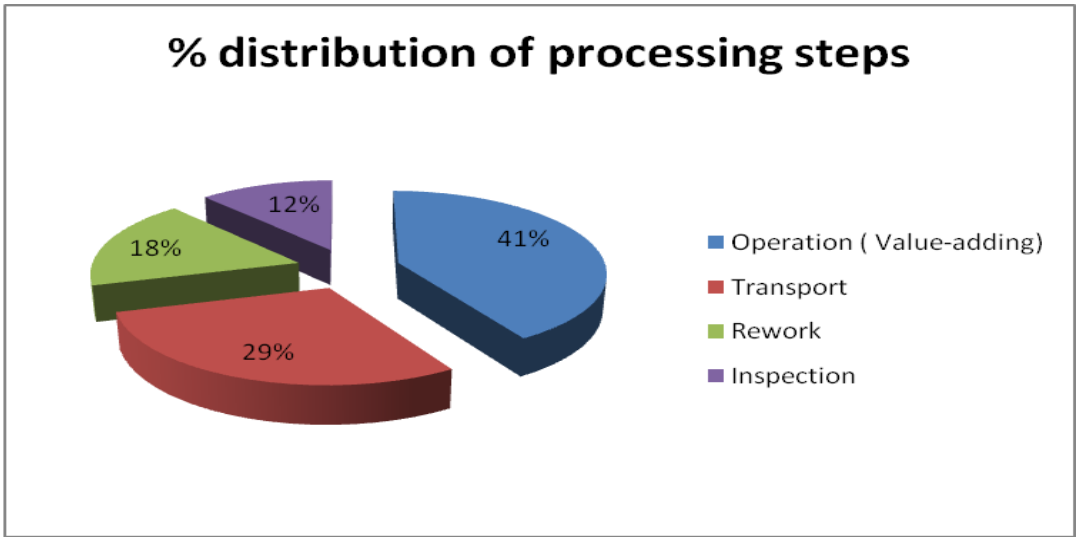
Source: University of Nairobi website

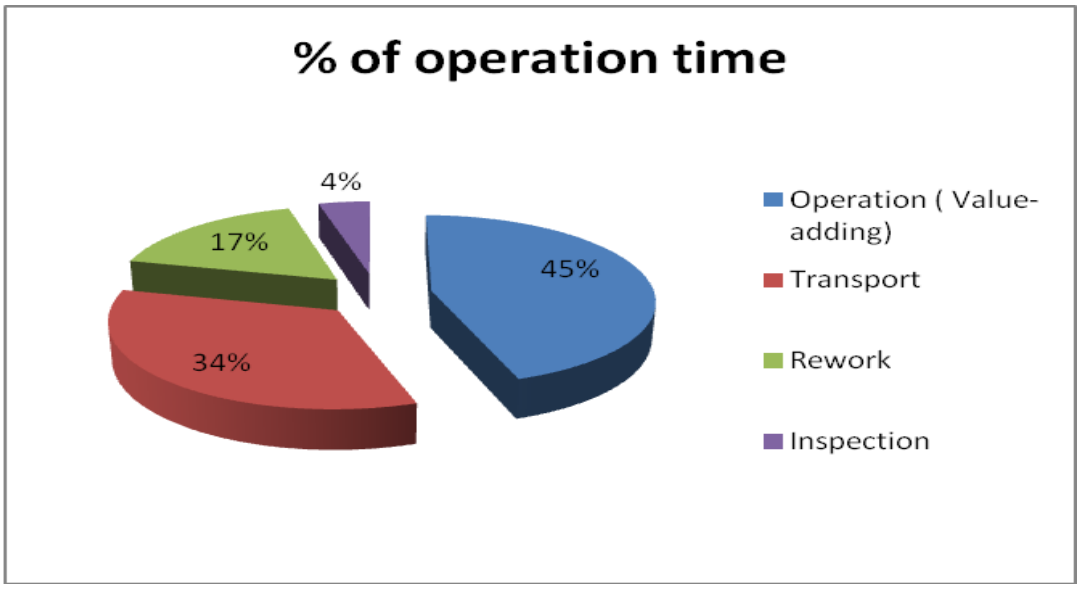
A data summary chart for teaching process

