EFFECT OF PERCEIVED ISO 9001:2008 QUALITY MANAGEMENT SYSTEM PRODUCT IDENTIFICATION ON PRODUCT REALIZATION AT MASENO UNIVERSITY, KENYA

BY

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ABSTRACT

Educational institutions in Europe began to implement the ISO 9000 family of standards in the 1990s followed by United States and Asia. These institutions encountered enormous challenges because the ISO 9001:2008 standard was designed mainly for manufacturing. However the interpretation of the term "product" in educational organizations is not uniform. Performance of Maseno University as ranked among public universities in Performance Contracting has deteriorated in the last three years. These may be attributed to its approach to Product Identification and Product Realization. The status and relationship between the two at Maseno University is not known. The purpose of the study was to establish the effect of perceived ISO 9001:2008 Quality Management System product identification on product realization at Maseno University, Kenya. The study specifically sought to establish the perception of a Product by academic staff of Maseno University, determine the perceived sequential flow of Product Realization process and finally determine the effect of Product Identification on Product Realization at Maseno University. The study used correlation case study design with a target population of 393 academic staff, a sample of 194 respondents was generated through stratified random sampling. A questionnaire was used to collect data and analysis done from generated percentages and means. The instruments were reliable at alpha (α) equal to 0.8. Findings showed 68.9% of staff perceived the product as a combination of Qualified Student, Learning Programmes and Research work, implying that staff regarded the three as product of Maseno University. The respondents however do not have a common understanding of the Product Realization process with the highest number (11.5%) perceiving a process that is different from the documented process and describing Product Realization process in 24 different patterns. The effect of Product Identification β_1 on Product Realization was found to be -.838 (ρ = .021) implying that a unit standard deviation in Product Identification causes 0.838 unit decrease in Product Realization. The study concludes that the combination of Qualified Student, Learning Programmes and Research is the product of Maseno University and that Sequential flow is different from what is documented in the standard and the quality manual. Product Identification affects Product Realization inversely. The study recommends that quality management system documents be revised to reflect the Product of Maseno University. Maseno University should endeavor to have staff conduct the Product Realization process as documented in the standard and its quality management systems documents. The University should carry out sensitization of staff on the quality management system documents. This may help in matching Product Identification with Product Realization processes. Further studies should be carried in other service organizations.

CHAPTER ONE
INTRODUCTION

1.1 Background of the Study

Implementation of Quality Management System (QMS) based on ISO 9000 standards is a target in performance contracting in Kenya. The performance contracting process has endured eleven cycles since its introduction in 2004, when 16 pilot state corporations signed and implemented performance contracts. In the financial year, 2010/2011, a total of 468 agencies (46 ministries/departments, 178 state corporations, 175 local authorities and 69 tertiary institutions) signed and implemented performance contracts (Performance Contracting Department, 2012).

Strategic Management provides overall direction to the enterprises. It entails specifying the organizations objectives, developing policies and plans designed to achieve these objectives, and then allocating resources to implement the plans. The adoption of quality system should be a strategic decision of the organization. The design and implementation of a organization's quality system is influenced by, its organizational environment, changes in the environment and the risks associated with that environment, its varying needs, its particular objectives, the products it provide, the processes it employs and its size and organizational structure (ISO 2008). There is need to determine if the quality system in Maseno University is responsive to its environment since this responsiveness is unknown moreover how Maseno University identifies its need is unknown.

Abbadi et al. (2012) at the global level, indicated that "In 1987, ISO published the ISO 9001, ISO 9002, and ISO 9003 standards which defined the requirements for a QMS. These standards were subsequently revised in 1994, 2000, and 2008, with a decision in March 2012 to create a new revision of ISO 9001 (West et *al.*, 2012). In the early 1990s, educational institutions in Europe began to implement the ISO 9000 family of standards, followed by those in the United States and Asia (Berghe, 1997). These institutions encountered enormous problems because this standard was designed mainly for manufacturing. Indeed, the requirements and vocabulary were not adapted to service providers or educational institutions. The problem of interpretation has been the subject of several studies during this period. The ISO 9001:1994 key terms, such as product and customer, and its requirements have been interpreted in the field of education by

(Karapetrovic et al., 1998) and (Berghe, 1997), where they posit that a critical point in the interpretation for education and training is the definition of the "product": is it the "learning output", the "learning process", or rather the education or training programme which is offered? In 2000, ISO revised and combined ISO standards 9001, 9002, and 9003 into one standard, ISO 9001. The resulting standard provided a set of generic requirements for a QMS applicable to any type of organization, regardless of activity, size, or if it is public or private. New requirements were added, the structure of the standard was changed, and the vocabulary adapted to make it applicable to all sectors, including education. The revised ISO 9001:2000 standard contained eight clauses. The first three were introductory in nature, while the last five contained generic requirements for any organization to implement a QMS, manage its processes, and meet customer requirements. Despite the revisions in the 2000 version, difficulties remained in applying and interpreting this standard in the educational field (Karapetrovic, 2001). This was probably because the ISO 9001 requirements were more generic in the 2000 version when compared to the 1994 set of standards (Karapetrovic, 2001).

It then follows that (Abbadi et al., 2012) illustrates the revisions to which the standard has been subjected to. However they state that the content still remains generic in nature and has difficulty in applying and interpreting. Their study also gives insight to the meaning of ISO 9000 family of standards where ISO published the ISO 9001, ISO 9002, and ISO 9003 standards as explained in the definition of terms. The ISO 9004 has just been introduced and organizations are currently being sensitized on it requirements. There is need to determine if Maseno University has kept track of the revisions that have developed over time including the newly introduced ISO 9004 (Steudel & Mann, 2003).

Abbadi et al., (2012) further stated that in 2003, ISO published the first version of IWA 2: Quality Management System Guidelines for the Application of ISO 9001:2000 in Education. It was revised again in 2007. The purpose of the initial international workshop agreement and its update was to provide guidelines for educational institutions (including HEIs) to use when implementing the ISO 9001:2000 requirements. In 2008, a new version of ISO 9001 was created to clarify the requirements of ISO 9001:2000. One year later, the IWA 2 working group developed ISO 9001:2008 Handbook for Educational Organizations — What to Do: Advice from

IWA 2 Working Group. This handbook provides guidance to educational organizations for implementing a QMS in compliance to ISO 9001:2008. In March 2012, ISO agreed to revise ISO 9001:2008 (West et al., 2012). It will probably add new concepts to this standard (AFNOR, 2012). The fifth edition of ISO 9001 is expected to be released in 2015 (West et al., 2012).

This brings to light that even the IWA 2 guidelines were revised in 2007 to clarify the first version. This necessitated the production of a new version of ISO 9001 again one year later IWA 2 group developed a handbook. However, Educational Organizations in Kenya have embraced ISO, developed their documents and procedures without making reference to this handbook. The QMS manuals they use are still generic and tailored towards firms that produce tangible products only. The perception of academic staff on the generic nature of the Maseno University quality manual should be determined.

With the intensified challenge of providing quality service for her citizens, Kenya adopted Performance Contracts as a tool not only to improve service delivery but also to refocus the mindset of the civil service from looking within to focusing on customers and results. The push factor for introduction of performance contracts in Kenya is the assumption that institution of performance measurements, customer orientation and an increased focus towards incremental productivity and cost reduction can lead to improvements in service delivery. This is achieved through performance management which is as a proactive management tool for achieving business goals and objectives, through a structured and continual process of motivating, measuring and rewarding individual and team performance. The performance of Maseno University has steadily improved over the last three (3) years. Table 1.1 below show that in the FY 2008/2009 Maseno University was ranked 5th with a composite score of 2.4175. In the FY 2009/2010it was ranked 8th with a composite score of 2.3270 and in the FY 2010/2011 it was ranked 7th in the category of Public Universities. The performance of Maseno University keeps oscillating from the initial position 5thin the first year, then position 8th in the second year and to position 7th in the third year. This show a decline in performance where other institutions are improving their performance. ISO implementation among other targets directly contributes to this performance. Table 1.1further shows an interpretation of the composite score where a score of 1.00 is excellent and a score of 5.00 is poor. The performance of Maseno university is

classified as very good for the period of three years even though very good only indicates that 100% of targeted activities have been achieved. The institutions performing better than Maseno are able to produce evidence that they have achieved more than 100% of the targeted activities.

Table 1.1: Results of Performance Contract for Public Universities

PUBLIC UNIVERSITIES	FY 2008/2009		FY 2009/2010		FY 2010/2011	
	No.	COMPOSITE SCORE	No.	COMPOSITE SCORE	No	COMPOSITE SCORE
University of Nairobi	1	1.8558	1	1.5843	1	1.4917
Kenyatta University	2	2.1976	2	1.9426	2	1.6502
Bondo University College	-	-	12	2.4217	3	1.8912
Jomo Kenyatta University of Agriculture and Technology	3	2.2772	3	1.9851	4	1.9116
Kisii University College	-	-	-	-	5	1.9330
Meru University College	-	-	13	2.4253	6	1.9994
Maseno University	5	2.4175	8	2.3270	7	2.0363
South Eastern University College	-	-	10	2.3650	8	2.0439
Masinde Muliro University of Science and Technology	6	2.4493	9	2.3409	9	2.1443
Kimathi University College	-	-	6	2.1724	10	2.1702
Kabianga University College	-	-	-	-	11	2.1889
Egerton University	7	2.6256	5	2.1143	12	2.2203
Moi University	4	2.3882	4	2.0482	13	2.2311
Laikipia University College	-	-	-	-	14	2.2859
Pwani University College	-	-	7	2.1874	15	2.2979
Mombasa Polytechnic University College	-	-	11	2.3714	16	2.3564
Kenya Polytechnic University College	-	-	14	2.4594	17	2.3992
Multi-Media University College of Kenya	-	-	16	2.9718	18	2.5234
Narok University College	-	-	-	-	19	2.6305
Chuka University College	-	-	15	2.7161	20	2.6307

"-" :- The Institutions were not ranked because they had not been established during respective financial years, No.:- Column under No. indicated the ranked position for respective institution
Performance and Composite Score:- Excellent (1.00 - 1.49) Very Good (1.50 - 2.49), Good (2.50 - 3.49), Fair (3.50 - 3.59), Poor (3.60 - 5.00)
Source:- Report on evaluation of the performance of public agencies (2010 – 2012)

The process of performance contracting entails setting targets. Implementation of Quality Management System (QMS) based on ISO 9000 standards is a target in performance contracting; it directly affects the overall composite score the organization attains during Performance Contract Evaluation. ISO 9000 is seen as a vehicle towards Total Quality Management (TQM) and is based on principles of quality assurance which builds the quality culture in the organization. ISO 9001 is an international standard containing requirements for establishing and maintaining a company's quality management system. A quality management system is set up by

a company to: establish a quality policy and quality objectives, and establish the means to achieve those objectives. This standard can be applied to almost any company from product manufacturers to service providers. It is not specific to any product or industry. Rather than specify requirements for your final product, ISO 9001 focuses further "upstream" on the processes or how you produce. This standard is based on the idea that there are certain elements every quality management system must have in place in order to ensure that quality products and services are consistently provided to the customer on time.

Whenever certification bodies conduct 3rd party audits, issues have been arising on the definition of the term "product". The correct definition of product limits the scope of QMS. Product Identification also therefore limits the scope of auditing. Given that the auditors do auditing in very many educational organizations, they have discovered the anomaly of these very many institutions identifying their products differently. Some institutions refer to the courses and programs as curriculum. Curriculum according to Pree (1987) is the foundation of the teaching-learning process. The development of programs of study, learning and teaching resources, lesson plans and assessment of students, and even teacher education are all based on curriculum. Curriculum refers to what students should learn, within a framework of goals, objectives, content and pedagogy it is more than a process; it is also a product. Berghe (2007) asserts that a critical point in the interpretation for education and training is the definition of the "product": is it the "learning output", the "learning process", or rather the education or training programme which is offered? The academic staff perception on Product Realization is unknown. It is necessary to determine the academic staff perception of the process of Product Realization at Maseno University.

Table 1.2: Comparing selected Educational Organization on Product Identification and Product Realization

	Education Organization	Identified Product	Planning the realization	Learner-related processes	Design and development	Purchasing	Provision of the educational service	Control of monitoring and measuring devices
1.	Hollande University	Educational programs, courses, and Services that it provides	Described what constitute Product Realization but it has not explained what takes place during planning	Defined product and the clients as the student. Described requirements for product	Explained the procedures involved in this stage involving the curriculum service department	Described who are involved in purchasing	Covers planning, delivery, monitoring and review of programs and courses	Students are often required to calibrate and adjust these devices as part of their training
2.	Technica University	Students	Specific to EO describes what takes place	Describes how they communicate but not how they determine customer requirements	No element of design and development is carried out	University describe how they make purchases	Describe the way the university delivers services	Use performance evaluation of the students,
3.	Kisumu Polytechnic	The curriculum	Generic and copy pasted the Standard	Generic and copy pasted the Standard and incomplete. Refers to non-existent procedures	KP has excluded this clause	A documented procedure, KP/PRC/OP/41 had been established.	This section is heavily borrowed from the standard	Generally explained as tool which also include a software
4.	Chuka University	Services, processes, procedures and activities undertaken by CUC.	Generic and copy pasted from the Standard	Generic and copy pasted from the Standard but does not address learner requirements	Copy pasted and not relevant e.g. The design and development stages of each product provided	Addressed purchases as it happens practically at the University	Crafted from the standard and only relevant for tangible products	What is described under monitoring and measurement is only relevant for production concerns
5.	Masinde Muliro	Educational Service	Specific to EO and copy pasted from IWA guideline	Well elaborated and focused to the learners	Refers to (MMU/WPR:503001) Makes it realistic	Well-articulated	Well stated and makes reference to QMS procedures	Learning assessment tool and testing and measuring equipment are calibrated
6.	Maseno University	Qualified Student	Generic and copy pasted from the Standard	Section contradicts design and development and identified product	QM states that MU does not design product for services	Although general will still apply	MU refers to provisions per MSU/MR/OP/XX None existent	Too general and copied from the Standard

Source: Extracted from the Quality Manuals from respective Educational Organizations (2014)

Table 1.2 above shows a comparison of how some selected educational organizations have identified their products and what they have done in Product Realization process. Internationally Hollande College (HC) which is an ISO certified institution in Canada has defined its product as "The educational programs, courses, and services" (HC, 2012). Technica Institute in New Deli – India defines its product as "the education and related processes" (Gupta, 2010). Masinde Muliro University of Science and Technology (MMUST) has identified their QMS product as "Educational Services" (MMUST, 2012) while Chuka University College (CUC) has identified it as "services, processes, procedures and activities" undertaken by CUC (CUC, 2012). Kisumu Polytechnic (KP) has identified their product in the QMS manual as "the Curriculum" (KP, 2011). Maseno University (MU) has identified the product for an Educational institution as the "qualified Student". (MU, 2010). The tasks involved in ISO implementation among others are Process Analysis appears the same in these institutions while the products are different. The application of ISO 9000 in education is difficult because of problems with interpretation. (Carman et al., 2008). There is a need to properly identify the product and provide means for the traceability of related quality problems to their causes in subsequent processes. In the context of this study, a properly identified product will provide a means of carrying out Product Realization.

IWA 2 (2007) describes 'Product Realization' as 'the different stages of instructional design, development, delivery, evaluation and support services activities, resource allocation, evaluation criteria, and improvement procedures to achieve the desired results'.

It involves planning the realization, determining learner related processes, design and development in the education organization, purchasing, provision of educational service and control of monitoring and measuring devices.

Karapetrovic et *al.* (1998) indicates that the version of the ISO 9001 standard approved in 1994 consists of twenty requirements, each representing one element of the quality system. Nevertheless, interrelationships of the twenty elements of ISO 9001 are not clear, and the elements do not seem to follow a logical order. He designed a six phase's system which starts from determining customer needs, systems design, allocation, deployment, systems implementation and actual outputs. The design by (Jain 2002) is related to tangible products. The

steps start with conducting a market research, design and development, material procurement, process engineering, production process, inspection and quality control, packaging, dispatch and customer feedback.

From the above literature, Step 1 in IWA 2 guidelines is done in step 2 and 4 in (Karapetrovic et *al.*1998), step 2 in IWA 2 guidelines is done in step 1 of (Karapetrovic et *al.*1998), step 3 in IWA guidelines is done in step 2 of (Karapetrovic et *al.*1998), step 4 of IWA 2 is done in step 3 of (Karapetrovic et *al.*1998) while step 5 and 6 of IWA 2 guidelines is done in step 5 of (Karapetrovic et *al.*1998). The model by (Jian 2002) has 9 steps but is similar to (Karapetrovic *et al.*1998) in the first 5 steps. It has an additional distinct steps 7, 8 and 9 which are done in step 5 of (Karapetrovic *et al.*1998) and step 5 and 6 in the IWA 2 guidelines.

From the above literature, there is no common definition of a product and academic institutions are not left out. There is also an issue with the processes of Product Realization where the order of carrying out the activities is not uniform. Plausibly correct Product Identification will lead to correct description of Product Realization. From literature there is controversy in Product Identification and Product Realization, perception of academic staff in educational organizations on Product Identification and sequential flow of Product Realization is not known. There is no literature has that has linked the two concepts conclusively and therefore the effect of Product Identification on Product Realization is not known.

Performance of Maseno University as ranked among public universities has deteriorated in the last three years as reflected in Table 1.1. ISO 9001:2008 quality management system (QMS) contributes directly to this performance. It therefore follows that it is important for Maseno University to determine if qualified student (as product identified by Maseno University) and Product Realization in the context of an education organization as described relates to the product identified in all documents.

1.2 Statement of the Research Problem

Educational organization desire to achieve and maintain ISO 9001:2008 certification in order to have a competitive edge over competitors and achieve of performance contract targets signed between the Ministry of Education and the Educational Organizations. The reference document that guides the implementation of ISO in these institutions is the Standard. The ISO 9000 standards were originally conceived for companies in the manufacturing industry. The wordings of the standard assume that all organization produce tangible products. The late 1980s saw the introduction of "industrial" quality concepts (such as Total Quality Management – TQM) in a few education and training institutes; in the early 1990s, some pioneers embraced ISO 9000. Since then, there has been increasing evidence that the adoption of TQM principles and methods – including those embedded in the ISO 9000 requirements could be relevant and useful for education and training organizations. In adopting the standard and in an attempt to produce quality manuals the educational organizations have interpreted differently the definition of their product and as such there is no harmony between the identified product and section of the manual that describes the Product Realization. Effective implementation of ISO contributes toward the overall of performance of educational organization. Maseno University was ranked 5th in Performance Contract (PC) in the financial year (FY) 2008/2009, in the FY 2009/2010 it was ranked 8th and in the FY 2010/2011 it was ranked 7th in the category of Public Universities. ISO implementation contributes directly by 2% and indirectly through the other 98% of the targets. The perception of Product Identification at Maseno University is unknown, the sequential flow of Product Realization process as perceived by academic staff given product identified is unknown and the determinannts of Product Realization is unknown. There are certain aspects of the standard that cannot be easily domesticated by an educational organization. It then follows that it is not possible to implement QMS as described in the manual. This study sought to assess the effect perceived ISO 9001:2008 Quality Management System Product Identification on Product Realization at Maseno University, Kenya.

1.3 Objectives of the Study

The main objective of the study was to assess the effect perceived ISO 9001:2008 Quality Management System Product Identification on Product Realization at Maseno University, Kenya. The Specific Objectives are to:-

i) Establish academic staff perception of Product Identification in Maseno University
ii) Determine the sequential flow of Product Realization process as perceived by academic staff.
iii) Determine the effect of Product Identification on Product Realization at Maseno University.

1.4 Research Questions

The study was guided by the following research questions:-

i) What is the academic staff perception of a product in Maseno University?
ii) Which is the sequential flow of Product Realization process as perceived by academic staff?
iii) What is the effect of Product Identification on Product Realization at Maseno University?

1.5 Scope of the Study

The study was limited to Siriba and College campus in Maseno University main campus. The study limited its scope to the implementation of ISO 9001:2008 on Product Realization at University which a strategy in management. The study is also limited to curriculum delivery within Maseno University. The cost of resources has limited the study to cover the sampled population.

.6 Justification of the Study

This study sought to clarify the definition of a product, identify the process of Product Realization as applicable to an educational organization as described in their QMS Manuals. The manual is one of the documents referred to during surveillance audits. Educational organizations in Kenya have been using their QMS manuals for the last six (6) years. There is need for the institutions to re-examine their QMS manuals and determine if they are in congruence with the VA 2 guidelines on application of the ISO 9001:2008 Standard. The study will be useful to

certification bodies since they will be able to have a common understanding of the concept understudy. To the Administration the study will contribute towards direct sensitization of the academic staff on ISO and the Government will use the study as a basis of evaluating the effectiveness of ISO implementation in educational organizations. The study will add to the body of knowledge the aspect of ISO as a discipline, Total Quality Management and Strategic Management. The academia will be able to utilize the aspects of this study in developing marketing programmes. The educational organizations will also be able to relate their Product Realization process in their manuals and effectively carryout activities that previous appeared vague in their QMS manual.

1.7 Conceptual Framework

The study identifies the independent variables as Product Identification. While Product Realization is the dependent variable. Demographic factors, cost and time are the intervening Variables. The conceptual framework shows that Product Identification determines the Product Realization process while the demographic factors such as age, educational level and experience, cost and time taken to implementing ISO intervene in the processes of Product Realization. Each product identified (Perceived Product Identification by academic staff) goes through the six phases during Product Realization process. The perception of product identified are also determined by the demographic factors of the respondents hence the Product Realization process.

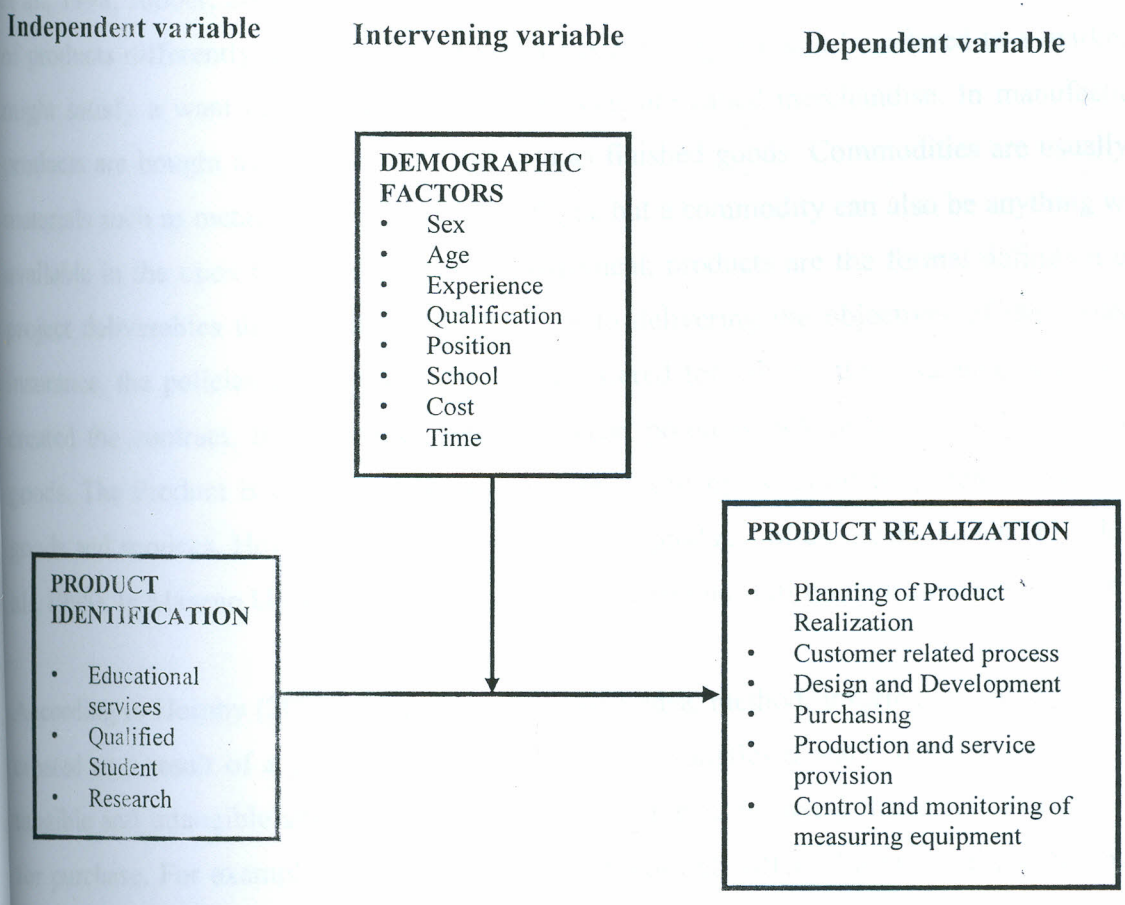


Figure 1.1: A relationship between Product Identification and Product Realization Source: Self Conceptualization, 2014

CHAPTER TWO

LITERATURE REVIEW

This study reviews both theoretical and empirical literature on Product Identification, Product Realization and sequential flow of Product Realization. It analyzes literature on the stages of Product Realization and concludes by relating the Product Realization process to Product Identification.

2.1. Theoretical Literature

2.1.1 Product Identification

The word "product" is used in very different contexts. Different authorities (Hornby, 2002, Juran et al., 1998, Jobber, 2004, Berghe 1996, Karapetrovic et al. 1998) have explained the meaning of products differently. In marketing, a product is anything that can be offered to a market that might satisfy a want or need. In retailing, products are called merchandise. In manufacturing, products are bought as raw materials and sold as finished goods. Commodities are usually raw materials such as metals and agricultural products, but a commodity can also be anything widely available in the open market. In project management, products are the formal definition of the project deliverables that make up or contribute to delivering the objectives of the project. In insurance, the policies are considered products offered for sale by the insurance company that created the contract. In economics and commerce, products belong to a broader category of goods. The Product is the output of any process. To many economists, products include both goods and services. However, under popular usage, "product" often means goods only (Juran et al., 1998). In Maseno University the perception of academic staff on its Product is not known.

According to Hornby (2002), the product as a good, idea, method, information, object or service created as a result of a process and serves a need or satisfies a want. It has a combination of tangible and intangible attributes (benefits, features, functions, uses) that a seller offers a buyer for purchase. For example a seller of a toothbrush not only offers the physical product but also the idea that the consumer will be improving the health of their teeth.

From the Marketing perspective (Jobber, 2004) a good or service which most closely meets the requirements of a particular market and yields enough profit to justify its continued existence. As

long as cars are manufactured, companies such as Michelin that produce tires fill the market need and continue to be profitable. Whereas for all these organization and define their products there is emphasis that markets requirements are established and met however the methods used by Maseno University to determine its customer needs should be established.

Berghe (1996) conducted a study in Thessaloniki on the application of ISO 9000 standards to education and training acknowledges that there are problems with interpretation of the standard. The author indicates that the standard was initially designed and written for the manufacturing industry. Manufacturing industry produces tangible products. A particular feature of the ISO 9000 standards is the need for interpretation. Many of the specifications laid down in the standards need careful analysis and adequate interpretation before they can be applied in a particular education or training context. A critical point in the interpretation for education and training is the definition of the "product": is it the "learning output", the "learning process", or rather the education or training programme which is offered? This is not just an academic problem, but one which has implications throughout the standard. Berghe (1996), did a comparisons with other service sectors, given the real difficulty of controlling the learning process, and the choices made by many certified education and training organization's across Europe, the most operational way to define the "product" in an ISO 9000 context is as, "the education and training services offered by the organization, including associated products, tools and services".