Type of Activity	**# of Steps**	**Hours**
Operation (Value-adding)	7	21
Transport	5	16
Decision	3	8
Inspection	2	2
Total	17	47

Percentage distribution of processing times

Type of Activity	**% of steps**	**% of Operation time**
Operation (Value-adding)	41.2	44.7
Transport	29.4	34.1
Rework	17.6	17.0
Inspection	11.8	4.2
Total	**100**	**100**





Discussion

A total of six and seven steps in examination and teaching processes respectively were found to be value adding steps and this was equivalent to 58% and 44.7% of processing time. A total of 42% and 55.3% processing time for examination and teaching process were either transport, rework or inspection time which was not value adding to the two processes. Non-value steps add to cost without adding to the process object value. They were found to lengthen the cycle time hence reduce the value to the customer resulting to unsatisfaction.

4.2.1: Waste in Monetary Terms

Course & semester (Semester one of academic year 2015)	Examination material, copies made	Sources of quality information	Number of candidates	Variance (Waste)
Course1	130	Examination office	120	10
Course 2	490	Examination office	450	40
Course3	560	Examination office	500	60
Course4	520	Examination office	490	30
Course5	510	Examination office	500	10
Course6	140	Examination office	130	10
Course7	150	Examination office	120	30
Course8	580	Examination office	580	0
Course9	570	Examination office	550	20
Course10	480	Examination office	470	10
Course11	420	Examination office	410	10
Course12	200	Examination office	180	20
Course13	600	Examination office	580	20
Course14	170	Examination office	160	10
Course15	500	Examination office	490	10
Course16	610	Examination office	600	10
Course17	100	Examination office	95	5
Course18	120	Examination office	115	5
Course19	300	Examination office	280	20
Course20	150	Examination office	145	5
Course21	180	Examination office	175	5
Course22	560	Examination office	550	10
Course23	190	Examination office	180	10
Course24	300	Examination office	280	20
Course25	240	Examination office	230	10
Course26	200	Examination office	195	5
Course27	390	Examination office	280	110
Course28	580	Examination office	570	10

Course29	140	Examination office	130	10
Course30	300	Examination office	290	10
			Average paper waste/Course	18.10345

Percent waste per course =0.2%

Implication

From the 30 courses sampled in a semester an average of 18 examination papers were not issued to the students either because excess printing was done by not correctly confirming the number of candidates enrolled for the course or students enrolled failed to sit the examination because of one reason or the other. This translated to 0.2% waste on papers per examination done in a course.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter presents the summary of key data findings, conclusion drawn from the findings highlighted and recommendation made there-to. The conclusions and recommendations drawn are in quest of addressing the research question or achieving the research objectives which is to map a selected process and identify value and non value adding activities in monetary terms.

5.2 Summary of Findings

The study analyzed all the steps of the teaching and examination process in the University of Nairobi. Raw data was presented to provide meaningful information, examine them in a holistic fashion, and find ways of communicating this interpretation to others. Data organization involved systematization and analysis of raw data based on interviews, transcripts, field notes and other documentation.

Process Effectiveness (Examination process) = 30 %

Process Effectiveness (Teaching process) = 41.2%

5.3 Conclusion

The most powerful tactic in operation efficiency and effectiveness is continuous review and critiquing our processes. Wealth is created if more are done, done better and done faster and at lower cost.

Reduction in process cost can be achieved by minimizing waste which is possible if we identify and reduce non value adding activities in the process. Waste come as a result of reworks/repairs, defects, material waste, delays, waiting, poor material allocation, unnecessary material handling and material waste.

All those activities that produce costs, direct or indirect, and take time, resources or require storage but do not add value or progress to the product need to be eliminated in the 21st century Institutions in order to meet customer needs and market expansion. The study concludes that there were several procedures in the University of Nairobi which need to be reviewed to eliminate activities that produce cost and waste resources.

5.4 Recommendation

From the discussions and conclusions in this chapter, the researcher recommends various higher institutions to consider reviewing and critiquing their processes by mapping them and find out activities which do not add value and increase cycle time to the process.

To ensure success in a fierce competition between companies, with increased customer expectations and volatile environment, there has to be a growing interest in new management paradigms that promise performance improvement. The level of process improvements will attracted considerable attention to enhance effectiveness. Performance in organization is hurt badly by rework occurrences mostly from the unnecessary redoing and rectifying efforts of incorrectly implemented processes or activities, delays and inefficiency.