Berghe (1996) further explains that this choice has many implications when interpreting a number of clauses of ISO 9001/9002. For instance, when "learning" is taken as the "product", then the "testing and inspection" requirements concern assessment and evaluation of students and trainees. However, when "the course (programme)" or "training" is considered as the product then the "testing and inspection" requirements refer to the evaluation of a course or training session by students, trainees and/or their employers. Interestingly, however, even when "learning" is being taken as the definition of the product, in practice it might lead to a similar implementation of the quality system. The author concludes that this is related to the somewhat redundant nature of the ISO 9000 requirements, and the fact that the systematic application of the principles of quality assurance is almost independent of the definition of the product.

Karapetrovic et al. (1998) conducted a study in Manitoba with the aim of providing an interpretation of the ISO 9001 model for quality assurance in a university environment. The objective was to prepare a framework for successful documentation and implementation of a quality system based on the ISO 9000 international standards in education. The author indicated that Universities create three main products, the student knowledge, abilities and competencies, courses and programs and research (new knowledge). Table 2.1 below show various terms used in interpretation of ISO 9001. These products if identified in isolation will require different process when undertaking Product Realization. It is important to note that the previous description of a product as the end of a process be identified as the product while the other process that have been described as products be considered as independent process that interact to produce the final process. In any case that is how the standard explains its process approach. However the terms in Table 2.1 should be taken into consideration when designing the Product Realization process. From the literature reviewed there is no educational organization that identified research as one of its products. What is not known is how Maseno University treats Research during its Product Realization Process.

Table 2.1: Terms used in the interpretation of ISO 9001

TERM(ISO 9001)	EXPLANATION		
	Student Knowledge	**Program/Courses**	**Research**
Product	Student knowledge, abilities& competencies	Programs & courses	New knowledge
Customers	Industry, community, alumni, professional organizations	Students, industry, community, professional organizations	Industry, research sponsors, other universities, community
Supplier	University/Faculty/Department	Professional	Researchers,
Subcontractor	High schools, other universities, community colleges	institutions, other universities	industry sponsors, literature sources(journals)
Executive Management	For a faculty: Dean, department heads and program directors; For a department: Head and associate heads		Research objectives
Design Plan	Undergraduate programs, M. Sc. Programs		
Designer	Academic staff (professors and instructors)		
Process Plan	Individual student curriculum	Course outline (plan); Program plan	Research project plan
Raw Material	Student knowledge and comprehension of basic arts and sciences before entering the university	Existing material on courses and programs	Existing practical and theoretical knowledge
Value Adding to Material	Value adding to student's knowledge and abilities	Improvement in course design, delivery and maintenance	Value adding to existing knowledge
Manufacturing Process	Learning	Teaching	Researching
Lead Time	Time from enrollment to graduation	Programs: 4 or 5 years; Courses: 1 or 2 terms Program: course; Course: lectures, labs, tutorials	Time from contract to delivery
Part	Student knowledge accumulated in a course		A phase in a research project
Operation/Tool	`Learning opportunity' inlays, lectures	Teaching labs, lectures, tutorials	Work on a phase of research project
Machine/Technology	`Learning opportunity'		`Research Opportunity'
Operator	Teacher and student	Teacher, teaching assistant	Researcher, research assistant
Part Specification	Course specification in the `General Calendar'		Specification of deliverables in a research contract
Quality Policy	The overall quality intentions and direction of the faculty (department), as formally expressed by the dean (department head)		
Quality Control	The operational techniques and activities used to fulfill the requirements for quality		
Nonconformity	The no fulfillment of specified requirements Student failure Course	program failure	Research project failure

Source: Karapetrovic 1998

Caraman et al., (2008) in Romania, presented a paper whose objective was to discuss a quality assurance strategy in education, and providing a framework for a systematic interpretation and a successful documentation/ implementation of the guidelines for the application of ISO 9001:2000 in education; namely IWA 2. Caraman et al., (2008) make reference to Karapetrovic et al., (1998), and states that a summary of terms found in the ISO 9001 standard and explanations of these terms with respect to the three products is quite hard to follow. Maybe the most fundamental difference in interpretations of ISO 9000 standards for education and training is the definition of the 'product': is it the 'learning' or the 'learning process', or rather the education or training program which is offered? This is not just an academic problem, but one which has implications throughout the standard. What is not known is how the other two products (learning process and research) are treated while describing the Product Realization given that it has identified the product as qualified student. This study sought to determine perceived Product of Maseno University by the academic staff.

2.1.2 Product Realization

Theoretical study on Product Realization for educational organization is limited. Caraman et al. (2008) defines Product Realization as different stages of instructional design, development, delivery, evaluation and support services activities, resource allocations, evaluation criteria and improvement procedures to achieve the desired results. These are activities that education organizations carry out including Maseno University. What is not known is the take of academic staff on how they are documented in procedures or work instructions.

Wikstrom (2008) in a study conducted in Europe with the objective of discussing and exploring an "innovative" approach towards product concept development methodologies, focused on creativity, multidisciplinary teams, and decision making. The author stated that important factors for conducting a multidisciplinary approach to Product Realization need attention. The most important source is the people involved in the process which he refers to as the 'Medici Effect'. To the author, the diversity of the members in the group, communication through the process for common understanding, visualization for the handover situations and common vision design processes as an iterative approach to the problem at hands. It was concluded that there is a need to develop and implement new innovative methods and models that will support and strengthen industry to generate new ideas and realize these into successful products and improved

processes. The study showed a process of Product Realization for tangible products. In education set up this is not a new concept since the final product is a combination of inputs from different disciplines.

IWA 2 (2007) describes 'Product Realization' as 'the different stages of instructional design, development, delivery, evaluation and support services activities, resource allocation, evaluation criteria, and improvement procedures to achieve the desired results'. The requirements and even the underlying concepts have to be 'translated' or 'interpreted' into a language which an education or training provider can understand. Berghe (1996) further states that ISO IWA 2: Quality management systems - Guidelines for the application of ISO 9001:2000 in education, made the standard easier to understand and implement by the education sector. IWA 2 (2007) did not come up with a new definition of a product only that they emphasized on explanation given by (Karapetrovic *et al.* 1998).

Product life cycle (PLC) theory (Nadeau and Casselman, 2008) pursues the notion that the progression of a product's market presence is similar to organic life. The PLC contains four key life stages a product passes through from inception to death. The pattern of sales mapped against time represents a bell-like shape of increasing sales toward a plateau and then falling off. Each of the four stages (introduction, growth, maturity and decline) are distinct because the products in this stage share more market characteristics with other products in the same stage than with itself at a previous or later stage. There is need to determine the product of Maseno University at the stage they are in the four phases.

Management theory and TQM (Dean and Bowen, 1994); Management theory, in contrast, is concerned with understanding, not just improving, organizations. Some management theories are prescriptive; others simply describe relationships among organizational characteristics .When management theory is prescriptive, its prescriptions tend to be contingent (i.e., sensitive to variation in the organizational context). Total Quality as a philosophy or an approach to management that can be characterized by its principles, practices, and techniques. Its three principles are customer focus, continuous improvement, and teamwork, and most of what has been written about Total Quality is explicitly or implicitly based on these principles. QMS has expanded the principles from three to eight making it more inclusive and that is what Maseno

University has implemented however it is necessary to determine the extent to which QMS is being implemented in Maseno University.

The theory of service quality and service capacity (Senge and Oliva, 1993) simulates a service center where customers enter the system and after a waiting time are served by the Center's employees. Service capacity (service personnel, years of experience, skill and motivation) is required to provide that service; the desired amount of capacity is determined by the desired level of quality, and the throughput of the service center. If a particular request is not satisfied to the customers' standards, it comes back into the service backlog and has to be reprocessed as rework. Customer feedback is a requirement of QMS whereas the theory of service quality and service capacity thus blends well with this requirement it will be necessary to determine follow-up action taken after analysis of customer feedback.

Prospect Theory (Kahneman and Tversky, 1979) avers that the basic idea is that people value losses much more harshly than gains. Reduction on the numbers of students served by Maseno University can have more serious implication to management of the institution as compared to a situation where there is an increase in those numbers. It is necessary to determine what strategies are being put in place to ensure those numbers don't go down. A similar analysis should be done for the other types of product offered by Maseno University

2.1.3 Sequential Flow of Product Realization Process

The ISO 9001:2008(E) Standard, fourth edition prepared by a technical committees describes sequentially the Product Realization in six phases namely; planning of Product Realization, customer related processes, design and development, purchasing, production and service provision and finally control of monitoring and measuring equipment.

Version 1 of IWA 2 guidelines identifies some Product Realization process as teaching-learning activities, designing and developing curricula, training or other activities, admission of candidates (students), controlling design and development changes in curricula, course calendars, timetables and prerequisites, providing library, audiovisual equipment, computers and other services, allocating classrooms laboratories, workshops, auditorium, classroom for ceremonies. IWA 2:2007(E) second edition address realization of the educational services in six phases.

Planning the realization, learner related process, design and development in the educational organization, purchasing, provision of educational services and control of monitoring and measuring devices. Figure 2.1 below shows Product Realization process as developed at IWA 2.

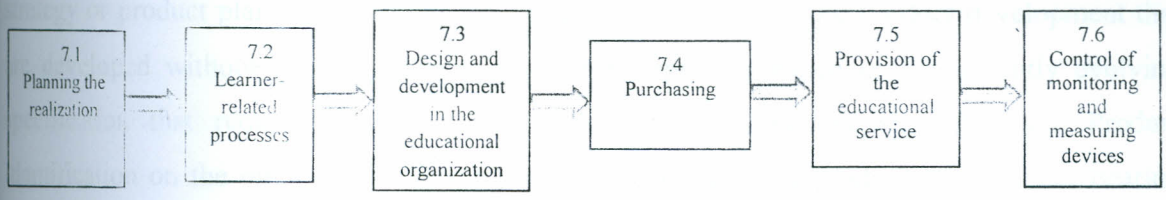


Figure 2.1: IWA 2 Guidelines Product Realization Process

2.2 Empirical Literature

2.2.1 Product Identification

Sommi et al., (1995) in a study done in Missouri-Kansas City on teaching through quality management with the objective of highlighting the potential solutions and problems that application of TQM causes, and discuss ways individual faculty members can implement quality management into their coursework and ways schools and colleges of pharmacy can implement quality management into their curricula. The researcher found that the concepts of TQM are less easily applied to businesses that are service oriented, such as healthcare. Applying TQM to higher education is even more clouded. One reason TQM is difficult to apply in service-based industries or in education, is that the "product" is less tangible, as is the process by which the product is delivered. For example, the student can be considered a product, worker, and customer of educational systems and does in fact play each of these roles. Nonetheless, many principles of quality management are applicable in education and can provide a framework from which individual faculty can set out to improve their coursework. The student is also vested in the "product" of the education, and thus could be viewed from one perspective as a worker. The student then would be vested in improving the quality of the product, or at least participating fully in the process, as quality managers would involve students as active participants in problem solving ways to improve the coursework. This article is not related to ISO but addresses quality from the aspect of TQM. It is specific on outcomes of classroom teaching only. What is not known is how Maseno University treats the worker as the "product".

Product definition is a critical starting point in the development of any new product. Yet for its importance, there are a number of common shortcomings to the process of product definition in many companies. According to this author, product definition should have a defined product strategy or product plan, formal requirements as a basis for initiating product development that are developed without true customer input and Creeping elegance or a constantly evolving specification that requires increasing development scope and redesign iteration. Product Identification on the other hand refers to attaching a notice to a product or container bearing information concerning its contents, proper use, manufacturer and any cautions or hazards of use (Koren, 2012). This is only applicable to tangible products. What is not known is wheather Maseno University has a unique way of Identifying its product including having an alumni association.

Product Identification in a rapidly changing economy and intensified worldwide competition make Product Identification critical for Brand Owners, Design Engineers, Legal Departments, End Users, and many others. For example, durable goods demand durable labeling and consumer goods need labels that imply product quality. Our narrow web roll form products will take care of your durable labeling, package decoration, and pharmaceutical and security labeling needs (FLEXcon, 2012). From the literature above product Idenfication is very crucial to all form of businesses including educational organizations.

In the International Standard, the term "product" only applies to a product intended for, or required by, a customer, and or any intended output resulting from the Product Realization processes ISO (2008). This is the definition Maseno University adopted. The workshop that produced guidelines for implementing ISO determined that educational services are the product ISO (2007) for educational organizations. From the above it is clear that the process of Product Realization cannot be the same for the two definitions.

The ISO 9001:2008(E) Standard, fourth edition prepared by a technical committees has identified the term "product" to only apply to product intended for, or required by a customer and or any intended output resulting from the Product Realization processes. The first part of this definition assumes that the product being produced is tangible. The second aspect of the

definition is applicable to an educational organization since it is possible to look at the product that comes out of a teaching process.

Harman (1998) has developed a set of criteria and questions that characterize desirable quality assurance features. When this instrument was applied, it indicated that the HEQC criteria would address all Harman's desirable criteria. From the text analysis it was concluded that the requirements of ISO 9001:2000 could be interpreted and applied to all the activities of an academic unit. The text analysis demonstrated that the framework of ISO 9001:2000 requirements was both useful and sufficient, since the minimum criteria for institutional audit and programme accreditation could be met in such a QMS system. It was further concluded that the implementation of ISO 9001:2000 in an academic unit was possible, but would require the text analysis to be converted into a faculty guideline on ISO 9001:2000. What is not known is how Maseno University interpreted the ISO 9001:2008. This study strives to determine the perception of academic staff of Maseno University on the interpretation of ISO.

Stables (2006) did a study in South Africa with an aim to evaluate the suitability of the requirements of the internationally accepted quality management system, ISO 9001:2000, as a framework for quality management in an academic unit. This was done by interpreting the ISO 9001:2000 standard requirements and comparing them to the institutional audit and programme criteria of the Higher Education Quality Control (HEQC). The understanding and beliefs of educators in a university faculty regarding the management of the quality of the higher education process were explored via questionnaires, to gain insight into the understanding of common quality concepts as well as knowledge of and attitudes towards formal quality management systems such as ISO 9001:2000. The interpretation of the standard and identification of appropriate faculty findings actions to ensure sufficient quality management of academic delivery raised the question as to what could be used to judge whether the interpretation was in fact useful and appropriate. Stables (2006) established that ISO 9000:2000 could be the framework for a faculty's QMS. What is not known is whether the quality assurance division of Maseno University has done a comparison of its quality control structures and harmonized it with the ISO 9001:2008 which is the latest revision of the standard.

Stables (2006) and Harman (1998) was discussing the ISO 9001:2000 standard because it was the latest revised edition at that time, it was then revised in the year 2008 to come up with ISO 9001:2008 standard.

2.2.3 Product Realization

Other studies reviewed dwelt mainly on the aspect of quality. Nderitu & Nyaoga (2013) conducted a study to determine the effect of Quality Management practices on performance in public primary schools within Nakuru Municipality, Kenya. The study used a census survey of all the 60 head teachers from all the 60 public primary schools in Nakuru Municipality. The study used structured questionnaires to gather data from school head teachers and Simple descriptive statistics mean, median, mode, percentages were used. Inferential statistics regression analysis technique was used to analyze data. Quality management practices (top management commitment, teamwork, continuous improvement, competitive benchmarking, training, reward and recognition and customer focus) were found to significantly influence performance among schools in the study area. This study recommended the need to strengthen these elements of quality management practices in order to realize meaningful performance increased levels of performance especially in KCPE mean score, enrolment and co-curricular activities. The researcher was investigating total quality management (TQM) and as such there was no uniformity in its implementation throughout the primary schools in Nakuru. Unlike Quality management in ISO that was implemented uniformly throughout Kenya the attribute under Nderitu & Nyaoga (2013) study cannot be uniformly measured.

Abbadi et al., (2012) in a study done in Morrocco, analyzed IWA 2 guidelines compared it to the guidance of the ISO 9001 handbook for educational organizations and pointed out some gaps in these guidelines. They found that both the standard (ISO 9001:2008) and the guidelines (IWA 2:2007) are not seamlessly linked because of the one year difference between the two. Therefore, the ISO 9001:2008 clarifications were not integrated into IWA 2. Another gap occurs where IWA 2 neglects research activities and its customers. The difficulty here rests on how IWA 2 defines the product as an educational service and the customer as a learner. This definition of product does not take into account the role research plays in HE IWA 2:2007 section 7 (Realization of the Educational Service) indicates that education is a service. Section 5.2 (Customer Focus) This approach demonstrates a difference between manufacturing and

education because, in the former, the organization's staff is the actor responsible for the realization and the quality of the product, while in the latter the learner is both customer and actor (Becket & Brookes, 2008). A learner is a "customer" in the sense that the individual acquires new knowledge, skills, and attitudes. On the other hand, the learner is also an "actor" who contributes in the delivery of higher education services and whose behavior influences the quality of services offered by an institution. Parenthetically, the dual role the learner plays requires that he or she should know what his or her rights and responsibilities are, a point covered by the code of conduct for learners integrated by the IWA 2 guidelines as part of established by organization. In conclusion they recommended an update to the IWA 2 guidelines to bridge the identified gaps pending the release of the new version of ISO 9001. The author acknowledges that Product Realization in IWA 2 describes educational services but is quite on other products produced by educational organizations, the central theme of this study. On the role of the student as being part of the product development in an educational organization the author concurs with (Roger et al., 1995) who state that the student is also vested in the product of the education and thus could be viewed as a worker. What is not known is the extent to which Maseno University involves the student in the product development.

Berghe (1996) in his study on application of ISO 9000 standard to education and training touches on Product Realization where he stresses the need to define and analyze "design input factors" during the design process. He states that is a matter of judgement by the institution and the auditor of the certifying body to decide whether all critical input factors are being considered. How such issues are dealt with has major consequences for the implementation and maintenance of the quality system. The ISO 9000 standards contain many parts which need subjective assessment for a particular education or training provider. He concludes that this is, actually, both strength and a weakness of ISO 9000 and that no authoritative guidance exists on such issues. What needs to be done in practice depends on the complexity of the organization, the demands from customers, and the educational attainment of the staff. The tangible and often compulsory requirements of ISO 9001 and 9002 standards (quality policy, quality manual and procedures, regular audits) provide an overall, measurable framework for quality efforts, which can be used by an education and training organization. What is unknown is if Maseno University has a system of measuring quality effort as espoused by (Berge 1996). It is actually necessary to determine if it is measurable at Maseno University.

Caraman et al. (2008) in Romania also looked at the other aspects of Product Realization and specifically the customer property where the authors indicate that the 'customer property' in a University, are the documents given by students (certificates, diplomas of previous scholar levels, personal ID documents), but IWA 2 completes this list performed by the student, applications, records of the student's academic history. On control of monitoring and measuring devices. The authors observe that there are some interesting clarifications in IWA 2. First, 'to ensure that measurement capability is consistent with the measurement requirements, measurement system should be validated for their reliability and utility'. This validation can be made using examination commissions or using a peer review of the examination instruments. Second, 'monitoring and measurement should be carried out during instruction to assure conformity with the instructional plan'. Finally, a problem that is difficult to solve using only ISO 9001 is the control of non-conforming product. Besides, that was an observation made by certification audit team. The observation was easily solved using IWA 2 clarifications: 'Where a nonconformity exists, involving student participation in the educational process, students may be, were permitted: with other things, like: exams, test or paperwork provided with additional training and permitted to be reassessed; b) to continue in the educational programme in accordance to defined procedures; c) transferred to another study programme.' What is not known is if Maseno University identified its customer property and nonconforming products. It is necessary to determine if Maseno University has identified its customer property and nonconforming products and examine the efficacy of its monitoring and measurement devices.

2.2.3 Sequential Flow of Product Realization Process

Karapetrovic et al.(1998) carried out a study in Canada with the objective of discussing quality assurance strategy in education, and providing a framework for a systematic interpretation and successful implementation of the most comprehensive standard in the ISO series namely ISO 9001. He designed a six phase's system which starts from determining customer needs to the evaluation of whether these needs have been met.

Karapetrovic et al.(1998) indicates that the version of the ISO 9001 standard approved in 1994 consists of twenty requirements, each representing one element of the quality system. Nevertheless, interrelationships of the twenty elements of ISO 9001 are not clear, and the

elements do not seem to follow a logical order. For example, element on design control is followed by document and data control, and purchasing, after which comes control of customer-supplied product. Some organizations have tried to document and implement these quality system elements in the order in which they appear in the standard, and encountered a treacherous path. The danger in this approach lies in the increased emphasis on documentation and a loss of the focus on the quality system. According to Karapetrovic (1998), the first process in the loop is the determination of customer requirements, and the ability of the organization to meet them this is the subject of the ISO 9001 requirement 4.3 Contract Review.

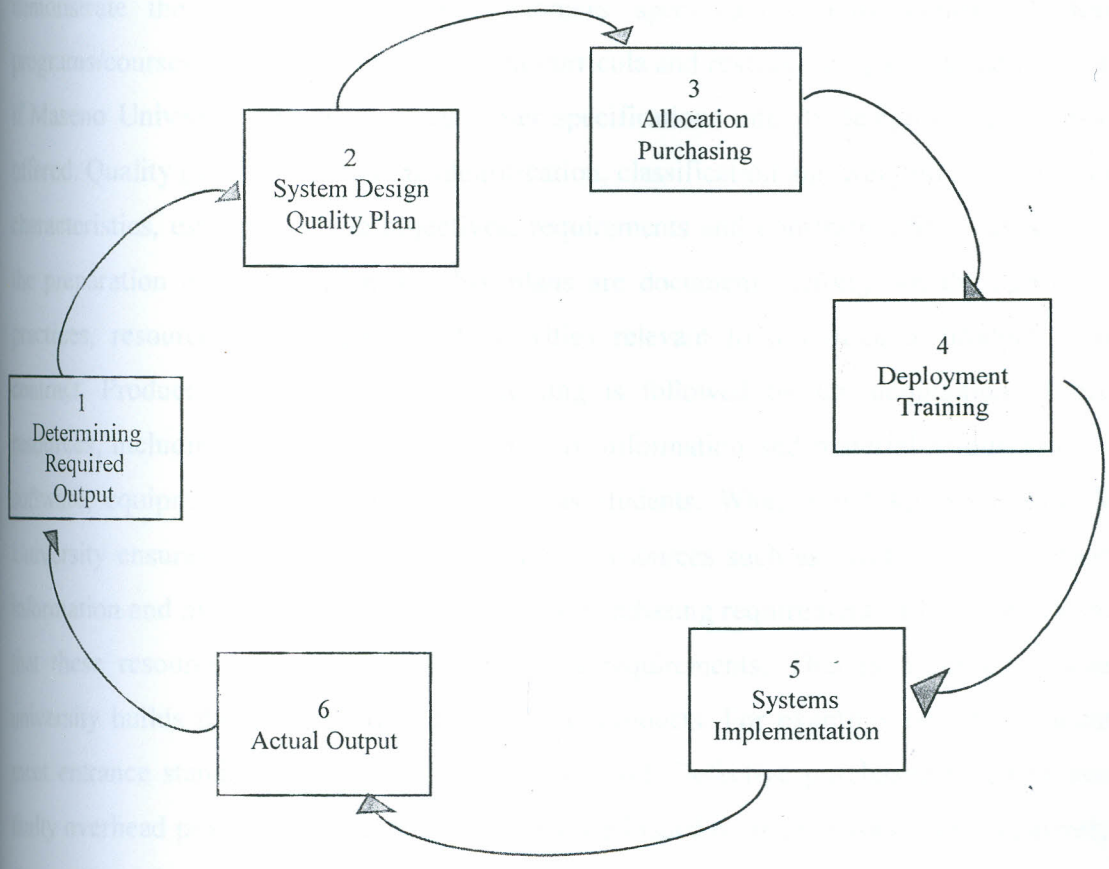


Figure 2.2: Graphical model of an ISO 9001 quality system

Source: Karapetrovic 1998

The product that meets these requirements is then designed (Design Control), and a quality plan addressing this specific product is prepared. The procurement of necessary resources follows,

focusing on these issues. Human resources must be trained to effectively use procured resources (Training). The product subsequently goes through processing (Process Control), inspection and testing, as well as handling and storage. Defective products are removed and corrective and preventive actions implemented. Finally, servicing is available, if required (4.19). From this illustration one can see a sequence of Product Realization flowing. It is expected that in this section the faculty/department determines the performance of its product. This information forms input to feed on and the cycle is repeated. This cycle is not the same as that described in the standard or even the Maseno University quality manual. The process should be such that the activities flow smoothly to the point the product is produced. What is not known is the academic staff's perceived flow Product Realization activities at Maseno University.

Karapetrovic et al.(1998) analyzes design control and states that the faculty (department) must demonstrate the ability to translate customers' specifications into appropriate design of programs/courses offered individual student curricula and research projects. What is unknown is if Maseno University incorporates customer specifications into its design of programs/courses offered. Quality planning covers the identification, classification and weighing of product quality characteristics, establishing the objectives, requirements and constraints for quality, as well as the preparation of quality plan. Quality plans are documents setting out the specific quality practices, resources and sequence of activities relevant to a particular product, project or contract. Product design and quality planning is followed by the acquisition of necessary resources, including academic and support staff, information and material resources (hardware, software, equipment and facilities), as well as students. What is not known is how Maseno University ensures quality during acquisition of resources such as academic and support staff, information and materials? The objective of the purchasing requirement of ISO 9001 is to ensure that these resources conform to the specified requirements. This is necessary because the university builds the acquired resources into its products. For example, only the students who meet entrance standards should be allowed to enroll. Defective purchased material, such as a faulty overhead projector or inappropriate software loaded on the network, may negatively affect the quality of the teaching, learning or research processes. Appropriate verification of a purchased product or an acquired resource must be planned, executed and reviewed. Another set of resources that has to be allocated before the actual delivery of programs and research includes the inspection/measuring equipment and methods.

This ISO 9001 requirement covers the methods and equipment used for measuring and testing of student knowledge/ abilities, methods applied to ensure that programs/ courses conform to the specified requirements, as well as the measuring and testing equipment used in research activities. However most institutions have generalized this part of Product Realization to an extent that they do not reflect the identified product. On control of customer-supplied product whose objective is to demonstrate the capability of the faculty (department) to identify, maintain, store, preserve and properly handle all material provided by students in the course of studies, and all products provided by external organizations with which the department has contracts for research projects.

The identification, verification and handling of student supplied material, such as exams, tests, assignments, reports, theses, software and books are covered. Examination, storage, maintenance, preservation, handling and proper usage of hardware and software provided by research sponsors, industry and governmental institutions and/or agencies should be documented by appropriate procedures and records yet educational organization and specifically in Kenya have not related these process as they take place in their institutions

On control of nonconformities, Karapetrovic et *al.*(1998) explains that the purpose of inspection is to confirm whether a product conforms or does not conform to specified requirements. While nonconforming products are students who do not meet course or program requirements, courses/programs that failed to achieve stated objectives, as well as research projects that did not meet specified contract requirements educational organizations in Kenya have not identified their nonconforming products.