5.5 Area for Further Research

The researcher recommends that a similar study on process mapping be done on other organization and institutions processes so as to find out how process improvements will

enhance effectiveness, lower cycle time and reduce on rework, scrap and time wasting while increasing customer satisfaction and reducing on amount a customer is willing pay.

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APPENDICES

Appendices 1: Task Analysis (Examination process)

Steps	**Why it has to be done**	**Type of activity**	**By who**	**Time on average**	**Remarks**
Schedule of semester					
Register for courses and examination					
nominate the Internal and External Examiners					
Approved External examiners setting out terms of the appointment					
Internal Examiners submit the set examination papers to the Chairman					
Chairmen/Directors forward the examination papers to the External Examiners					
Directors submit examinations timetables and examinations papers for typing by the Examinations Centre					
Issuance of examination cards, answer booklets and other examination materials to the departments					
Examination Officer organises for the typing, proofreading, corrections, photocopying, collating and packaging of examination papers					
Chief Invigilator collects examination papers from the Examination Centre to be administered at the scheduled venues					
Chairmen of Departments supervise the marking and submission of results by					

Internal Examiners after the end of semester examination					
Chairmen of Departments organise for external moderation of the examinations					
Departmental Examination Boards consider examination results after end of examinations					
Schools/Institutes Boards consider examination results after end of examinations.					
College Academic Board considers examination results and releases provisional results to the students					
Submission of results in Senate rubric form and consolidated mark sheets to Academic Registrar/Deputy Registrar Examinations					
Approval of results by Senate					
Examination results are communicated to students and copies given to the relevant offices.					
Academic transcripts are prepared and issued to students					
Upon clearance by all the Departments of the University of Nairobi, Senate certifies final year students to graduate.					

Appendices 2: Task Analysis (Teaching process)

Steps	**Why it has to be done**	**Type of activity**	**By who**	**Time on average**	**Remarks**
Allocation of course by CODs in consultation with academic members of staff					
The CODs ensure that teaching timetables indicate day, time, course units, year of study, lecturers and venues					
The CODs confirm that duty allocations and teaching timetables are in line with the curriculum and University calendar dates					
The CODs issue teaching timetables to lecturers and technical staff (where applicable) at least two weeks					
Uploaded timetable to the relevant website					
Appropriate teaching aids are available					
Lecturers prepare teaching materials for their respective courses in line with the course content.					
For courses using log books for recording of procedures carried out by students, the lecturers witness the procedure by the student and sign for it					
Lecturers in conjunction with tutorial fellows/laboratory technologists/workshop technologists (where applicable) deliver lectures/tutorials/clinicals and supervise group work/practicals/clinicals/field work, farm/industrial attachment, demonstration/rotation, and mailing of reading materials for distance education					

A facility for students to register their attendance shall be provided and shall indicate name, registration number and signature					
Lecturers periodically prepare and administer Continuous Assessment Tests					
Students unable to attend lectures/tutorials/practicals/clinicals for genuine reasons such as ill health, bereavements etc seek permission from the COD using the prescribed Student Permission Sheet					
If a lecturer misses a lecture/practical, the class representative reports the matter to the COD on the same day, using the prescribed Student Report on Missed Lectures Form. The COD gives a copy of the form to the lecturer concerned and files the original form for record purposes. The COD ensures the missed lecture is recovered.					
Course Lecturer evaluation by the students is conducted using the prescribed form for Course/Lecture Evaluation by Students					
Feedback on course lecturer evaluation is communicated to the lecturers by the COD.					
Examinations are done as per the Procedure for Management of Examinations					
Portfilio examinations are done at the end of the academic year by a panel of examiners, appointed by the Chairman of Department					

Appendices 3: Process Analysis (Examination Process)

Group of activities	Total steps	Time
Operations		
Repeat Steps		
Inspection		
Transportation		
Decision		
Total Value steps		
Total Non value Steps		
Total		

Appendices 4: Process Analysis (Teaching process)

Group of activities	Total steps	Time
Operations		
Repeat Steps		
Inspection		
Transportation		
Decision		
Total Value steps		
Total Non value Steps		
Total		