In the corrective and preventive action a logical path after the occurrence of nonconforming products is to look for and eliminate the causes of these nonconformities, if feasible. Corrective and preventive actions taken at all stages of planning, design and delivery of programs, courses and research in the faculty (department) are included in this element. Existing and potential non-conformances are identified, for instance, by means of internal quality Audits, statistical techniques, tests or personal observations. If the product was not accurately identified then it follows that the correct nonconformity will not be established hence inappropriate corrective and

preventive actions. What is not known is the perception of academic staff that non-conforming products are identified during Product Realization.

Handling, storage, packaging, preservation and delivery. Where the product is identified as student, describing storage becomes a challenge. The material and equipment used in teaching, learning and research should be properly handled, stored and preserved in order to prevent damage or deterioration. Karapetrovic et *al.* (1998) has related the elements of the standard to an educational organization maintaining as much as possible the phases and their subheadings. Fig 2.3 Graphical presentation of activity performed in a production system. Figure 2.4 below shows a comparison of sequential order as described in the IWA 2 guidelines and the logical sequence proposed by (Karapetrovic, 1998). It is evident that whereas the process flows from item 7.1 to 7.6, proposals are there that it should flow in the order described below with the arrows crisscrossing indicating flow is not logical.

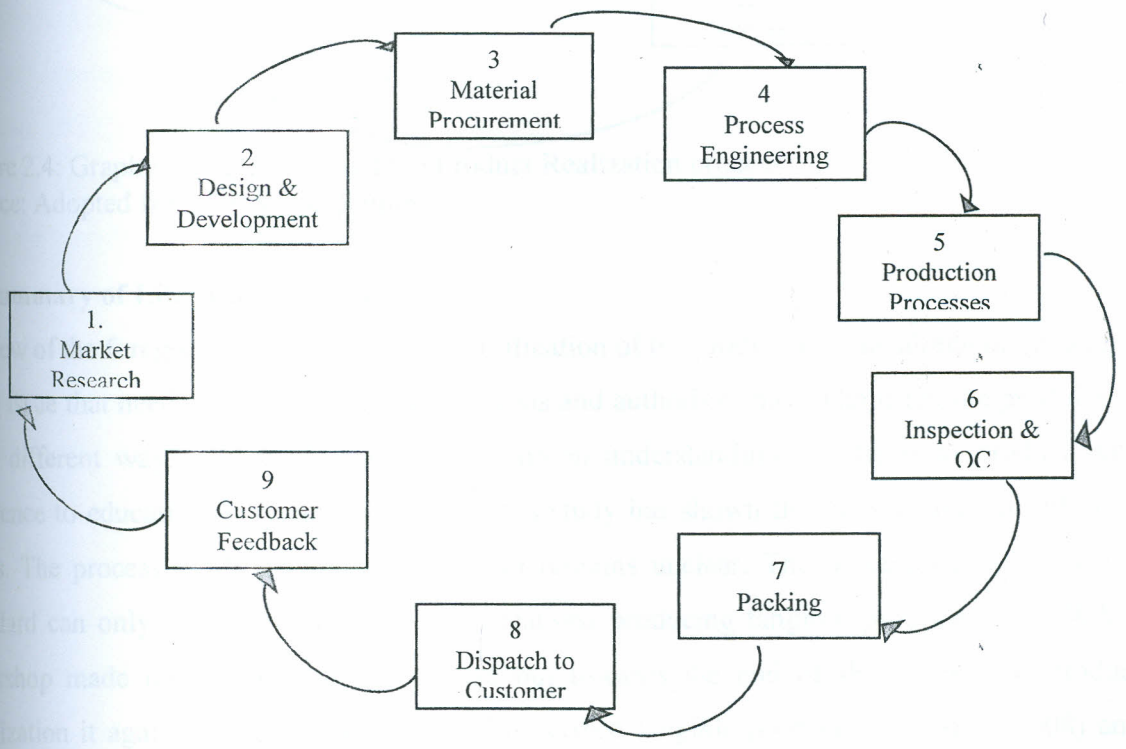


Figure 2.3: Graphical presentation of activity performed in a production system
Source: Adopted from (Jain, 2002)

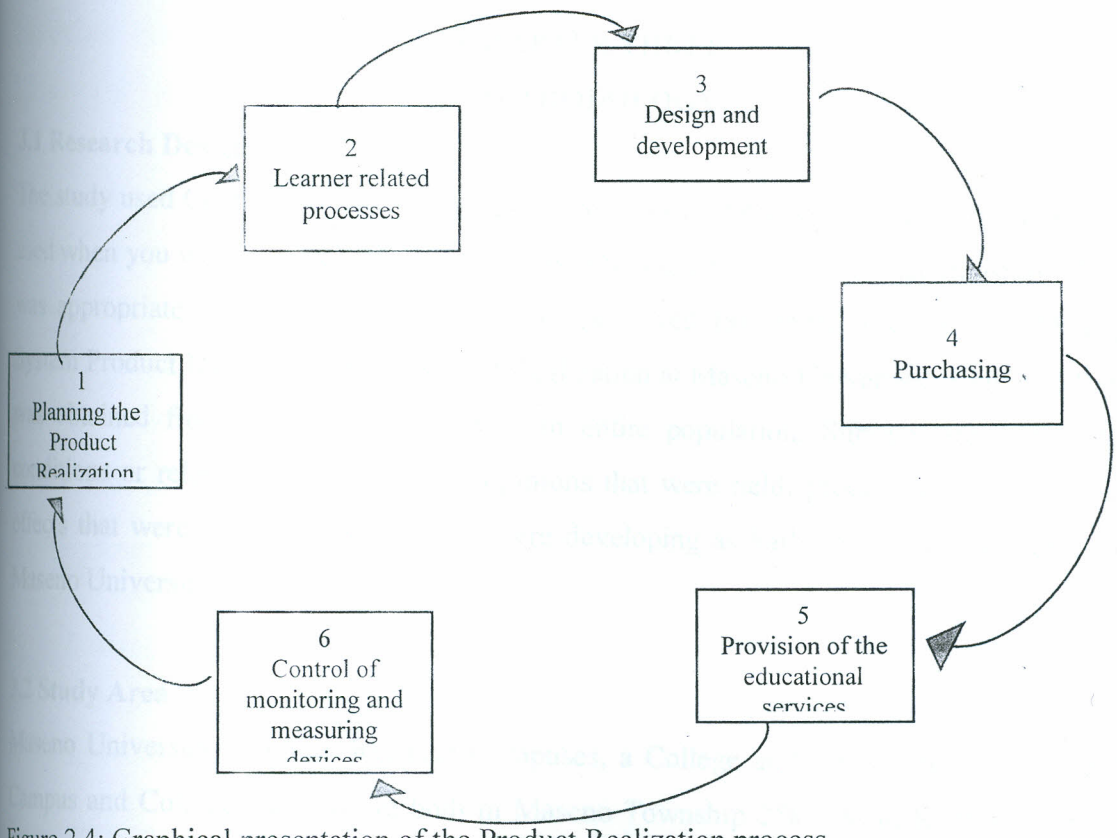


Figure 2.4: Graphical presentation of the Product Realization process
Source: Adopted from IWA2 guidelines

2.3Summary of Literature Review

In view of the foregoing it is evident that identification of the product in educational organization is an issue that needs to be addressed. Institutions and authorities have identified the products in very different ways. There is need for a common understanding for the term product with reference to educational organization which this study has shown that it is defined in different ways. The process of Product Realization still remains unclear. The process described in the standard can only effectively apply to organizations producing tangible products. The IWA 2 workshop made the standard simple to use but towards the end of the process of Product Realization it again became too general and described tangible products. Caraman (2008) and Karapetrovic (1988) provided interpretation on application of the standard that needs to be tried and tested. It is important that the study determines these interpretations and make it implementable at Maseno University. This justifies the need for further investigation and documentation of Product Realization in educational organizations as described in the QMS manual in Maseno University and its effect on Product Identification.

CHAPTER THREE
METHODOLOGY

3.1 Research Design

The study used Correlation case study design. Stanovich (2007) notes that a correlation study is used when you want to take a look at variables and see if they have any relationship. The design was appropriate in establishing the effect of perceived ISO 9001:2008 Quality Management System Product Identification on Product Realization at Maseno University, Kenya. Information was obtained from a sample rather than an entire population. Surveys are concerned with conditions or relationship that existed, opinions that were held, processes that were going on, effects that were evident or trends that were developing as harbored by the academic staff of Maseno University.

3.2 Study Area

Maseno University currently has four Campuses, a College and a Constituent College. Siriba Campus and College Campus are both in Maseno Township 25km from Kisumu on the Busia road and Homa Bay Campus. The core activities and central administration of the University takes place on these two Campuses. The third Campus, City Campus, is located in Kisumu City Campus College, a College of Maseno University. The University is also strategically placed within the Great Lakes Region. This is a region that has significant challenges and opportunities for socio-economic development. These challenges include endemic diseases and socio-political upheavals. On the other hand untapped minerals and a diversity of culture and language provide opportunities which can be exploited for socio-economic development. This study was carried out at Siriba and College campus. Maseno University is situated at the Equator with coordinates 0°00'49.19"N and 34° 35' 33.55"E. The coverage included all schools and institutions within Maseno University. Appendix V shows the location of the study.

3.3 Target Population

The target population was the entire set of units for which the survey data was used to make inferences. In this study the target population was 393 who mainly consisted of academic teaching staff; the human resource involved in Product Realization process. The academic teaching staff included; Tutorial Fellows, Assistant Lecturers, Lecturers, Senior Lecturers

(Associate Professors and Professors), QMS Management Representative (MR) and the Directors of Faculties and Chairpersons of Department.

3.4 Sampling Frame

For the purpose of this study, the list of academic staff that includes the Tutorial Fellows, Assistant Lecturers, Lecturers, and Senior Lecturers to be interviewed was be obtained from the respective department offices while Chairpersons and Directors were interviewed in their respective offices. . According to Mugenda and Mugenda(2003) on procedure for determining sample size,

$$n_1 = \frac{384}{1+\frac{N}{393}} \quad \text{.......} \quad (3.1)$$

n_1 = Desired sample size

384 = Sample for a large population for population less than 10,000 at 95% confidence level.

N = Target Population

$$n_1 = \frac{384}{1+\frac{384}{393}} = 194$$

From the above population of 393, a sample of 194 respondents was generated through stratified sampling.

Table 3.1: Target Population and Sample size

Section	Population No.	Percentage (%)	Sample Size
Tutorial Fellows	68	17.3	33
Assistant Lecturers	107	27.2	53
Lecturers	99	25.2	49
Senior Lecturers	33	8.4	16
Associate Professors	18	4.6	9
Professors	16	4.1	8
Chairpersons of Department			
• Assistant Lecturers	2		1
• Lecturers	14	8.4	7
• Senior Lecturers	6		3
• Associate Professors	5		2
• Professors	6		3
Deans of Schools			
• Senior Lecturers	6		3
• Associate Professors	8	4.8	4
• Professors	5		2
Total	**393**	**100**	**194**

Source: Maseno University (March 2014)

Maseno University has 27 Professors out of which 6 are chairpersons in departments and 5 are directors of faculties, the other 16 have no portfolio. The study used 9 respondents from Maseno University to pilot the data collection tools. The researcher distributed 240 questionnaires in different schools within Maseno University to obtain 100% response rate this is supported by (Altman & Bland, 2007) who avers that in spite of these recent research studies, a higher response rate is preferable because the missing data is not random. There is no satisfactory statistical solution to deal with missing data that may not be at random.

3.5 Data Collection Methods

Primary data was utilized for this study. A questionnaire (Appendix II) was used to collect data from the respondents. The research assistants administered the questionnaires to the respondents. Where necessary the questionnaire was left with the respondents and collected later by the research assistants after one week.

3.5.1 Data Sources

The study utilized both primary and secondary data which was collected during this research study and captured using questionnaires. Secondary data which include data originally used for a

different purpose provided insight into what people think and what they do, providing useful background and historical data on what has been with regards to implementation of ISO in educational organization. Secondary data was captured while reviewing the related empirical literature in the following, Google scholar, Eurostat, Emerald, OECD and BizEd time websites.

3.5.2 Data Collection Procedure

Two research assistants were engaged to collect data on behalf of the researcher. They were recruited from a pool of college students at Kisumu Polytechnic. The research assistants were trained on data collection and interpersonal relations. They discussed the questionnaires and were expected to give respondents the questionnaires to fill at their own time and commit to collect it after one week. The research assistants then collected the compiled questionnaires and present them to the researcher for analysis.

3.5.3 Data Collection Instrument

Questionnaires were used to collect data. It was divided in to three parts consisting of a mixture of closed and open questions covering the identification of product through the process of Product Realization and background details of the respondent and implementation of ISO 9001:2008 at Maseno University. The questionnaire items had been constructed using nominal and ordinal scale. The questionnaire used is included in the appendix 2.

3.5.4 Reliability Test

Reliability is the degree to which an assessment tool produces stable and consistent results. For this study, test-retest reliability was administered to members of academic staff of Kisumu Polytechnic. The same test was re-administered after one week (Phelan & Wren, 2005). The scores from time 1 and time 2 after one week were then correlated in order to evaluate the test for stability over time. The data collected was entered into SPSS where Cronbach's alpha was used to perform the reliability test for comparison reliability was acceptable then where alpha (α) was at 0.8 (Tavakol & Dennick, 2011). Tests of Questionnaire was done on 9 members of staff of Maseno University who were deducted from the list of respondents hence no possibility of contamination.

Another reliability test was performed on the data collection tool after data collection.

Table 3.2: Reliability Statistics after administration of questionnaires

Reliability Statistics		
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.745	.711	80

Source: Author 2014

Table 3.1 show that (α) alpha was at 0.745 after data had been and it confirmed reliability of the data collection tool.

3.5.5 Validity Tests

Validity refers to how well a test measures what it is purported to measure. The type of validity test employed is the construct validity which is used to ensure that the tool will actually measure what it is intended to measure (i.e. the construct), and not other variables. The researcher used a panel of "experts" (individuals with experience in educational organizations) to assess validity. The experts examined the items and decide on specific items to be measured (Phelan & Wren, 2005).

3.6 Data Analysis

Descriptive statistics was used to summarize the data. Descriptive studies are usually the best methods for collecting information that will demonstrate relationships and describe the world as it exists. Bickman and Rog (1998) suggest that descriptive studies can answer questions such as "what is" or "what was." Data analysis used SPSS to generate percentages, tabulations and mean as a measure of central tendency. Transformation of means was used to represent the set of Product Realization in terms of a common factor. In establishing academic staff perception of Product Identification in Maseno University the study used descriptive statistics of average, mean scores; in determining the most appropriate sequential flow of Product Realization process the study used percentages to determine the most preferred sequence. On analyzing Product Realization at Maseno University the study used correlation and regression analysis.

3.6.1 Model Specification

To reveal the effect of Product Identification on the Product Realization. The estimation procedure used by Nguyen et al., (2011) was adopted and modified as:

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \varepsilon \ldots (3.2)$$

Where

α = Unique factors in Product Realization
$\beta_1 \ldots \beta_7$ = are the loading for variable x on $x_1 \ldots x_7$
X_1 = Product Identification measured on a nominal scale
X_2 = Position. measured on a nominal scale
X_3 = School, measured on a nominal scale
X_4 = Gender a dummy variable
X_5 = Qualification, measured on a nominal scale
X_6 = Age measured on an metric scale
X_7 = Experience measured on an ordinal scale
ε = $\varepsilon \sim N(0, \sigma^2)$

y = a mean score of Product Realization measured on likert scale anchored between 1-5 where 1 = Strongly Disagree and 5 = Strongly Agree

3.7 Data Presentation

The study used Bar graphs and pie charts for categorical variables, correlation tables were used to depict the relationship between two quantitative variables.

CHAPTER FOUR
RESULTS AND DISCUSSIONS

4.1 Introduction

In this chapter data pertaining to effect of ISO 9001:2008 Quality Management System Product Identification on Product Realization at Maseno University, Kenya is analyzed and interpreted in form of demographic characteristics of the respondents, an analysis of the respondents' interpretation of a product, the respondents' perception of how Product Realization process takes place in Maseno University and a correlation and regression analysis of the variable as used in the study.

4.2 Demographic Factors Analysis

The section outlines findings on demographic characteristics of the respondents which include: respondents' Position, School and Gender, highest level of education, Age and experience.

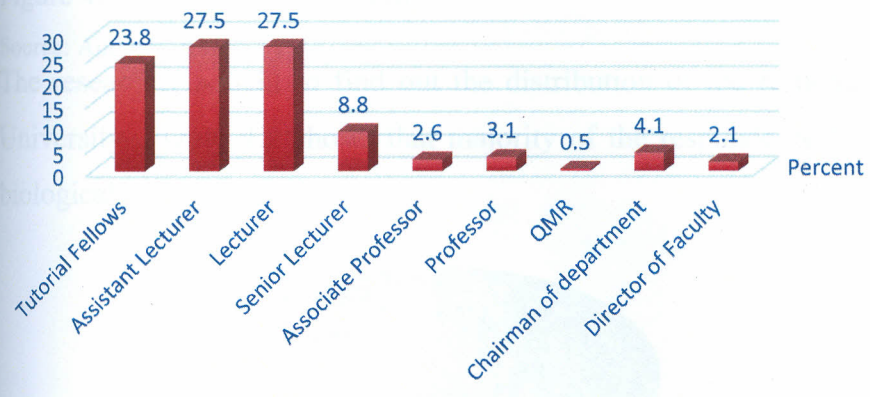


Figure 4.1: Position of the respondents in Maseno University

Source: Author (2014)

The researcher sought to find out the position of employment of the respondents. Figure 4.1 shows that majority 27.5% of the respondents in this study were assistant lecturers and lecturers.

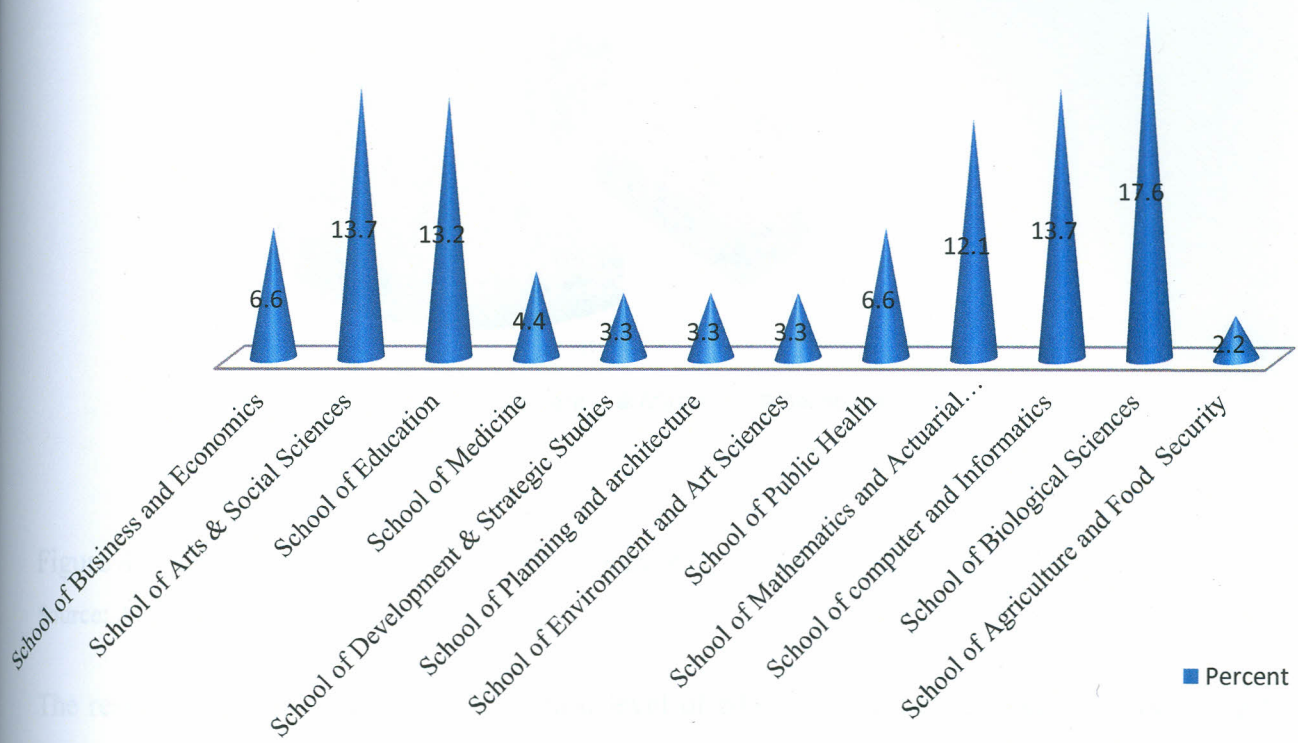


Figure 4.2: Respondents' School

Source: Author (2014)

The researcher sought to find out the distribution of the respondents by Schools and Maseno University. Figure 4.2 shows that majority of the respondents 17.6% were from the school of biological sciences.

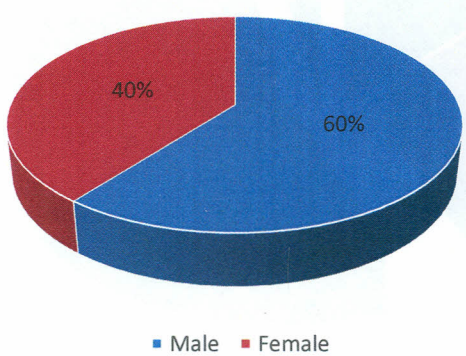


Figure 4.3: Gender of respondents

Source: Author (2014)

The research sought to find out the gender of the respondents. According to the findings, in Figure 4.3, majority 60% of the respondents were male, while 40% were female

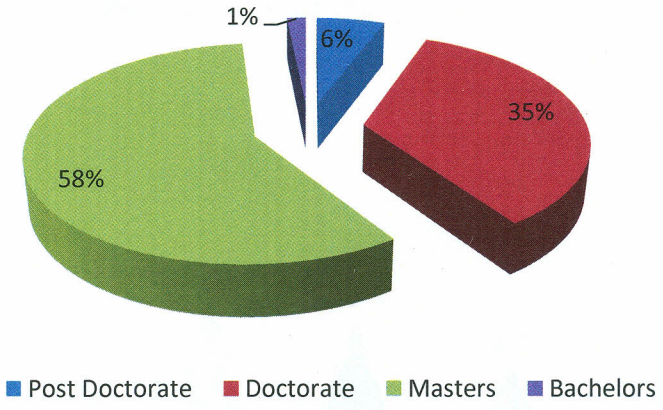


Figure 4.4: Respondents highest level of education

Source: Author (2014)

The research sought to find out the highest level of education of the respondents. According to the findings, Figure 4.4 above shows that majority 58% of the respondents were Master's holders with bachelor holders being the minority at 1%.

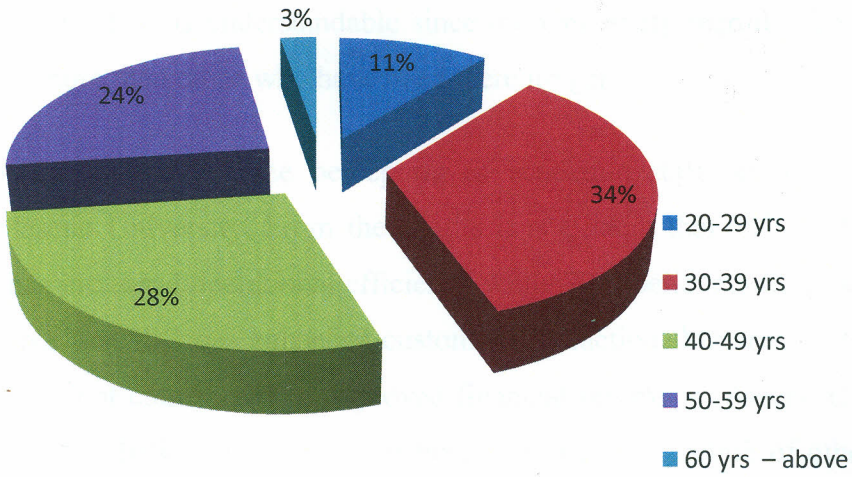


Figure 4.5: Distribution of respondents by age

Source: Author (2014)

The research sought to find out the age of the respondents. From the results Figure 4.5 above, it is evident that majority of the respondents 34% were aged between 30 and 39 years old. Respondents at 60 and above constituted 3%.

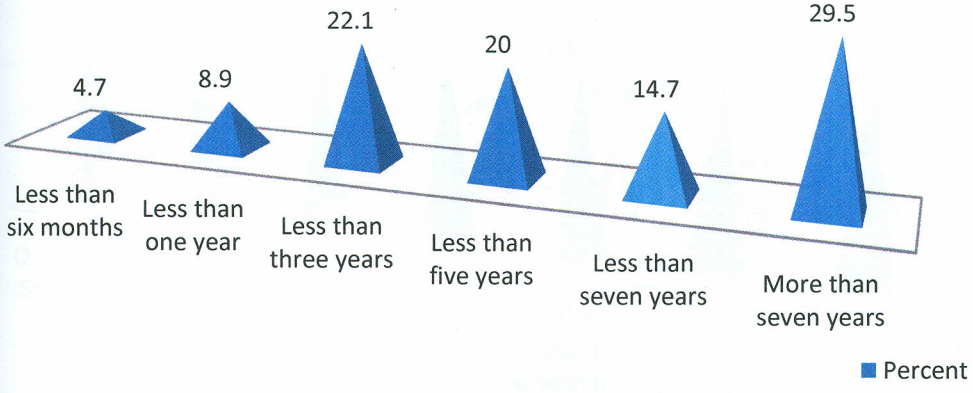


Figure 4.6: Distribution of respondents by experience

Source: Author (2014)

The research sought to find out the experience of the respondents. From the results figure 4.6 above it is evident that majority of the respondents 29.5% had worked in Maseno University for more than seven years. This is understandable since the University recruits new staff and their numbers cannot be more than those who have been there longer.

The research sought to find out the perception of academic staff on the benefits of ISO certification to Maseno University. From the results it is evident that 29% of the respondents believe that ISO has increased operational efficiency while 70% believe otherwise. 21.6% of the respondents believed that ISO has enhanced customer satisfaction. Majority of the respondents 86% believe ISO has not contributed to improved financial returns at Maseno University. Only 8.2% of the respondents believe ISO has contributed towards satisfaction of other stakeholders and sustainability. Majority of the respondents 38% believe ISO has contributed towards continual improvement while 28% believe that ISO certification has enable Maseno University to be recognized internationally. The study also determine availability of QMS documents in the point of use by academic staff and determined that 49% of respondents have quality manuals,

26% had the QMS compulsory procedures while 35% had the ISO 9001:2008 standard. Only 35% of the respondents had the teaching operational procedure.

4.3 Perception of Maseno University academic staff on Product Identification

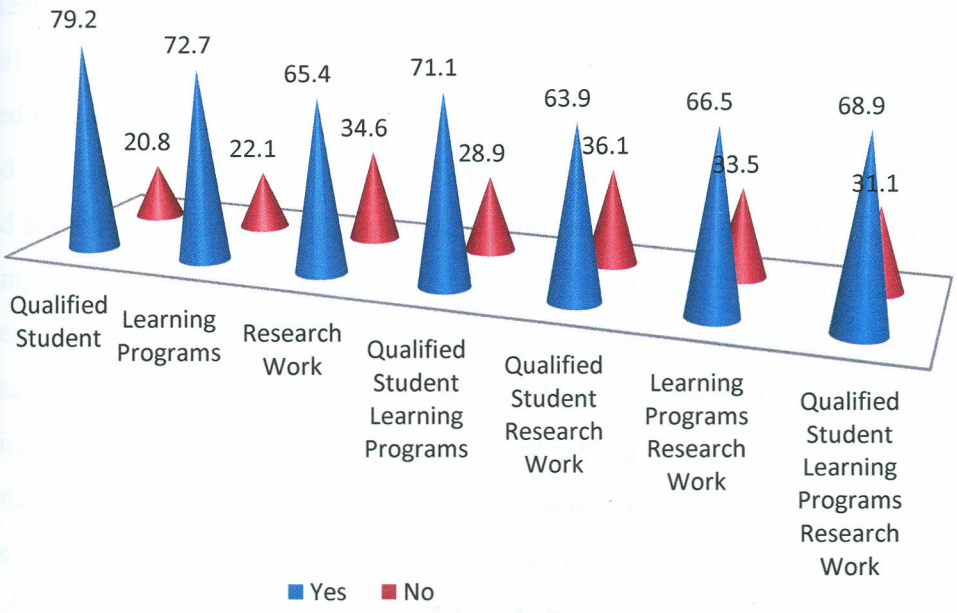


Figure 4.7: Perception of staff on Product Identification at Maseno University

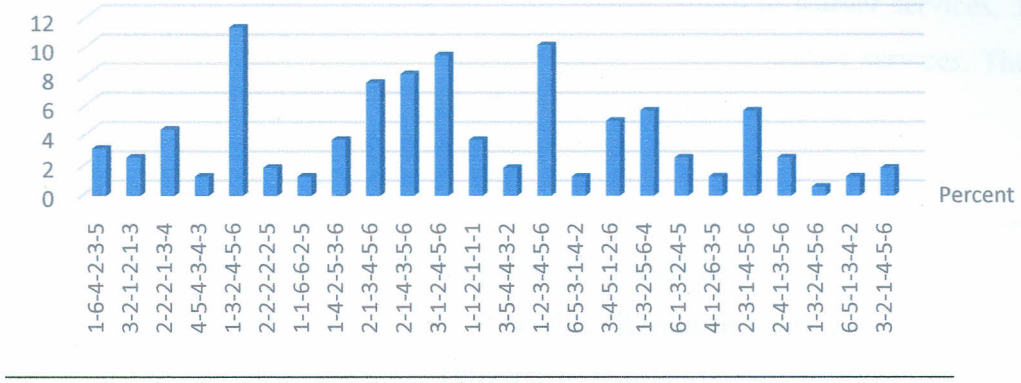
Source: Author (2014)

Figure 4.7 above sought to probe the perception of academic staff on what they identify as the product of Maseno University. The study determined that 79.2% of the respondents identified the product as qualified students, while 77.9% of the respondents identified the product as learning programmes and 65.4% identified research work. When two products were combined, 71.1% of the respondents indicated that it was a combination of qualified student and learning programmes, 63.9% aver that the product of Maseno University is qualified student and Research while 66.5% indicated that the product is learning programmes and research work. When all the products were combined 68.9% of the respondents affirm that the product of Maseno University is qualified student, learning programmes and research work. This findings are supported by (Stables 2006) who also found out that while probing the understanding of staff in a particular faculty, the Faculty of Natural Sciences, of quality and quality management system-related concepts, as well as how the staff would receive an ISO 9000-based QMS. The

results of this probe indicated that engagement with quality-related issues was probably low, since the understanding of quality management systems was generally poor. The establishment of any QMS would require effective and appropriate preparation in the faculty.

The research sought to find out the perception of staff on Product Identification at Maseno University. From the results in Figure 4.1 and 4.2 it is evident that 65.4% of the respondents identified the product as research work. 63.9% of the respondents identified the product as both qualified student and Research work, 71.1% of the respondents identified the product as qualified student and learning programmes, and 66.5% of the respondents identified the product as learning programmes and research work while 68.9% of the respondents identified the product of Maseno University as Qualified Student, learning programmes and research work. The interpretation of this finding shows that even at Maseno University there is no uniformity in identifying the product. If they were in agreement with qualified student as documented in the quality manual then majority of the respondent would have identified it as the product. This confirms (Carman et al., 2008). Assertion that for the application of ISO 9000 in education is difficult because of problems with interpretation in identifying its product and Berghe (1996) who explicitly states that a critical point in the interpretation for education and training is the definition of the "product". The finding shows that the University has been producing products that have not been accurately documented. The new knowledge emerging from this findings is that even research is a product of an educational organization.

4.4 Sequence of Product Realization Process



1. Planning for the Product Realization stages
2. Determining the Customer/Learner related services
3. Design and Development
4. Purchasing of materials needed for Product Realization
5. Production and service provision
6. Control of monitoring and measuring devices

Figure 4.8: Respondents perception of the Product Realization Process
Source: Author (2014)

The research sought to find out the respondents perception of the Product Realization Process. From Figure 4.8 above, it is evident that most of the respondent were not able to state a common (uniform) process. The patterns were so diverse. It gives an impression that there is no common approach to Product Realization process in educational organization. While the standard adopts the pattern 1-2-3-4-5-6, 10.3% of the respondents perceive this to be the correct process for Product Realization while 11.5% respondents in this study preferred the pattern 1-3-2-4-5-6. This confirms assertions by Karapetrovic et al.(1998) who states indicates that the version of the ISO 9001 standard approved in 1994 consists of twenty requirements, each representing one element of the quality system. Nevertheless, interrelationships of the twenty elements of ISO 9001 are not clear, and the elements do not seem to follow a logical order. The order as described in the standard first requires that the University plans for Product Realization Process, 63.18% of academic staff believe Maseno University Plans for Product Realization. Nearly all the respondents started by indicating that it was the first activity is the production sequence.

The standard identifies customer related services as activity number 2 and results from Table 4.3 shows that an average percentage 64.4% of the academic staff of Maseno University perceives

that the university has a mechanism to gather information related to learner services. The only problem now is to agree on when to gather information related to learner services. There were respondents who felt it should be done before the planning phase.

The third phase is carrying out design and development process where they verify that instruction materials match instruction requirement, conducting design for learner's needs assessment to lesson, assessment and release of results. Results in Table 4.2 shows 57.7% of the academic staff perceive that Maseno University translate customers' specifications into appropriate design of programs/courses offered. Even though the majority of the respondents indicated that the University translates customers' specification they could not collectively place it a sequence of its place in the Product Realization Process.

The fourth phase is purchases for Product Realization in this case the respondents were to confirm that the academic staff are involved in the processes of purchasing by providing information which describes appropriately the educational services to be purchased and establish an effective communication with suppliers. Ensuring effective purchasing process by the academic staff appraisal of purchased educational products or services ensures they meet specified purchasing requirements. the results in From Table 4.3 minority, 41.53% of Maseno University academic staff agree that the university correctly undertake the process of Purchasing necessary resources, including academic and support staff, information and material resources (hardware, software, equipment and facilities), as well as students. But then majority 68.5% of the academic staff believes otherwise. This may be attributed to the fact that academic staff aver that they are not fully involve in purchases that would lead to Realization of the Product.

The fifth phase involves service provision. Distinguishing this phase and the third phase is not easy and this is why (Karapetrovic, 2001) refers to it as interpretation problems. This is where service provision takes place in Maseno University under controlled conditions. Results in Table 4.6 show respondents preferences under different controlled conditions ranging from designing courses and quality plans to monitoring, measuring and control of critical quality characteristics and teaching process parameters student course evaluation. This are activities that the academic staff have continuously done but to the respondents the achievements on this area were not

related to embracing ISO. Table 4.7 presents finding on how Maseno University treats Nonconforming products. The researcher defined the term Nonconforming products to the respondent thus making it easy for them to respond to the questionnaire. The findings show that 59.8% of the respondents indicated that students who constitute Non-performing products attend additional training and are subsequently reassessed, 69.4% continue in the educational programme in accordance to defined procedure while 65.9% are transferred to another study programme. Maseno University has identified Customer property in an educational organization are documents given by students (certificates, diplomas of previous scholar levels, personal ID documents), applications and records students' academic history. 72.8% of the respondents aver that Maseno University identifies, verifies, protects and safeguards customer property.

4.5 Analysis of Product Realization Process

4.5.1 Planning for Product Realization Process

Table 4.1: Planning for Product Realization Process

Response	N	SA	AS	NU	DS	SD	Mean	Stand Deviation
Maseno University plans for design and development of teaching methods	191	62 (32.5)	73 (38.2)	29 (15.2)	14 (7.3)	13 (6.8)	3.82	1.165
Maseno University plans for Design, developing, reviewing and updating study plans and curricula	189	60 (31.7)	63 (33.3)	40 (21.3)	15 (7.9)	11 (5.8)	3.77	1.151
Maseno University plans for Learning assessment and follow-up, support services activities, resource allocation, evaluation criteria, and improvement procedures	191	51 (26.7)	59 (30.9)	44 (23)	21 (11)	16 (8.4)	3.57	1.229
Maseno University plans for controls (needs assessment, instructional design, development and delivery, and outcome measurement)	191	37 (19.4)	71 (37.2)	46 (24)	24 (12.6)	13 (6.8)	3.50	1.142
Maseno University plans for Monitoring of educational programmes	191	47 (24.6)	79 (41.4)	34 (17.8)	14 (7.3)	17 (8.9)	3.65	1.186
Average	190	51 (27)	69 (36.2)	38 (20.3)	17 (9.2)	13.99 (7.3)	3.662	1.1746

Strongly Agree, AS: Agree Somehow, NU: Neutral, DS: Disagree Somehow, SD: Strongly Disagree, N: Total Number
ce: Author (2014)

The research sought to find out the perception of the academic staff if Maseno University plans for Product Realization process. From the results in Table 4.1 it is evident that academic staff believe Maseno University plans for Product Realization since the average percentage for those who agree is 26.98% and 36.2% which is 63.18% which is greater than 50%.

4.5.2: Carrying out customer related process

Table 4.2: Carrying out customer related process

	N	SA	AS	NU	DS	SD	Mean	Stand Deviation
Behavior needed to meet academic, professional and societal expectations	190	39 (20.5)	90 (47.4)	40 (21)	10 (5.3)	11 (5.8)	3.72	1.035
Compliance with legal, regulatory and accreditation requirements related to the programme	190	47 (24.7)	74 (38.9)	39 (20.7)	17 (8.9)	13 (6.8)	3.66	1.147
Ability to meet the defined requirements of educational programmes	189	66 (34.9)	60 (31.7)	41 (21.7)	16 (8.5)	6 (3.2)	3.87	1.086
Effectiveness of communication to learners including addressing learner complaint	190	55 (28.9)	58 (30.5)	36 (19.1)	24 (12.6)	17 (8.8)	3.58	1.273
Average	189.7	51 (27.3)	70 (37.1)	39 (20.6)	16 (8.8)	11 (6.15)	3.707	1.135

Strongly Agree, AS: Agree Somehow, NU: Neutral, DS: Disagree Somehow, SD: Strongly Disagree, N: Total Number
ce: Author (2014)

The research sought to find out the perception of the academic staff if Maseno University carries out needs assessment befor embarking on the Product Realization process. From the results in Table 4.2, the average percentage 64.4% of the academic staff of Maseno University perceives that the university has a mechanism to gather information related to learner services.

4.5.3 Design and Development process

Table 4.3: Carrying out design and development process

	Response	N	SA	AS	NU	DS	SD	Mean	Standard Deviation
i)	Maseno University prepares procedures which ensures that appropriate instruction materials match instruction requirements	191	40 (20.9)	76 (39.8)	38 (19.9)	20 (10.5)	17 (8.9)	3.53	1.191
ii)	Maseno University conducted a needs assessments that include learner achievement and system effectiveness to determine potential or actual performance requirements	191	40 (20.9)	60 (31.4)	58 (30.5)	19 (9.9)	14 (7.3)	3.49	1.146
iii)	Maseno University identify the inputs to the design of curricula	191	50 (26.2)	76 (39.8)	40 (20.9)	15 (7.9)	10 (5.2)	3.74	1.093
iv)	Maseno University has identified design and development outputs which include skills and knowledge to be acquired, instruction strategies, and assessment of performance, among others	189	55 (29.1)	67 (35.4)	44 (23.4)	15 (7.9)	8 (4.2)	3.97	2.16
v)	Maseno University Staff are involved and in each identified stage they review the design and development results versus the corresponding requirements	189	33 (17.5)	77 (40.7)	31 (16.4)	23 (12.2)	25 (13.2)	3.37	1.276
vi)	Maseno University does design performed in one or several stages according to the design and development plan.	191	36 (18.8)	71 (37.2)	47 (24.6)	25 (13.1)	12 (6.3)	3.49	1.128
vii)	Maseno University does validation generally, on the final design stages. Among others, piloting and certification are accepted validation methods.	191	35 (18.3)	62 (32.5)	55 (28.8)	29 (15.2)	10 (5.2)	3.43	1.112
viii)	Maseno University has identified, documented, authorized and communicated changes in the education environment.	191	55 (28.8)	46 (24.1)	50 (26.1)	25 (13.1)	15 (7.9)	3.53	1.252
	Average	190.5	43 (22.6)	66.9 (35.1)	45 (23.8)	21 (11.2)	14 (7.3)	3.57	1.295

SA: Strongly Agree, AS: Agree Somehow, NU: Neutral, DS: Disagree Somehow, SD: Strongly Disagree, N: Total Number
Source: Author (2014)

The results in Table 4.3 shows 57.7% of the academic staff perceive that Maseno University translate customers' specifications into appropriate design of programs/courses offered.

4.3.4 Purchases for Product Realization

Table 4.4: Carrying out Purchases for Product Realization Process

	Response	N	SA	AS	NU	DS	SD	Mean	Standard Deviation
i)	Maseno University ensures effective purchasing process by the academic staff providing timely, effective and accurate identification of needs and purchase of educational services to specifications.	191	13 (6.8)	57 (29.8)	26 (13.6)	37 (19.4)	58 (30.4)	2.63	1.362
ii)	Maseno University ensures effective purchasing process by the academic staff providing purchasing information which describes appropriately the educational services to be purchased and establish an effective communication with suppliers.	190	20 (10.5)	60 (31.6)	34 (17.9)	34 (17.9)	42 (22.1)	2.91	1.342
iii)	Maseno University ensures effective purchasing process by the academic staff appraisal of purchased educational products or services ensures they meet specified purchasing requirements.	189	16 (8.5)	65 (34.4)	32 (16.8)	43 (22.8)	33 (17.5)	2.94	1.27
iv)	Maseno University ensures effective purchasing process by the staff who keep records of supplier assessments and of actions taken in this regard	191	25 (13.1)	60 (31.4)	22 (11.5)	45 (23.6)	39 (20.4)	2.93	1.377
	Average	190.25	19 (9.7)	60 (31.8)	28 (15.0)	40 (20.9)	43 (22.6)	2.9	1.3

SA: Strongly Agree, AS: Agree Somehow, NU: Neutral, DS: Disagree Somehow, SD: Strongly Disagree, N: Total Number
Source: Author (2014)

The research sought to find out the perception of the academic staff on whether Maseno University does purchases for Product Realization process. The results in Table 4.4 shows 41.53% of Maseno University academic staff agree that the university correctly undertake the process of Purchasing necessary resources, including academic and support staff, information and material resources (hardware, software, equipment and facilities), as well as students. But then 68.5% of the academic staff believes otherwise.

4.5.5 Production and Service Provision

Table 4.5: Production and service provision

	Response	N	Yes	No	Mean	Standard Deviation
i)	Review of course design and quality plans	183	160 (87.4)	23 (12.6)	1.13	0.332
ii)	Assessing the need and selection for course/program prerequisites	183	146 (79.8)	37 (20.2)	1.2	0.403
iii)	Identification of critical quality characteristics for the course	178	131 (73.6)	47 (26.4)	1.26	0.442
iv)	Identification of teaching process parameters to be monitored and controlled	180	138 (76.7)	42 (23.3)	1.23	0.424
v)	Planning the methods for monitoring and control of critical quality characteristics and suitable process parameters	177	112 (63.3)	65 (36.7)	1.37	0.483
vi)	Identification of adequate teaching equipment	187	114 (61)	73 (39)	1.39	0.489
vii)	Ensuring proper maintenance of teaching equipment	182	85 (46.7)	97 (53.3)	1.53	0.5
viii)	Identification of proper teaching and learning environment	173	92 (53.2)	81 (46.8)	1.47	0.5
ix)	Review of equipment, facilities and services admissibility for the course	180	106 (58.9)	74 (41.1)	1.41	0.493
x)	Incoming inspection of student's prerequisites	184	114 (62)	70 (38)	1.38	0.487
xi)	Assessment of student's admissibility to a course	183	149 (81.4)	34 (18.6)	1.19	0.39
xii)	Assessment of topics and matter taught in course prerequisites course delivery	181	130 (71.8)	51 (28.2)	1.28	0.451
xiii)	Monitoring, measuring and control of critical quality characteristics and teaching process parameters student course evaluation	185	138 (74.6)	47 (25.4)	1.25	0.437
xiv)	Planning, implementing and reviewing preventive and corrective actions	182	122 (67)	60 (33)	1.33	0.471
xv)	Assessment and review of critical quality characteristics, suitable process parameters, equipment, environment, facilities and services	184	108 (58.7)	76 (41.3)	1.41	0.494
	Average	181	123 (67.7)	59 (32.3)	1.32	0.45

Source: Author (2014)

The research sought to find out the perception of the academic staff if Maseno University delivers on core mandate (Production and Service provision) for Product Realization process. The results in Table 4.5 shows that an average of 63.3% of the respondents believe that Maseno University has developed the teaching process control that determines how production and service provision of teaching at carried out.

4.5.6 Control and monitoring

Table 4.6: Control and monitoring

	Response	N	Yes	No	Mean	Standard Deviation
i)	Maseno University has demonstrated the ability of the Product Realization processes to achieve planned results?	183	117 (63.9)	66 (36.1)	1.36	0.48
ii)	**Nonconforming products**					
	Nonconforming products are students who do not meet course or programme requirements; Maseno University addresses nonconformity involving student participation in the educational process by permitting them through exams, tests or assignments to:-					
	• Attend additional training and be reassessed	112	67 (59.8)	45 (40.2)	1.4	0.49
	• Continue in the educational programme in accordance to defined procedure	186	129 (69.4)	57 (30.6)	1.31	0.46
	• Transferred to another study programme	185	122 (65.9)	63 (34.1)	1.34	0.48
iii)	**Customer property**					
	Customer property in an educational organization are documents given by students (certificates, diplomas of previous scholar levels, personal ID documents), applications and records students' academic history. Maseno University identifies, verifies, protects and safeguards customer property	180	131 (72.8)	49 (27.2)	1.27	0.45
	Average Percentage	169.2	113 (66.36)	56 (33.6)	1.336	0.47

Source: Author (2014)

The research sought to find out the perception of the academic staff if Maseno University does controls and monitoring for Product Realization process. From the results in the Table 4.6 shows that 63.9% of the respondents perceive that Maseno University has demonstrated the ability of the Product Realization processes to achieve planned results. On Nonconforming products while 59.8% of the respondents per perceive that Maseno University addresses nonconformity involving student participation in the educational process by permitting them through exams, tests or assignments to. On customer property, 72.8% perceive that Maseno University identifies, verifies, protects and safeguards customer property.

4.5.7 Correlations of Product Realization and Product Identification

Table 4.7: Correlations of Product Realization and Product Identification

Correlations									
Product Realization	Pearson Correlation	1							
	Sig. (2-tailed)								
	N	194							
Product Identification	Pearson Correlation	-.101	1						
	Sig. (2-tailed)	.166							
	N	189	189						
What is Your Position in Maseno University	Pearson Correlation	-.066	-.013	1					
	Sig. (2-tailed)	.363	.859						
	N	193	188	193					
Which is your School	Pearson Correlation	.171*	.023	.052	1				
	Sig. (2-tailed)	.021	.758	.486					
	N	182	177	181	182				
What is your gender	Pearson Correlation	.006	-.051	-.219**	-.293**	1			
	Sig. (2-tailed)	.930	.488	.003	.000				
	N	190	185	189	178	190			
What is your highest level of Education	Pearson Correlation	.223**	-.070	-.612**	-.063	.276**	1		
	Sig. (2-tailed)	.002	.346	.000	.400	.000			
	N	190	185	189	178	186	190		
Indicate your age	Pearson Correlation	-.051	.088	.613**	.069	-.219**	-.486**	1	
	Sig. (2-tailed)	.479	.230	.000	.353	.003	.000		
	N	192	187	191	182	188	188	192	
How long have you worked at Maseno University	Pearson Correlation	-.136	-.040	.448**	.236**	-.139	-.386**	.462**	1
	Sig. (2-tailed)	.062	.584	.000	.001	.058	.000	.000	
	N	190	185	189	178	186	186	188	190

*. Correlation is significant at the 0.05 level (2-tailed).
**. Correlation is significant at the 0.01 level (2-tailed).
Source: Author (2014)

In Table 4.7, the researcher sought to determine the correlation between the variables in an attempt to answer the questions; how strongly is the association between the independent variables or dependent variables. According to the guide by (Evans, 1996) as quoted by (Neill, 2014) suggests for absolute value of r; 0.00 – 0.19 is very weak; 0.20 – 0.39 is weak; 0.40 – 0.59 is moderate; 0.60 – 0.79 is strong and 0.8 – 1.0 is very strong. The Product Realization process had a weak negative correlation with Product Identification. This may be attributed to academic staff not being able to strongly link ISO to their Product Realization process. This is also an indicator that before embracing ISO, sensitization for all members of the academic staff was not effectively done. Position of respondents also had a negative correlation with Product Realization. This is based on attitude. If some members of the academic staff were able attain their position during the period that ISO had not been embraced either had very high

expectations that with ISO things will be different. The school had a very weak positive correlation with Product Realization. The reasons explaining Position of Respondents cuts across all the other demographic variables.

4.5.9 Regression analysis of Product Realization Process

Table 4.8: Model Summary showing Product Realization process explained by predictor variables

Product Identification (β_1 = -.838, ρ = .021) is significant and its coefficient is negative indicating that what staff perception in Product Identification contributes less to the process of

	R	Adjusted R^2	Unstandardized Coefficients		Standardized Coefficients		
	.415[a]	.135					
			β	Std. Error	Beta	t	Sig.
(Constant)			74.340	9.374		7.931	.000
Product Identification			-.838	.360	-.174	-2.331	.021*
What is Your Position in Maseno University			.228	.839	.029	.271	.787
Which is your School			.840	.299	.218	2.811	.006*
What is your gender			.090	2.230	.003	.040	.968
What is your highest level of Education			7.665	2.150	.353	3.565	.000**
Indicate your age			2.090	1.339	.155	1.561	.121
How long have you worked at Maseno University			-.465	.825	-.050	-.564	.573

a. Dependent Variable: Product Realization, *$\rho < 0.05$, ** $\rho < 0.001$

Source: Author (2014)

Product Realization. The respondents School (β_3 = .840, ρ = .006) and respondent's highest level of Education (β_5 = 7.665, ρ = .000) were significant and had positive coefficients indicating that the respondents school and education levels contributes positively towards Product Realization. Respondents Position in Maseno University (β_2 = .228, ρ = 0.787), gender (β_4 = .090, ρ = 0.968), age (β_6 = 2.090, ρ = .121) and how long respondent has worked at Maseno University (β_7 = -.465, ρ = .573) were not significant predictors in the model. The coefficient of determination is 0.415; therefore about 41.5% of the variation in the Product Realization process is explained by the independent variables. The regression equation appears not to be very useful for making prediction since the value is not close to 1. In this case 58.5% of the variation is caused by something else. When read with the Figure 4.8 it is clear that there was no unison in Product Identification which ISO assume should be obvious. The process of Product Realization shown in Figure 4.8 should not the 24 different patterns displayed. This explain the reason why the error term is as big as 86.5% in the model.

CHAPTER FIVE

SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This section summarizes and describes the findings of the study, conclusion and provides policy recommendations to address the concerns of the study based on the objectives. Research limitations and suggested areas for further studies were identified are also discussed in this chapter.

5.2 Summary of Findings

The study was geared towards assessing the effect of ISO 9001:2008 quality management system Product Identification on Product Realization at Maseno University, Kenya. One of the objectives of the study was to establish academic staff perception of Product Identification in Maseno University. The researcher determined that the perception of academic staff of Maseno University on the product is qualified student, learning programmes and research work. The second objective was to determine the most appropriate sequential flow of Product Realization process. The study also determined that the academic staff of Maseno University interpreted the Product Realization sequence in 24 different ways, with the pattern 1-3-2-4-5-6 being preferred by 11.5% of the respondents and the documented pattern of 1-2-3-4-5-6 being preferred to by 10.3% of the respondents. These percentages are very low. The third objective on analysis of Product Realization was done by correlation in which the Product Realization process had a weak negative correlation with Product Identification. This may be attributed to academic staff not being able to strongly link ISO to their Product Realization process. Adjusted R^2 which is the corrected or adjusted value of R necessary to enable a linear reporting showed that 0.135 or 13.5% of Product Realization process (dependent variable) can be explained or determined by the predictor variables in the model.

5.3 Conclusions

Based on the response of the academic staff of Maseno University, the main conclusion that can be drawn from the analysis discussed in chapter 4 is that even though the study was conducted on what was assumed to be a fairly homogenous population of likeminded persons, namely academic staff of Maseno University, the perceptions and understandings of individuals varied

greatly. This implied that mechanisms would have to be put in place to ensure consistency of approach and implementation. The study concludes that a combination of qualified student, learning programmes and research are Products produced by Maseno University.

Production of the different products perceived by academic staff are described in 24 different ways which have not been document in the manual as Product Realization process. Slightly less than a third of the respondents describe the flow as 1-3-2-4-5-6. This sequential flow is different from what is documented in QMS documents.

The relationship between Product Identification and Product Realization is inverse in nature fairly strong.

5.4 Recommendations

The study recommends that quality management system documents be revised to reflect the Product of Maseno University. Maseno University should endeavor to have staff conduct the Product Realization process as documented in the standard and its quality management systems documents. The University should carryout sensitization of staff on the quality management system documents. This may help in matching Product Identification with Product Realization processes. Further studies should be carried in other service organizations.

5.5 Limitations of the study

First, a major limitation of this study was the timing. Data collection was done at a time when Examinations were on and this made it difficult to get all the respondents as stratified. The second limitation was the impression that ISO issues are managed by staff at the administration. At the end of the exercise more academic staff were able to appreciate that they too are part of ISO implementation. The third limitation is that there are limited local previous studies on the same research problem. Most studies that were close were looking more at the general problems on effect of ISO implementation on public service. The researcher therefore did not review as much of local studies as desired.

5.6 Suggestions for Further Studies

A similar study should be carried out covering all universities in Kenya. The findings have opened possibility for further research in the arena of ISO implementation in educational

organization and future studies can expand the sample to cover more universities and their constituent colleges and campuses in Kenya. In addition it will be interesting to compare factors affecting Product Realization at the education organization that have not been captured in this study. Future study will have to confirm the findings aforementioned. This study was quantitative in nature further research need to be done using qualitative methods to explain the effect of Product Identification on Product Realization Process.

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